ANGULAR ANISOTROPY OF CORRELATED NEUTRONS IN LAB FRAME

OF REFERENCE AND APPLICATION TO DETECTION AND VERIFICATION

A Thesis

by

LAURA CYNTHIA HOLEWA

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

May 2012

Major Subject: Nuclear Engineering

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Approved by:

Chair of Committee,	William Charlton
Committee Members,	John Poston
	Tracy Hammond
Head of Department,	Yassin Hassan

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ABSTRACT

Angular Anisotropy of Correlated Neutrons in Lab Frame of Reference and Application

to Detection and Verification. (May 2012)

Laura Cynthia Holewa, B.S., Rensselaer Polytechnic Institute

Chair of Advisory Committee: Dr. William Charlton

It has been shown that neutrons emitted from the same ^{252}Cf fission event are preferentially detected within small angles of each other and at angles around 180°. The distribution of this angular anisotropy is dependent upon the nuclide emitting the neutrons. Coincident neutrons can be detected from a shielded source, so a study of the angular anisotropy between coincident neutrons is useful for this context. This could allow for the dynamic determination of the ratio of the rate of (α,n) neutron production to the spontaneous fission neutron production (designated α) used in neutron coincidence counting for safeguards. This could also be used to identify neutron emitting isotopes in a homeland security application.

An angular frequency distribution for coincident neutrons was produced via experiments using an array of cylindrical liquid scintillators and a ^{252}Cf source. It was found, in accordance with previous experiments, that the angular frequency distribution peaks at small angles and at angles around 180º. A Monte Carlo, physics-based simulation program was created to simulate the distribution of angles between neutrons from the same fission event from ^{252}Cf and ^{240}Pu sources. The resulting distributions were clearly distinguishable from each other. The code was benchmarked to measured results from a ^{252}Cf source at Lawrence Livermore National Laboratory. Knowledge of the unique angular distributions of coincident neutrons from various fissioning sources is useful for identification and verification purposes. Another practical application of angular anisotropy information for coincident neutrons from a given source is determining the ratio of the (α,n) to spontaneous fission rates for a source undergoing neutron coincidence counting. The utility of this was verified by using measurements made by faculty and students of the University of Michigan Nuclear Engineering Department for a MOX fuel pin at the Joint Research Center in Ispra, Italy. Good agreement between the predicted and declared values for α was found.

ACKNOWLEDGEMENTS

I would like to express my sincere appreciation to my advisory committee: Dr. William Charlton, Dr. John Poston, and Dr. Tracy Hammond. Dr. Charlton, thank you for your initial decision to make me a part of your non-proliferation team. Also, thanks for sticking with me throughout the long and bumpy road to my M.S. degree. Dr. Poston, thank you for your helpful and detailed review of everything I have ever asked you to look over. Dr. Hammond, thank you for your insightful advice about graduate school and about how to get through it.

I am very grateful to the Department of Homeland security for the financial support that made this research possible and wish to thank them. I would also like to graciously thank Ron Wurtz for his review of part of the data analysis included in this thesis. Thanks also goes to Les Nakae for suggesting that the question of whether an angular anisotropy of correlated neutrons in the lab frame was detectable be answered. I sincerely appreciate Stephen Sheets and Andrew Glenn for their assistance in preparing and sending the data that was used. The Advanced Detector Group at Lawrence Livermore National Laboratory provided invaluable assistance to me. Additionally, I greatly appreciate Eric Miller and Sara Pozzi of the University of Michigan for sending me data that was used in my research.

Lastly, I would like to acknowledge myself. There have been so many people in my life that have wanted me to not succeed. I have been the only person that I could always depend on. I'm lucky that I'm an innately stubborn person, so stubborn that I never stopped believing that I could come this far. And I still believe that I will go much, much further.

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CHAPTER I

INTRODUCTION

MOTIVATION AND OBJECTIVES

Power can decidedly be used for good or evil. Nuclear power is no exception. A nuclear reactor can supply millions of people with the clean energy that they need to live in a world full of the modern amenities that they demand. However, most nuclear weapons use plutonium that was made in a nuclear reactor. Furthermore, most nuclear reactors necessitate the enrichment of uranium, which in turn requires the existence of uranium enrichment facilities. Enrichment facilities can be misused to enrich uranium beyond what is needed for use in commercial nuclear reactors. Highly-enriched uranium can be used to make nuclear weapons. [1] Obviously the countries of the world are not going to just turn off their nuclear reactors, and they should not. However, the potential for devastating consequences following the misuse of nuclear reactors and associated enrichment facilities does underscore the importance of technology that ensure the responsible application of nuclear energy.

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This thesis follows the style of *Nuclear Science and Engineering*.

Plutonium and uranium both undergo spontaneous fission. When a nuclide undergoes fission (either spontaneous or induced), multiple neutrons are emitted virtually simultaneously from the fragments and thus are correlated in time. When neutrons are detected within a time frame that has been determined such that the neutrons are likely to be from the same fission event, they are called coincident neutrons. If two neutrons are detected within a certain time frame, we call that a "doubles count". If only one neutron is counted, we call that a "singles count". An important passive nondestructive assay technique that can be used for quantitative and qualitative analysis of nuclear material in a safeguards context is neutron coincidence counting. This includes the accurate determination of Pu mass via passive nondestructive assay. [2] Since the specific coincident neutron characteristics are determined by the fissioning nuclide that is under consideration, identification of the nuclide can often be done by an analysis of the coincident neutron signature. [3]

Typically, when neutron coincidence or multiplicity counting is performed, there are three unknowns: the sample mass, the leakage self-multiplication, and the ratio of the (α,n) rate of the source to the spontaneous fission rate. For a given counting time, the strength of the source or the detector efficiency must be sufficiently high for the singles, doubles, and triples count rates to represent statistically meaningful quantities. Often, the source strength and the allotted counting time are such that only the singles and doubles count rates are statistically meaningful. In this latter case, the ratio of the (α,n) rate to the

spontaneous fission rate must be estimated through some other means. With a simulated (α,n) rate, the two equations related to the singles and doubles count rates can be used to determine the sample mass. In this manner, to determine the ratio of (α,n) to spontaneous fission rate of the source, the isotopic composition of the sample as well as the light element impurities inside the source must be known. Ideally, there would be a way to dynamically determine the (α,n) rate of the source from count rate information. In this thesis, it is shown that the (α,n) rate of the source can be determined by using information about the ratio of the number of coincident neutrons at 180° to the number at 90°. By using this information, the three aforementioned unknowns can be dynamically determined through the sole use of singles and doubles count rates.

Different fissioning nuclides result in different fission fragment mass distributions and thus different fission fragment velocity contributions to emitted neutron velocities in the lab frame of reference. [4] Consequently, unique distributions of angles between neutrons from the same fission event exist for different nuclides. This means that neutron angular anisotropy information can be used to identify or verify the identity of spontaneously fissioning nuclides.

THEORETICAL BACKGROUND

It has been shown that 90% of prompt fission neutrons from the spontaneous fission of

^{252}Cf are evaporated from fission fragments instead of at the instant of fission (scission neutrons). A similar percentage of evaporation neutrons were found from ^{233}U , ^{235}U , and ^{239}Pu neutron induced fissions. [5] Consequently, it seems reasonable to assume that the majority of neutrons are emitted from energetic fission fragments. As such, the distribution of angles between neutrons from the same fission event in the lab frame of reference is different than the distribution in the fragment frame of reference due to the velocity contribution of the fission fragments. The concept of the velocity of the fission fragment significantly affecting the velocity of neutrons that it emits in the lab frame of reference is not new. It has been shown that neutrons were more likely to be detected around angles of 0º and 180º of coincident fission fragments for a spontaneously fissioning Cf-252 source. [6] Angular dependence of coincidences between the neutrons of a U-235 sample undergoing induced fission has also been studied. [7] However, past research in understanding the distribution of angles between neutrons for a fissioning source, especially the peaks around angles of 0º and 180º, is limited.

Assuming that all fissions result in two fission fragments, the fission fragments travel 180º apart due to conservation of momentum. In Fig. 1, an example fission event in which two neutrons are emitted from each fission fragment is shown. The variables have the following meanings:

v_{fx} = velocity of fission fragment x

$v_{nx,y}$ = velocity of neutron y from fragment x

$\theta_{x,y}$= angle between neutron y and fission fragment x in fragment frame of reference

$\theta'_{x,y}$= angle between neutron y and fission fragment x in lab frame of reference
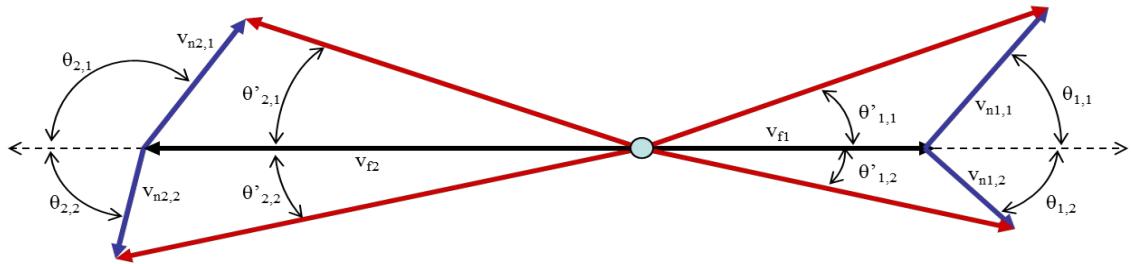
Fig. 1 Diagram of Velocity Vectors of Fission Fragments and Neutrons From Fission.

Neglecting relativistic effects, which is reasonable to do for typical prompt neutron energies, one can find the following expression for the angle between a neutron and the fragment that it was emitted from in the lab frame of reference:

$$\theta'_{x,y} = \tan^{-1}\left(\frac{v_{fx} \cdot \sin\theta_{x,y}}{v_{fx} + v_{nx,y} \cdot \cos\theta_{x,y}}\right) \qquad \text{(Eq. 1)}$$

This formula holds for any number of neutrons that are emitted from the fragments. Knowing the angle between neutrons and the fragments from which they are emitted, one can use elementary addition and subtraction to find the angle between neutrons that are emitted from the same fission fragment or different fission fragments.

ORGANIC LIQUID SCINTILLATORS

The process of prompt fluorescence occurs when a substance immediately emits visible radiation after being excited by some means. Related to prompt fluorescence are phosphorescence and delayed fluorescence. The former refers to the emission of a longer wavelength of light than fluorescence, and with a greater characteristic time after excitation than fluorescence. The latter refers to an emission spectrum that is identical to that resulting from prompt fluorescence but after a greater characteristic time after excitation than fluorescence. The details of the physics of these processes are not relevant to gaining a general understanding of how liquid scintillators work. [8] For an in-depth discussion on the physics of fluorescence and phosphorescence one can visit Ref. 8.

In the case of liquid scintillators, charged particles that are created within the scintillation liquid from impinging radiation excite the scintillating material and cause it to fluoresce, and to an extent phosphoresce as well. [8] The light emission of liquid scintillating detectors is comprised of a fast decay component and a slow decay component. In organic liquid scintillators, the relative population of the fast and slow decay components is a strong function of the linear energy loss (dE/dx) of the charged particle.

Gamma rays interact in scintillators through the photoelectric effect, Compton

Scattering, and pair production mechanisms. The result of this initial interaction is free

electrons exciting the scintillation material due to their charge. This results in

fluorescence and phosphorescence occurring, which in turn creates light that is collected

by the photomultiplier tubes, converted to electrons, and is registered as a pulse.

Neutrons can be detected by liquid scintillators because they collide with protons in the

liquid. As a result, protons obtain kinetic energy and excite the scintillation material

because they are charged. A pulse is then registered by the detection system in the same

way as for gamma rays. These two different processes for gamma rays and neutrons

result in different slow decay components of the light emission. Pulse shape

discrimination can therefore be used to distinguish neutron detection events from

gamma-ray detection events. [9]

Organic liquid scintillators, such as that shown in Fig. 2, are particularly useful when

information about the incoming neutron direction needs to be preserved. This is due to

the fact that the neutrons are often detected before they scatter for the first time.

Fig. 2. A 2" x 2" BC501 Detector in Front of a ^{252}Cf Source. [10]

NEUTRON COINCIDENCE POINT MODEL

Neutron coincidence counting is an important passive nondestructive assay technique because it can be used for the quantitative and qualitative analysis of nuclear material. Neutron coincidence counting is a particularly useful tool because it can be used to identify nuclides that are undergoing fission. There are often situations related to safeguards and homeland security in which it is desired that a spontaneously fissioning nuclide be identified.

The neutron coincidence point model is frequently employed in neutron coincidence counting analysis.

According to this model, the singles rate and the doubles rate are given by the following [2]:

$$S = m \cdot F \cdot \epsilon \cdot v_{s1} \cdot M \cdot (1 + \alpha) \qquad \text{(Eq. 2)}$$

$$D = m \cdot F \cdot \frac{\epsilon^2}{2} \cdot f_d \cdot M^2 \cdot \left[v_{s2} + \frac{M-1}{v_{i1}-1} v_{s1} v_{i2} \cdot (1 + \alpha) \right] \qquad \text{(Eq. 3)}$$

where;

S = singles count rate (counts per second);

D = doubles count rate (counts per second);

m = effective mass of the spontaneously fissioning nuclide in the sample (grams);

F = spontaneous fission rate (f/s-g);

ε = detector efficiency (counts per neutron);

M = leakage multiplication;

α = (α,n) rate divided by the spontaneous fission neutron emission rate;

f_d = doubles gate fraction;

v_{s1} = first reduced moment of the spontaneous fission neutron distribution;

v_{s2} = second reduced moment of the spontaneous fission neutron distribution;

v_{i1} = first reduced moment of the induced fission neutron distribution; and

v_{i2} = second reduced moment of the induced fission neutron distribution.

For a more in-depth explanation of what these variables mean, please refer to Ref. 2.

Embedded within the neutron point model are a number of assumptions:

    1.Induced fission neutrons can be assumed to be emitted at the instant of fission and/or (α,n) neutron production. Particles from fission are generally emitted within a very short time period of fission. However, it is possible that the reasonableness of this assumption can be violated if a neutron re-enters the sample and induces fission.

2. Detector efficiency and probability of fission are uniform over the entire sample. If the sample is relatively small and homogeneous, this is a reasonable assumption. However, this assumption becomes increasingly inappropriate with greater sample size.

3. The spontaneous fission and (α,n) energy spectra are the same. This is equivalent to   assuming that F, v_{s1}, v_{s2}, v_{i1}, v_{i2}, and ε are the same for neutrons from induced fission and neutrons from (α,n) reactions.

4. Neutron capture without fission can be neglected.

5. Neutron multiplicity and energy are not correlated.

6. Neutron die-away time can be approximated by a single exponential time constant.

Assumptions 4, 5, and 6 are appropriate for small detectors [2]. Assumption 3 is not technically correct but its influence on results from neutron coincidence measurements has shown historically to be small [11].

A frequent challenge associated with using neutron coincidence counting is having too many unknowns and too few equations. We have two equations with statistically meaningful quantities: Eqs. 2 and 3. Generally, when neutron coincidence counting is performed, there are three unknowns: the sample mass, the leakage self-multiplication, and the ratio of the (α,n) rate of the source to the spontaneous fission rate. Traditionally, one of the unknowns is simulated and it is usually α. However, to simulate the (α,n) rate

of the source, the geometry of the source as well as impurities inside the source must be known. It is shown in this thesis that the (α,n) rate of the source can be dynamically determined from correlated neutron angular anisotropy information. Another application of correlated neutron angular anisotropy information that will be discussed in this thesis is identifying unknown fissioning nuclides.

CHAPTER II

SIMULATING THE ANGULAR ANISOTROPY OF CORRELATED NEUTRONS

FROM A ^{252}Cf SOURCE

SIMULATION MODEL

A theoretical simulation was performed based on first principles to better understand the physics of neutron angular anisotropy and to predict the distribution of neutrons from the same fission event for a spontaneously fissioning source specifically for ^{252}Cf. This was a Monte Carlo simulation that performed the following steps:

1. Simulate which fission fragments that a spontaneously fissioning ^{252}Cf nuclide breaks into based on data from ENDF/B-VII.0. [12] This data can be found in Appendix A.

2. Simulate how much kinetic energy each fragment has based on experimental data from Ref. 6. It was assumed that the kinetic energy for all fission fragments was normally distributed with the given average and standard deviation experimentally determined in Ref. 6. This data can be found in Appendix A.

3. Based on the mass of the fragment and its kinetic energy, calculate the fragment velocity.

4. Simulate how many neutrons are released from each fragment based on experimental data from Ref. 6. The predicted values were rounded to the nearest integer. This data can be found in Appendix A.

5. Simulate the velocities of the neutrons that are emitted in the fragment frame of reference by sampling a Watt spectrum for the given fissioning nuclide. Parameters for the Watt Spectrum were from Ref. 13.

6. Simulate the direction that the neutron is emitted relative to the direction of travel of the fragment from which it was emitted. This was done by assuming that neutron emission in the fragment frame of reference was isotropic.

7. Find the energies of the neutrons that would be detected in the lab frame of reference. Find the probability that those neutrons would be detected based on an MCNP simulation of the intrinsic energy-dependent efficiency of the BC-501 liquid scintillators that were used experimentally.

8. Find the angle between each neutron and the fragment direction of travel from which it was emitted in the lab frame of reference.

9. Find the angle between neutrons emitted from the same fragment in the lab frame of reference.

10. Increment the same fragment integer bins between 0º and 180º that calculated angles fall in proportionally to the probability that those neutrons will be detected.

11. Given that the fragments will be traveling in opposite directions due to

conservation of momentum, find the angle between neutrons emitted from opposite fragments in the lab frame of reference.

12. Increment the opposite fragments integer bins between 0º and 180º that calculated angles fall in proportionally to the probability that those neutrons will be detected.

13. Repeat steps 1-12 50,000 times to represent 50,000 fissions. This was a reasonable number of fissions to simulate because even assuming that a given bin had 50% lower counts than average, with 180 bins this would result in less than 10% statistical error.

14. Divide same fragment bins by the sum of all of the same fragment bins and store results of frequency of normalized angles between neutrons from same fission fragment as a function of angle.

15. Repeat step 14 for opposite fragment bins.

16. Sum the normalized angles between neutrons from the same and opposite fission fragments as a function of angle and plot.

The simulation code can be found in Appendix A.

Aside from assuming that all neutrons are emitted from the fission fragments, the following assumptions were also built into the simulation program:

1. Neutron emission is isotropic in the frame of reference of the fragment from which it is emitted.

2. Two fission fragments result from each fission, fissions which result in higher numbers of fission fragments are neglected. This is generally a good assumption because tertiary fission typically produce an α particle as the third fission fragment and that fragment does not produce evaporation neutrons.

3. Relativistic effects were neglected.

4. It was reasonable to assume that all neutrons detected within 100 ns of each other were from the same fission event for the ^{252}Cf source that was used.

5. The data sources mentioned in the simulation steps section were assumed to be sufficiently accurate.

6. By normalizing the distribution of angles from the same fission fragment and separately normalizing the distribution of angles from opposite fission fragments (before the distributions were summed), it was assumed that neutrons are equally likely to be emitted from the same fragment as they are opposite fragments.

SIMULATION RESULTS

The simulated distributions of the angles between neutrons emitted from the same fission event from a ^{252}Cf source were recorded and plotted in Fig. 3. All of the statistical errors for the data points in Fig. 3 ranged between 5% and 7%. This level of statistical

error could be decreased by sampling more than 50,000 fissions. However, for this work

uncertainties in the 5-10% range were sufficient.
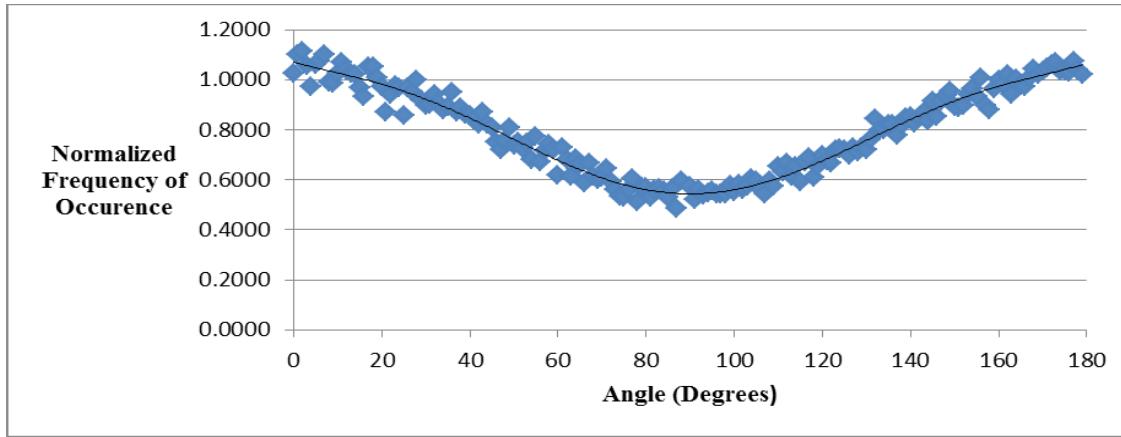
Fig. 3. Distribution of Normalized Simulated Angles Between Neutrons from Same Fission Event from a Spontaneously Fissioning ^{252}Cf Source.

It is clear that the velocity contribution of the fission fragments produces an anisotropy

in the lab frame of reference. It can be seen from Fig. 3 that there is a preference for

detection of neutron pairs with angles between them of either 0º or 180º. A sixth-order

polynomial was fit to each of the distributions in Fig. 3 to allow for easy comparison to

the measured data. The fitted polynomial is plotted as a bold line in Fig. 3.

The equation for the polynomial is:

Normalized Frequency of Occurrence=$[1.01624205119188 \times 10^{-12} \times (Angle^6)]-$

$[5.46579009181751 \times 10^{-10} \times (Angle^5)]+[1.0187490603452 \times 10^{-7} \times (Angle^4)]-$

$[7.23780502709381 \times 10^{-6} \times (Angle^3)]+[1.52649316323306 \times 10^{-4} \times (Angle^2)]-$

[5.38249326393725 x 10^{-3} x Angle]+1.07184312521053.

The R^2 value of the polynomial to the data was 0.96.

CHAPTER III

NEUTRON ANGULAR ANISOTROPY EXPERIMENTAL DATA FROM A ^{252}Cf SOURCE

LLNL EXPERIMENTAL SETUP

At Lawrence Livermore National Laboratory, a ^{252}Cf source was placed inside a cylindrical array of BC-501 liquid scintillator detectors. Information about the detector in which detection occurred, as well as time of arrival, and particle energy were recorded. The positions of the detectors and the source were known. In order to neglect the variation of solid angle subtended by detectors in the array, only data from one ring of the array was analyzed. An image of the experimental setup is shown in Fig. 4. Each detector is a cylinder that is 5.08 cm in radius and 7.62 cm in length. All of the detectors were placed inside a cylindrical array that had an inner radius of 29.3 cm. The closest angle two detectors could have between each other was about 19º. The source was small enough that it was approximated as a point source**.**

Fig. 4. Cylindrical Array of Liquid Scintillators Around Source.

ANGULAR ANISOTROPY EXPERIMENTAL RESULTS

It was assumed that all neutrons detected within 100 ns of each other were from the same fission event. A neutron that was detected 500 detections after a given neutron was assumed to be not from the same fission event. The angle between two neutrons that were detected was assumed to be equal to the angle between the centers of the detectors in which they were detected. After variable detector efficiency and non-perfect source centering were accounted for, the frequency of occurrence of different angles between coincident neutrons was determined. The resulting distribution is shown in Fig. 5. As can be seen from this distribution, the frequency peaks near 0º and 180º with a valley around 90º.
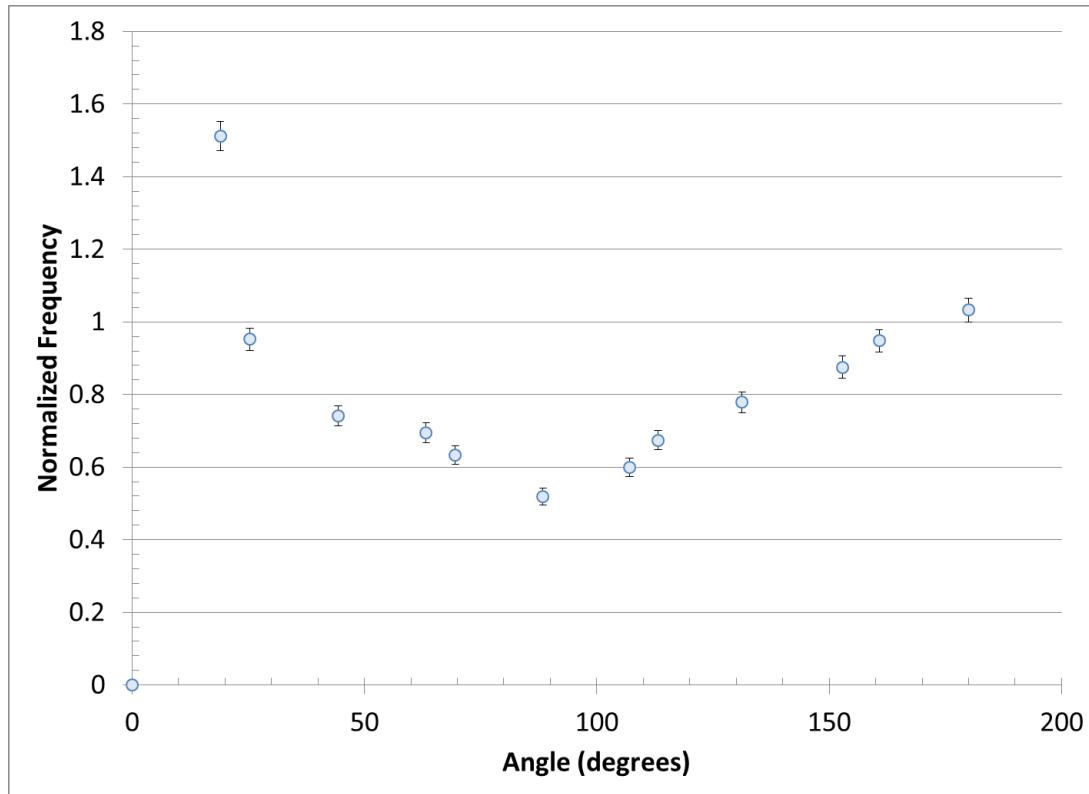
Fig. 5. Distribution of Angles Between Neutrons Detected Within 100 ns of Each Other, Assumed from the Same Fission Event.

COMPARISON TO SIMULATION RESULTS

Excellent agreement was found between the experimental results and simulated results.

A plot of the experimental results divided by the simulated results is shown in Fig. 6.

Experimental frequency divided by predicted frequency was plotted instead of the

conventional inverse to show that the experimental frequency for the angle of 0º was

equal to 0 (as opposed to undefined). If the two sets of values matched perfectly, then a

solid line at 1.0 would be seen on this plot.
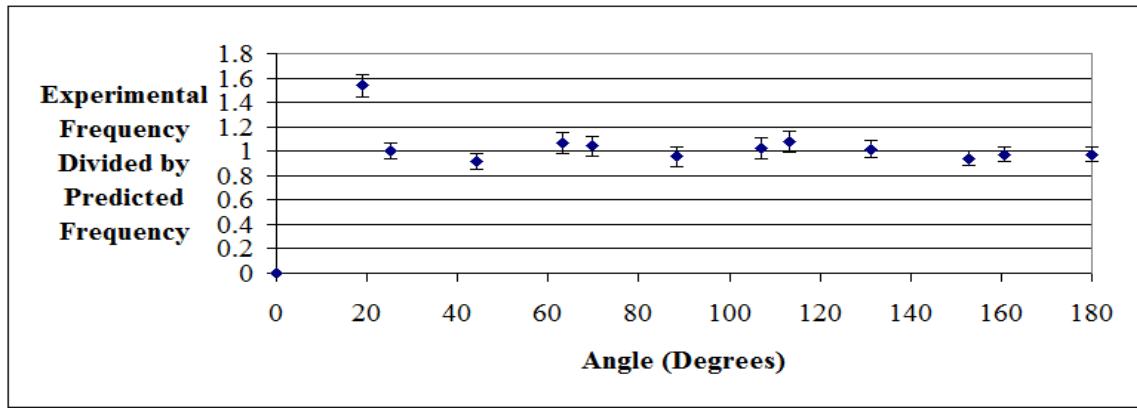
Fig. 6. Ratio of Experimental Frequency for Given Angle to Predicted Frequency for Given Angle. Predicted Frequencies were found from the 6ᵗʰ order polynomial fit to simulation output.

The standard deviation of the differences between the values predicted by the 6ᵗʰ order polynomial and all of the simulation output values for given angles was found. This will be referred to as the simulation standard deviation. The differences between the values predicted by the 6ᵗʰ order polynomial and the values found experimentally for given angles greater than 19° were all less than one simulation standard deviation (about 7%). The reason that the values predicted for angles equal to or less than 19° do not match well with experimental results will be explained below.

The only other statistically significant deviation of the experimental results from the simulated results is that the experimental frequency of neutrons detected from the same fission event in the 0 degree bin (corresponding to detection of two neutrons in the same

detector within 100 ns) was zero. This is explainable because the dead time of the detectors will not allow for two neutrons to be detected within 100 ns of each other.

CORRECTING FOR DOUBLE-COUNTING

Further simulation was performed using MCNP to estimate the amount of double counting that occurred between detectors in the experimental system. To these ends, data generated from an input file that modeled the detector system and source was analyzed. (For those familiar with MCNP, PTRAC data was analyzed). For a given ring of the detector system, it was found that $|1.294 \pm 0.003|\%$ of the time a neutron that deposits the requisite energy to be detected in one detector will go on to deposit the requisite energy in the closest detector to it. It was also found that, for a given ring of the system, the percent of time that a neutron deposits the requisite energy to be detected in one detector and then goes on to deposit the requisite energy in a detector not closest to it is negligibly small.

It is by making use of the above stated double-scattering information that the unusually high frequency of detection of neutrons from the same fission event with angles of 19º between them can be explained.

The ratio (R_{DS}) of total neutron pairs counted due to double scattering plus actual coincidence neutrons from the same fission event to actual coincidence neutron pairs

counted from the same fission event is given by:

$$R_{DS} = \frac{\eta \cdot \chi \cdot v + \tau}{\tau}$$ (Eq.4)

where:

η = intrinsic efficiency of detector

χ = probability that a neutron that is detected in a given detector will scatter into angle and be detected

v = the average number of neutrons emitted per fission from the source

τ = probability that a pair of neutrons from the same fission will be detected in the angle of interest

Eq. 4 applies to a specified angle between neutron pairs that are being counted.

The overall intrinsic efficiency (η) of the detectors for the source under consideration was found by analysis of data from the MCNP simulation and determined to be 0.093±0.0127. (Again, for those familiar with MCNP, PTRAC data was analyzed.) The likelihood (τ) of a pair of neutrons being detected from the same fission event in detectors next to each other was determined to be 0.0069±0.0010. This was found by taking the simulated value of the frequency of coincident neutrons from the same fission event detected within 19º of each other with the intrinsic efficiencies of the detectors considered and dividing that by the same value assuming perfect intrinsic efficiencies. It

was assumed that 3.75 neutrons are emitted per spontaneous fission of ^{252}Cf. This information was found in Ref. 13. As stated above $\chi = (1.294 \pm 0.003)\%$.

Thus, by making use of Eq. 4, the ratio of coincident neutrons detected due to double-counting plus the actual coincident neutrons from the same fission event divided by the actual coincident neutrons from the same fission event should be 1.65±0.33. The ratio of the normalized experimental frequency of neutrons detected from the same fission event in the 19º bin to that of the simulated frequency with 0% scission component of prompt neutrons is 1.54±0.09. These two values are statistically identical. It is therefore concluded that the deviation of the normalized experimental detections of neutrons from the same fission event with angles of 19º between them from that found through simulation is due to the counting of double-scattered neutrons.

When double-counting and dead time were corrected for, a revised plot of the experimental frequency divided by the predicted frequency was produced. This plot is shown in Fig. 7a. A zoom in of the plot is shown in Fig. 7b. The agreement between the measured and predicted angular frequencies of correlated neutron pairs is very good. The standard deviation of the data plotted in Fig. 7a is 5.1% which is equal to the standard deviation in the simulated values due to just statistical errors.
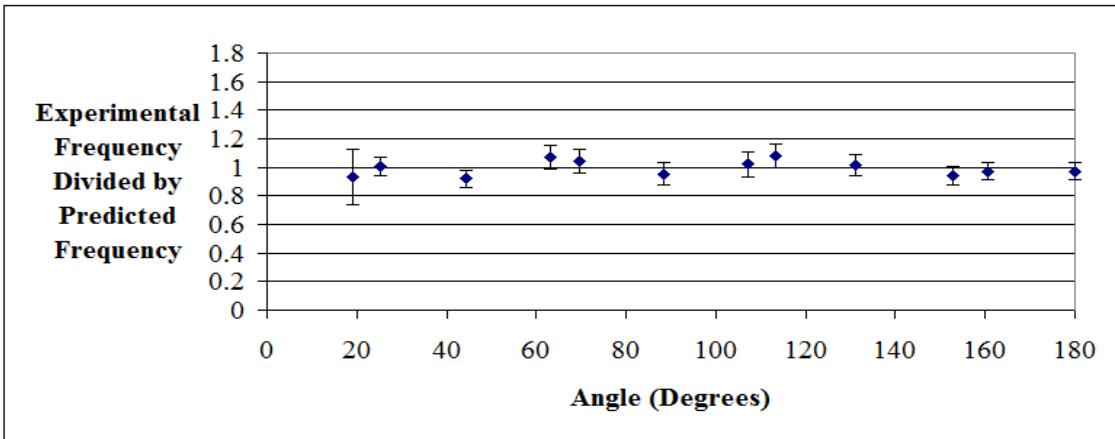
Fig. 7a. Revised Experimental Frequency for Given Angle/Predicted Frequency for Given Angle (Double-Counting and Dead-Time Corrected For). Same Scale as Fig. 6.
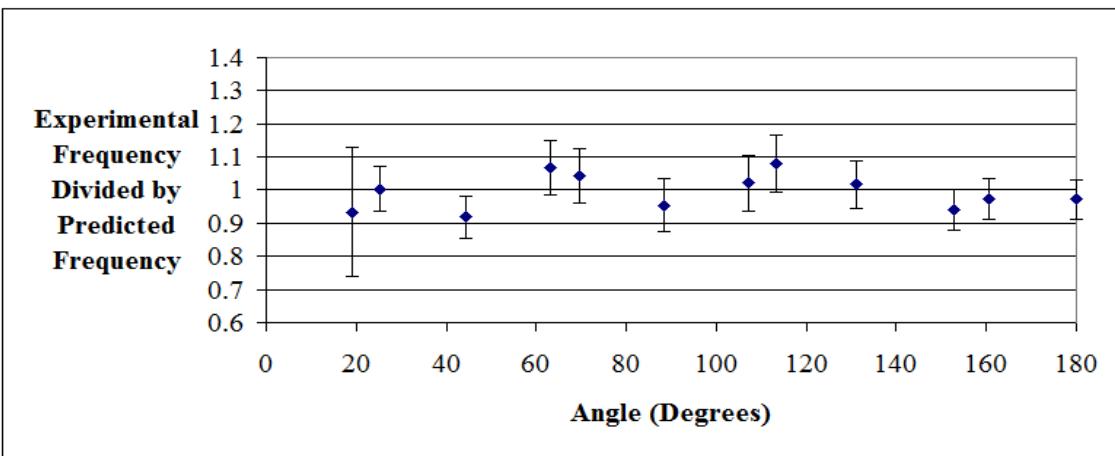
Fig. 7b. Same as Fig. 7a, Scale Zoomed In.

Since the ^{252}Cf source that was used was small enough to be considered a point source and elementally pure, it can be assumed that the (α,n) rate was not strong enough to distort the angular distribution. (The distribution of angles between coincident (α,n) pairs is isotropic.) It is therefore concluded that the simulated distribution represents the true distribution of angles between neutrons from the same fission event for a ^{252}Cf source.

CHAPTER IV

SIMULATING THE ANGULAR ANISOTROPY OF CORRELATED NEUTRONS FROM A ^{240}Pu SOURCE

After the simulation model was validated, it was used to simulate the distribution of angles between neutrons from the same fission event for a nuclide of much greater interest to the nonproliferation community: ^{240}Pu.

SIMULATION MODEL

The same steps were taken in this second simulation as were for the first simulation except for steps 1, 2, and 4. Here are the new steps.

1. Simulate which fission fragments a ^{239}Pu nuclide that undergoes induced fission breaks into based on data from ENDF/B-VII.0 [12]. Data were not available for the fission fragments that a spontaneously fissioning ^{240}Pu nuclide breaks into. This data can be found in Appendix B.

2. Simulate how much kinetic energy each fragment resulting from the spontaneous fission of ^{240}Pu has based on experimental data from Ref. 14. It was assumed that the kinetic energy for all fission fragments was normally distributed with the given average and standard deviation experimentally determined in Ref. 14. This

data can be found in Appendix B.

4. Simulate how many neutrons are released from each fragment resulting from the spontaneous fission of ^{240}Pu based on experimental data from Ref. 15. The predicted values were rounded to the nearest integer. This data can be found in Appendix B.

The second simulation employed all of the same assumptions as the first as well as one additional assumption. It was also assumed that the mass distribution of fission fragments from the spontaneous fission of ^{240}Pu could be approximated by the mass distribution of fission fragments from the induced fission of ^{239}Pu by thermal neutrons.

SIMULATION RESULTS

The simulated distributions of the angles between neutrons emitted from the same fission event from a spontaneously fissioning ^{240}Pu source were recorded and plotted alongside the results from a spontaneously fissioning ^{252}Cf source in Fig. 8. To reinforce the distinguishability of the distributions from the ^{240}Pu and ^{252}Cf Sources, the ^{252}Cf frequency distribution divided by the ^{240}Pu frequency distribution is plotted in Fig. 9. As can be seen, there is a significant difference in the angular distribution of coincidence neutrons emitted from these two nuclides.
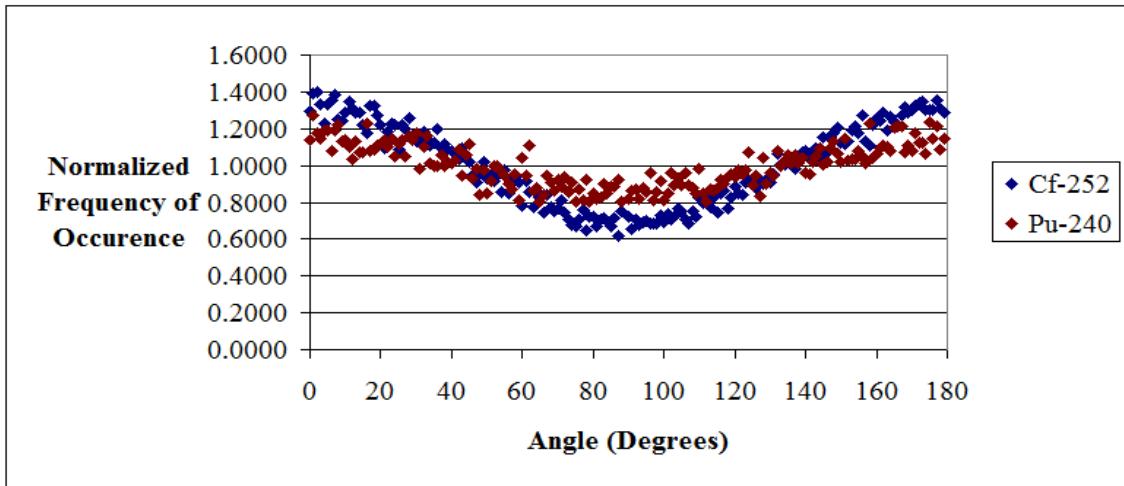
Fig. 8. Distribution of Normalized Simulated Angles Between Neutrons from Same Fission Event from Spontaneously Fissioning ^{240}Pu and ^{252}Cf Sources.
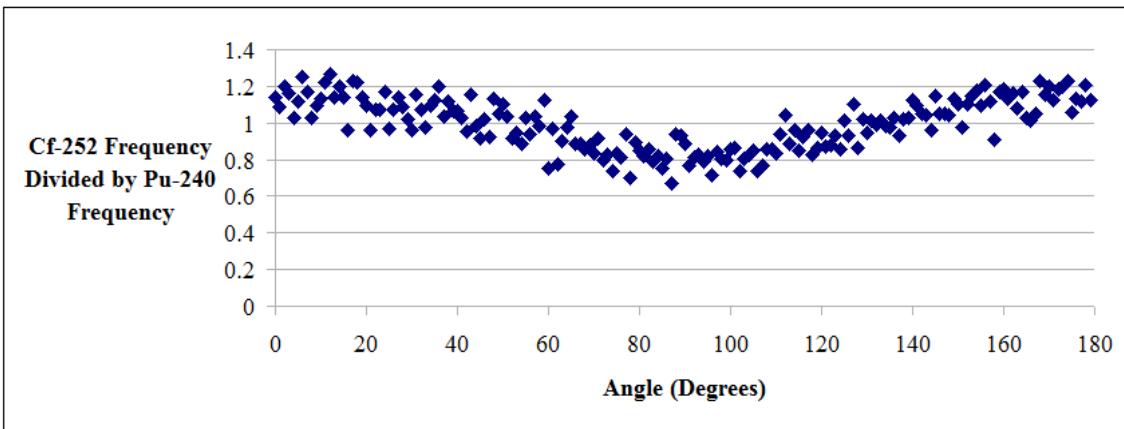
Fig. 9. Distribution of Normalized Simulated Angles Between Neutrons from Same Fission Event from Spontaneously Fissioning ^{252}Cf Source Divided by Distribution from ^{240}Pu Source.

IMPLICATIONS TO RADIONUCLIDE IDENTIFICATION

Often times when an unknown radioactive source is apprehended, it is composed of

several different kinds of radioactive materials. Typically, unknown radionuclides in the

field are identified through gamma spectroscopy. It is conceivable that the characteristic gamma rays (used as a unique identifier in gamma spectroscopy) from one nuclide could mask the presence of characteristic gamma rays from a different nuclide in the source. This could even be done intentionally. Additionally, there is a large amount of gamma background radiation in almost any environment. This can obscure characteristic gamma rays from a given nuclide. Another situation in which neutron angular anisotropy nuclide identification would be useful is when the International Atomic Energy Agency verifies the declared nuclide quantities of a nuclear facility. In this situation as well, the traditional identification method of gamma spectroscopy is vulnerable to gamma rays from other nuclides and background masking the characteristic gamma rays of the nuclide of interest.

In both of these situations, the distribution of angles between coincident neutrons could be used to identify spontaneously fissioning nuclides. This follows from the fact that the distribution of angles between coincident neutrons is unique to the nuclide undergoing fission. Consequently, spontaneously fissioning radionuclides can be identified through the distribution of angles between their coincident neutrons. A source that is composed of several spontaneously fissioning nuclides would have a distribution of angles between coincident neutrons that is equal to the superposition of the distributions of angles between neutrons of the constituent nuclides.

CHAPTER V

USING ANGULAR ANISOTROPY TO DETERMINE THE RATIO OF (α,n) RATE TO SPONTANEOUS FISSION RATE OF A SPONTANEOUSLY FISSIONING SOURCE

MATHEMATICAL DERIVATION

In neutron coincidence counting only the singles and doubles count rates are statistically meaningful, and yet three unknowns exist (α, M, and m). Additional information is needed to have a fully determined system. It is with this motivation that a supplementary equation based on neutron anisotropy that can be used in coincidence counting was derived.

The factor α is equal to the (α,n) rate divided by the spontaneous fission neutron emission rate. This can be expressed mathematically as:

$$\alpha = \frac{R_\alpha}{R_{SF}} \qquad\qquad \text{(Eq. 5)}$$

where:

R_α = (α,n) neutron production rate; and

R_{SF} = spontaneous fission neutron emission rate.

The spontaneous fission neutron emission rate is embedded into the singles and doubles equations. It is expressed as:

$$R_{SF} = m \cdot F \cdot \epsilon \cdot v_{s1}$$ (Eq. 6)

where;

m = effective mass of the spontaneously fissioning sample (grams);

F = spontaneous fission rate (f/s-g);

ε = detector efficiency (counts per neutron); and

v_{s1} = first reduced moment of the spontaneous fission neutron distribution.

If one neglects induced fission neutrons (which will be justified later), Eq. 5 can be manipulated to yield the (α,n) to total source ratio as well as the spontaneous fission to total source ratio:

$$1 + \alpha = \frac{R_{SF} + R_{\alpha}}{R_{SF}} \approx \frac{R_T}{R_{SF}}$$ (Eq. 7)

$$1 - (1+\alpha)^{-1} = \frac{R_{SF} + R_{\alpha}}{R_{SF} + R_{\alpha}} - \frac{R_{SF}}{R_{SF} + R_{\alpha}} = \frac{R_{\alpha}}{R_{SF} + R_{\alpha}} \approx \frac{R_{\alpha}}{R_T} \quad .$$ (Eq. 8)

R_T is the total neutron production rate in the sample, approximately equal to the sum of

the spontaneous fission neutron production rate and the (α,n) neutron production rate. The induced fission neutron production rate is also included in this sum but induced fission neutrons were neglected in this work. Note that this assumption will likely not be valid for large samples with values of M that are much different than unity (i.e. M greater than ≈ 1.2).

Neglecting the induced fission contribution, the ratio of coincident neutron pairs detected at 180º from each other (D_{180}) to the number detected at 90º from each other (D_{90}) can be expressed as:

$$\frac{D_{180°}}{D_{90°}} \approx \frac{[D \cdot \frac{R_{SF}}{R_T} \cdot N_{180°}] + [\frac{D \cdot R_\alpha}{R_T} \cdot N_\alpha]}{[D \cdot \frac{R_{SF}}{R_T} \cdot N_{90°}] + [\frac{D \cdot R_\alpha}{R_T} \cdot N_\alpha]} \qquad \text{(Eq. 9)}$$

where:

$N_{180°}$ = normalized simulated frequency of detecting neutrons from the same fission event 180º apart;

$N_{90°}$ = normalized simulated frequency of detecting neutrons from the same fission event 90º apart; and

N_α = normalized frequency of detecting neutrons from (α,n) reactions (isotropic angular distribution).

Eq. 7 and Eq. 8 can then be substituted into Eq. 9 and D can be eliminated:

$$\frac{D_{180°}}{D_{90°}} \approx \frac{[(1+\alpha)^{-1} \cdot N_{180°}] + [(1-(1+\alpha)^{-1}) \cdot N_\alpha]}{[(1+\alpha)^{-1} \cdot N_{90°}] + [(1-(1+\alpha)^{-1}) \cdot N_\alpha]} \qquad \text{(Eq. 10)}$$

The numerator and denominator of Eq. 11 can be multiplied by $(1+\alpha)$ to provide further simplification.

$$\frac{D_{180°}}{D_{90°}} \approx \frac{N_{180°} + \alpha \cdot N_\alpha}{N_{90°} + \alpha \cdot N_\alpha} \qquad \text{(Eq. 11)}$$

Eq. 11 can be solved for α to acquire:

$$\alpha = \frac{1-RP}{Q(P-1)} \qquad \text{(Eq. 12)}$$

where:

$$R = \frac{N_{90°}}{N_{180°}} \quad ;$$

$$P = \frac{D_{180°}}{D_{90°}} \quad ; \text{ and}$$

$$Q = \frac{N_\alpha}{N_{180°}} \quad .$$

This formulation of the equation for α allows for the determination of α using ratios of measured and simulated quantities which will tend to minimize uncertainty in the

predicted α value. We can justify neglecting induced fission neutrons. Neutrons from

both spontaneous fission and (α,n) reactions can induce fission in ^{240}Pu. However, the

total number of neutrons from induced fissions is small when compared to the number of

neutrons from spontaneous fissions (for samples with M < 1.2) and neutrons from (α,n)

reactions. Also, the neutrons that result from these induced fissions will have a similar

angular distribution as the spontaneous fission neutrons. For these reasons, the

contribution of induced fission neutrons to the ratio of neutron pairs detected at 180º

from each other to the number detected at 90º from each other is negligible.

The uncertainty associated with Eq. 12 can be expressed as:

$$\sigma_\alpha{}^2 = [\frac{P^2}{Q^2(P-1)^2}]\sigma_R{}^2 + [\frac{R^2}{Q^2(P-1)^2} + \frac{(1-RP)^2}{Q^2(P-1)^4}]\sigma_P{}^2 + [\frac{(1-RP)^2}{Q^4(P-1)^2}]\sigma_\alpha{}^2 \quad . \quad \text{(Eq. 13)}$$

COMPARISON OF PREDICTED (α,n) RATE WITH ACTUAL (α,n) RATE FOR A MOX FUEL PIN

A paper entitled, "Experiments and Simulation of Cross-Correlations on MOX fuel" by

E. Miller et al. (Ref. 16) was recently published. S. Pozzi and E. Miller kindly provided

us with data on which the paper is based. Specifically, they provided information which

could be used to solve for the actual value of α as well as the neutron coincidence count

rates in detectors 180º from each other and 90º from each other. This data was then used

to benchmark the methodology derived here to show the viability of this technique.

Two MOX samples were analyzed by faculty and students of the University of Michigan Nuclear Engineering Department. This took place at the Joint Research Center in Ispra, Italy (JRC-Ispra). Each MOX sample was identical isotopic composition. The source strengths were 8.93×10^4 n/s and 1.01×10^5 n/s respectively. A breakdown of the source neutrons for the MOX samples is shown in Fig. 10. [16]
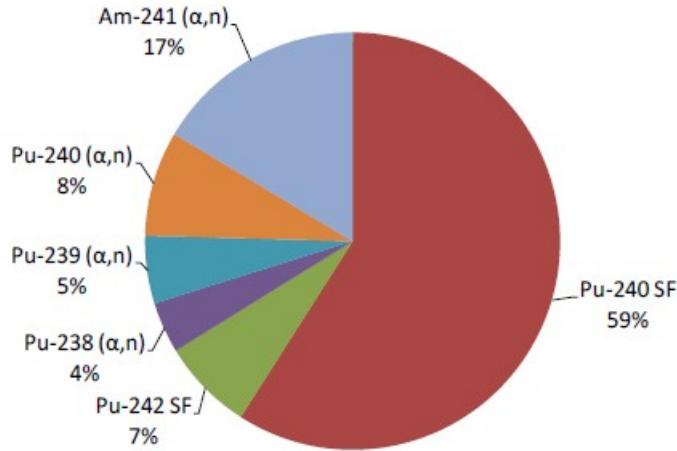
Fig. 10. Percent of Source Neutrons By Nuclide for the MOX Samples. [16]

Four 12.7×12.7-cm EJ-309 detectors were placed symmetrically around the source under consideration. There was a 30-cm distance from the center-line of the source to the front face of the detector. A lead brick was placed in front of each detector. The entire apparatus was placed on an aluminum table 90 cm above a concrete floor. There was a 0.07 MeV threshold for measurement. [16] The EJ-309 measurement setup is shown in Fig. 11.
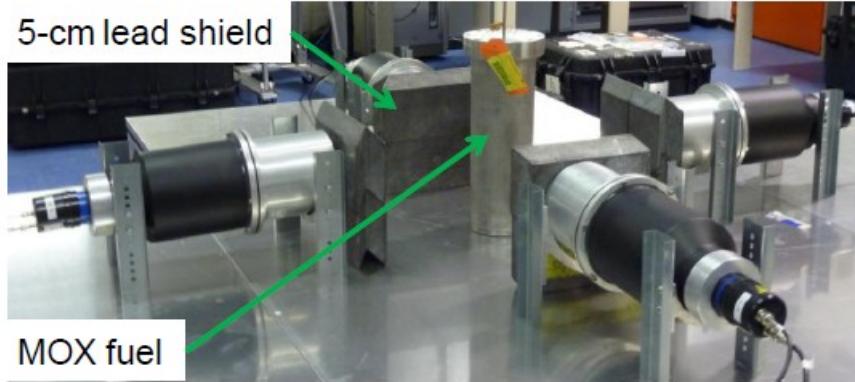
Fig. 11. The EJ-309 Measurement Setup. [16]

Eq. 12 was then solved by making use of the following values.

$N_{180°} = 1.17 \pm 0.01$

$N_{90°} = 0.83 \pm 0.01$

$N_{\alpha} = 1.00 \pm 0.00$

$M_{180°} = 1.16 \pm 0.01$

$M_{90°} = 0.92 \pm 0.01$

The value of α predicted by Eq. 12 was compared to the declared value of α. These are

shown in Table 1.

Table 1. Comparison of Predicted α to Declared α.

Predicted α	Declared α	Absolute Relative Error (%)
0.47 ± 0.079	0.5152 ± 0.029	8.13

By using Eq. 12, the predicted value of α has an associated percent difference from the

known value approximately 8% of the declared value. Those uncertainties and the difference between predicted and declared values of α (essentially a bias error) can likely be decreased through longer count times, better statistics in the simulated distributions, and other methods. However, it is not likely that these errors can be decreased much below about 5% due to error propagations in Eq. 12. This level of accuracy is expected to be sufficient more most safeguards applications where α has to be determined through gamma spectroscopy measurements.

The following possible sources of error for the predicted α are expected:

1. The values of $N_{180°}$ and $N_{90°}$ (found from simulation output) have associated statistical errors as well as bias errors due to the sources that were used in the simulation.

2. The values of $D_{180°}$ and $D_{90°}$ have associated errors due to the process by which they were measured.

3. There is error associated with the "known" value of α of the source.

4. There is error associated with assuming all of the spontaneous fission neutrons are from ^{240}Pu and neglecting the spontaneous fission neutrons from ^{242}Pu. This error will lead to a lower predicted value of α than was actually present in the sample.

There will be increased confidence in the predictive power of neutron angular anisotropy

when further experimental work is performed. It would be beneficial in the future to perform an experimental validation of the simulated distribution of angles between neutrons from the same spontaneous fission of ^{240}Pu. Also, additional work would be needed to determine if the value of α can be unfolded when multiple spontaneously fissioning nuclides are present in the sample.

CHAPTER VI

CONCLUSIONS

It has been shown that neutrons emitted from the same fission event are preferentially detected 180º from each other and least likely to be detected 90º from each other. This was shown by creating a physics based simulation code and benchmarking it to experimental data from a ^{252}Cf source at Lawrence Livermore National Laboratory. Both simulation and experimental results exhibited the neutron angular anisotropy. The distribution of angles between neutrons from the same fission event was simulated for the nuclides ^{252}Cf and ^{240}Pu.

This angular anisotropy can be exploited for use in many safeguards and homeland security applications. One such application is identifying spontaneously fissioning nuclides. Two situations that neutron angular anisotropy spontaneously fissioning nuclide identification would be useful in are: identifying interdicted radionuclides and verifying the nuclide declarations of nuclear facilities during IAEA inspections. Additionally, neutron angular anisotropy can be exploited to dynamically determine the value of α when coincidence counting is being performed. This eliminates the need to simulate α (which requires time in addition to knowledge of source geometry and impurities). An experimentally determined value for α and one obtained through simulation can be used to validate each other. Once the value of α is known, all of the

variables in the singles and doubles equations of the neutron coincidence point model can be explicitly determined.

An equation relating the value of α to the doubles counts in detectors 180º and 90º away from each other was derived. This equation was tested by using information about the doubles counts in detectors 180º and 90º away from each for a MOX fuel pin to predict the value of α with the derived equation. This result was compared to the declared value of α. There was relatively good agreement between the predicted and declared values.

In the future, an experimental validation of the simulated distribution of angles between neutrons from the same spontaneous fission of ^{240}Pu should be performed. Experimental work should be undertaken to find whether radionuclide identification can practically be done using neutron angular anisotropy information. More experimental work needs to be done with regard to using neutron angular anisotropy to determine the value of α for a source undergoing coincidence counting. It should be investigated whether the value of α can be unfolded when multiple spontaneously fissioning nuclides are present in the sample.

Lastly, it is important to point out that the system developed here has one possible fatal flaw: it uses fast neutron detection which has a low efficiency. That means lower doubles count rates than for a thermal neutron detection system. A systems study is needed to see

if this can be made into a complete coincidence counter which can produce mass values

with uncertainties comparable to thermal instruments.

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APPENDIX A

Fission Fragment Distribution from a Spontaneously Fissioning ^{252}Cf Source

This data is size 7 font to conserve space. If you wish to use this data, please copy and paste it from the electronic version of this thesis.

This data is of the form:

    if randomnumber >a and randomnumber <=b:
        m1=mass number of first fragment
        m2=mass number of second fragment
        mass1=mass corresponding to mass number of first fragment
        mass2=mass corresponding to mass number of second fragment

The variable randomnumber is a number between 0 and 1. The interval a and b is specific to the particular fragments that are predicted to come out. The intervals were chosen to reflect the relative probabilities of the fission fragment combinations. This data was originally taken from Ref. 12 and then formatted for code implementation.

```
if randomnumber < 0.021975:
    m1=143
    m2=109
    mass1=142.9206267
    mass2=109.0793733
if randomnumber >0.021975 and randomnumber <=0.04094195:
    m1=141
    m2=111
    mass1=140.9200458
    mass2=111.0799542
if randomnumber >0.04094195 and randomnumber <=0.05911515:
    m1=138
    m2=114
    mass1=137.9139545
    mass2=114.0860455
if randomnumber >0.05911515 and randomnumber <=0.07728085:
    m1=107
    m2=145
    mass1=106.9150796
    mass2=145.0849204
if randomnumber >0.07728085 and randomnumber <=0.0953971:
    m1=110
    m2=142
    mass1=109.914136
    mass2=142.085864
if randomnumber >0.0953971 and randomnumber <=0.1128725:
    m1=139
    m2=113
    mass1=138.9187929
    mass2=113.0812071
if randomnumber >0.1128725 and randomnumber <=0.13020445:
    m1=106
    m2=146
    mass1=105.9181368
    mass2=146.0818632
```

```
if randomnumber >0.13020445 and randomnumber <=0.1470724:
    m1=144
    m2=108
    mass1=143.9229529
    mass2=108.0770471
if randomnumber >0.1470724 and randomnumber <=0.16373185:
    m1=108
    m2=144
    mass1=107.9184612
    mass2=144.0815388
if randomnumber >0.16373185 and randomnumber <=0.1790354:
    m1=103
    m2=149
    mass1=102.9191438
    mass2=149.0808562
if randomnumber >0.1790354 and randomnumber <=0.19413195:
    m1=105
    m2=147
    mass1=104.9169746
    mass2=147.0830254
if randomnumber >0.19413195 and randomnumber <=0.20906925:
    m1=109
    m2=143
    mass1=108.9132032
    mass2=143.0867968
if randomnumber >0.20906925 and randomnumber <=0.22320745:
    m1=104
    m2=148
    mass1=103.9137636
    mass2=148.0862364
if randomnumber >0.22320745 and randomnumber <=0.2370592:
    m1=140
    m2=112
    mass1=139.9172824
    mass2=112.0827176
if randomnumber >0.2370592 and randomnumber <=0.25053655:
    m1=142
    m2=110
    mass1=141.9164534
    mass2=110.0835466
if randomnumber >0.25053655 and randomnumber <=0.2634984:
    m1=137
    m2=115
    mass1=136.9115621
    mass2=115.0884379
if randomnumber >0.2634984 and randomnumber <=0.27626545:
    m1=140
    m2=112
    mass1=139.9216409
    mass2=112.0783591
if randomnumber >0.27626545 and randomnumber <=0.28893515:
    m1=142
    m2=110
    mass1=141.9242989
    mass2=110.0757011
if randomnumber >0.28893515 and randomnumber <=0.30147595:
    m1=145
    m2=107
    mass1=144.9216454
    mass2=107.0783546
if randomnumber >0.30147595 and randomnumber <=0.31375775:
    m1=111
    m2=141
    mass1=110.9115859
    mass2=141.0884141
if randomnumber >0.31375775 and randomnumber <=0.32572425:
    m1=113
    m2=139
    mass1=112.9101529
    mass2=139.0898471
if randomnumber >0.32572425 and randomnumber <=0.33768795:
    m1=112
```

```
        m2=140
        mass1=111.9143942
        mass2=140.0856058
if randomnumber >0.33768795 and randomnumber <=0.34963665:
        m1=146
        m2=106
        mass1=145.9257935
        mass2=106.0742065
if randomnumber >0.34963665 and randomnumber <=0.3614111:
        m1=148
        m2=104
        mass1=147.9244324
        mass2=104.0755676
if randomnumber >0.3614111 and randomnumber <=0.3731691:
        m1=134
        m2=118
        mass1=133.9113687
        mass2=118.0886313
if randomnumber >0.3731691 and randomnumber <=0.3846241:
        m1=136
        m2=116
        mass1=135.914654
        mass2=116.085346
if randomnumber >0.3846241 and randomnumber <=0.3959194:
        m1=111
        m2=141
        mass1=110.917696
        mass2=141.082304
if randomnumber >0.3959194 and randomnumber <=0.4069142:
        m1=101
        m2=151
        mass1=100.9211404
        mass2=151.0788596
if randomnumber >0.4069142 and randomnumber <=0.4178794:
        m1=106
        m2=146
        mass1=105.9143579
        mass2=146.0856421
if randomnumber >0.4178794 and randomnumber <=0.4286153:
        m1=104
        m2=148
        mass1=103.9224647
        mass2=148.0775353
if randomnumber >0.4286153 and randomnumber <=0.43913875:
        m1=105
        m2=147
        mass1=104.9116606
        mass2=147.0883394
if randomnumber >0.43913875 and randomnumber <=0.44943355:
        m1=145
        m2=107
        mass1=144.927627
        mass2=107.072373
if randomnumber >0.44943355 and randomnumber <=0.45971395:
        m1=100
        m2=152
        mass1=99.91776189
        mass2=152.08223811
if randomnumber >0.45971395 and randomnumber <=0.46990475:
        m1=102
        m2=150
        mass1=101.9180376
        mass2=150.0819624
if randomnumber >0.46990475 and randomnumber <=0.4799411:
        m1=107
        m2=145
        mass1=106.9216926
        mass2=145.0783074
if randomnumber >0.4799411 and randomnumber <=0.4898566:
        m1=108
        m2=144
        mass1=107.9101735
```

```
        mass2=144.0898265
if randomnumber >0.4898566 and randomnumber <=0.4995924:
        m1=113
        m2=139
        mass1=112.9155306
        mass2=139.0844694
if randomnumber >0.4995924 and randomnumber <=0.50928715:
        m1=147
        m2=105
        mass1=146.9282353
        mass2=105.0717647
if randomnumber >0.50928715 and randomnumber <=0.51883275:
        m1=147
        m2=105
        mass1=146.922674
        mass2=105.077326
if randomnumber >0.51883275 and randomnumber <=0.52826645:
        m1=109
        m2=143
        mass1=108.9199827
        mass2=143.0800173
if randomnumber >0.52826645 and randomnumber <=0.53757305:
        m1=144
        m2=108          mass1=143.9195996
        mass2=108.0804004
if randomnumber >0.53757305 and randomnumber <=0.546835:
        m1=135
        m2=117
        mass1=134.9100481
        mass2=117.0899519
if randomnumber >0.546835 and randomnumber <=0.5559655:
        m1=139
        m2=113
        mass1=138.913364
        mass2=113.086636
if randomnumber >0.5559655 and randomnumber <=0.5650483:
        m1=114
        m2=138
        mass1=113.9103626
        mass2=138.0896374
if randomnumber >0.5650483 and randomnumber <=0.574090515:
        m1=133
        m2=119
        mass1=132.9109553
        mass2=119.0890447
if randomnumber >0.574090515 and randomnumber <=0.583010665:
        m1=135
        m2=117
        mass1=134.9164486
        mass2=117.0835514
if randomnumber >0.583010665 and randomnumber <=0.591485465:
        m1=115
        m2=137
        mass1=114.9136838
        mass2=137.0863162
if randomnumber >0.591485465 and randomnumber <=0.599348115:
        m1=137
        m2=115
        mass1=136.9178708
        mass2=115.0821292
if randomnumber >0.599348115 and randomnumber <=0.606829965:
        m1=149
        m2=103
        mass1=148.9283999
        mass2=103.0716001
if randomnumber >0.606829965 and randomnumber <=0.614168715:
        m1=103
        m2=149
        mass1=102.9132071
        mass2=149.0867929
if randomnumber >0.614168715 and randomnumber <=0.621398815:
        m1=102
```

```
        m2=150
        mass1=101.9229813
        mass2=150.0770187
if randomnumber >0.621398815 and randomnumber <=0.62813008:
        m1=110
        m2=142
        mass1=109.9111364
        mass2=142.0888636
if randomnumber >0.62813008 and randomnumber <=0.63464558:
        m1=101
        m2=151
        mass1=100.915252
        mass2=151.084748
if randomnumber >0.63464558 and randomnumber <=0.64115528:
        m1=150
        m2=102
        mass1=149.926673
        mass2=102.073327
if randomnumber >0.64115528 and randomnumber <=0.64758609:
        m1=98
        m2=154
        mass1=97.92220302
        mass2=154.07779698
if randomnumber >0.64758609 and randomnumber <=0.65383179:
        m1=99
        m2=153
        mass1=98.91651211
        mass2=153.08348789
if randomnumber >0.65383179 and randomnumber <=0.659914525:
        m1=132
        m2=120
        mass1=131.9144669
        mass2=120.0855331
if randomnumber >0.659914525 and randomnumber <=0.66585235:
        m1=116
        m2=136
        mass1=115.9113599
        mass2=136.0886401
if randomnumber >0.66585235 and randomnumber <=0.6715992:
        m1=99
        m2=153
        mass1=98.9246362
        mass2=153.0753638
if randomnumber >0.6715992 and randomnumber <=0.67714825:
        m1=141
        m2=111
        mass1=140.914411
        mass2=111.085589
if randomnumber >0.67714825 and randomnumber <=0.68249485:
        m1=151
        m2=101
        mass1=150.9283186
        mass2=101.0716814
if randomnumber >0.68249485 and randomnumber <=0.68777615:
        m1=133
        m2=119
        mass1=132.9152516
        mass2=119.0847484
if randomnumber >0.68777615 and randomnumber <=0.6930442:
        m1=143
        m2=109
        mass1=142.9160627
        mass2=109.0839373
if randomnumber >0.6930442 and randomnumber <=0.698121845:
        m1=117
        m2=135
        mass1=116.9116846
        mass2=135.0883154
if randomnumber >0.698121845 and randomnumber <=0.703171645:
        m1=146
        m2=106
        mass1=145.918759
```

```
        mass2=106.081241
if randomnumber >0.703171645 and randomnumber <=0.708193695:
        m1=138
        m2=114
        mass1=137.9223496
        mass2=114.0776504
if randomnumber >0.708193695 and randomnumber <=0.713202545:
        m1=141
        m2=111
        mass1=140.926648
        mass2=111.073352
if randomnumber >0.713202545 and randomnumber <=0.718199805:
        m1=105
        m2=147
        mass1=104.9239365
        mass2=147.0760635
if randomnumber >0.718199805 and randomnumber <=0.723172315:
        m1=131
        m2=121
        mass1=130.9119823
        mass2=121.0880177
if randomnumber >0.723172315 and randomnumber <=0.728102715:
        m1=148
        m2=104
        mass1=147.9322289
        mass2=104.0677711
if randomnumber >0.728102715 and randomnumber <=0.733006875:
        m1=146
        m2=106
        mass1=145.9302196
        mass2=106.0697804
if randomnumber >0.733006875 and randomnumber <=0.737888785:
        m1=115
        m2=137
        mass1=114.9087627
        mass2=137.0912373
if randomnumber >0.737888785 and randomnumber <=0.742593185:
        m1=150
        m2=102
        mass1=149.9304089
        mass2=102.0695911
if randomnumber >0.742593185 and randomnumber <=0.74728587:
        m1=112
        m2=140
        mass1=111.918965
        mass2=140.081035
if randomnumber >0.74728587 and randomnumber <=0.75192925:
        m1=149
        m2=103
        mass1=148.9237177
        mass2=103.0762823
if randomnumber >0.75192925 and randomnumber <=0.75649834:
        m1=134
        m2=118
        mass1=133.9097445
        mass2=118.0902555
if randomnumber >0.75649834 and randomnumber <=0.76106155:
        m1=114
        m2=138
        mass1=113.9088037
        mass2=138.0911963
if randomnumber >0.76106155 and randomnumber <=0.765620685:
        m1=136
        m2=116
        mass1=135.9201012
        mass2=116.0798988
if randomnumber >0.765620685 and randomnumber <=0.770147345:
        m1=109
        m2=143
        mass1=108.9087373
        mass2=143.0912627
if randomnumber >0.770147345 and randomnumber <=0.774585405:
```

```
        m1=96
        m2=156
        mass1=95.9216968
        mass2=156.0783032
    if randomnumber >0.774585405 and randomnumber <=0.77895539:
        m1=138
        m2=114
        mass1=137.9110167
        mass2=114.0889833
    if randomnumber >0.77895539 and randomnumber <=0.78331321:
        m1=107
        m2=145
        mass1=106.9099051
        mass2=145.0900949
    if randomnumber >0.78331321 and randomnumber <=0.78766198:
        m1=97
        m2=155
        mass1=96.918134
        mass2=155.081866
    if randomnumber >0.78766198 and randomnumber <=0.79193763:
        m1=110
        m2=142
        mass1=109.9238205
=        mass2=142.0761795
    if randomnumber >0.79193763 and randomnumber <=0.796154335:
        m1=103
        m2=149
        mass1=102.9265996
        mass2=149.0734004
    if randomnumber >0.796154335 and randomnumber <=0.800294375:
        m1=152
        m2=100
        mass1=151.9246822
        mass2=100.0753178
    if randomnumber >0.800294375 and randomnumber <=0.804386955:
        m1=116
        m2=136
        mass1=115.9141587
        mass2=136.0858413
    if randomnumber >0.804386955 and randomnumber <=0.808467075:
        m1=136
        m2=116
        mass1=135.9072188
        mass2=116.0927812
    if randomnumber >0.808467075 and randomnumber <=0.812461315:
        m1=153
        m2=99
        mass1=152.9276982
        mass2=99.0723018
    if randomnumber >0.812461315 and randomnumber <=0.81635148:
        m1=100
        m2=152
        mass1=99.92775659
        mass2=152.07224341
    if randomnumber >0.81635148 and randomnumber <=0.820235065:
        m1=132
        m2=120
        mass1=131.9085532
        mass2=120.0914468
    if randomnumber >0.820235065 and randomnumber <=0.824068945:
        m1=95
        m2=157
        mass1=94.91935877
        mass2=157.08064123
    if randomnumber >0.824068945 and randomnumber <=0.82779406:
        m1=112
        m2=140
        mass1=111.9073141
        mass2=140.0926859
    if randomnumber >0.82779406 and randomnumber <=0.83150695:
        m1=143
        m2=109
```

```
       mass1=142.9273518
       mass2=109.0726482
if randomnumber >0.83150695 and randomnumber <=0.834987735:
       m1=152
       m2=100
       mass1=151.9314992
       mass2=100.0685008
if randomnumber >0.834987735 and randomnumber <=0.83845031:
       m1=137
       m2=115
       mass1=136.9070895
       mass2=115.0929105
if randomnumber >0.83845031 and randomnumber <=0.84178469:
       m1=108
       m2=144
       mass1=107.923453
       mass2=144.076547
if randomnumber >0.84178469 and randomnumber <=0.84479219:
       m1=97
       m2=155
       mass1=96.92615292
       mass2=155.07384708
if randomnumber >0.84479219 and randomnumber <=0.84774779:
       m1=118
       m2=134
       mass1=117.9145828
       mass2=134.0854172
if randomnumber >0.84774779 and randomnumber <=0.850684675:
       m1=98
       m2=154
       mass1=97.91273489
       mass2=154.08726511
if randomnumber >0.850684675 and randomnumber <=0.853537945:
       m1=100
       m2=152
       mass1=99.91418162
       mass2=152.08581838
if randomnumber >0.853537945 and randomnumber <=0.8563397:
       m1=151
       m2=101
       mass1=150.9238289
       mass2=101.0761711
if randomnumber >0.8563397 and randomnumber <=0.85914106:
       m1=114
       m2=138
       mass1=113.918806
       mass2=138.081194
if randomnumber >0.85914106 and randomnumber <=0.86193259:
       m1=134
       m2=118
       mass1=133.9203797
       mass2=118.0796203
if randomnumber >0.86193259 and randomnumber <=0.86469434:
       m1=154
       m2=98
       mass1=153.9264639
       mass2=98.0735361
if randomnumber >0.86469434 and randomnumber <=0.867437005:
       m1=144
       m2=108
       mass1=143.9320769
       mass2=108.0679231
if randomnumber >0.867437005 and randomnumber <=0.870173005:
       m1=94
       m2=158
       mass1=93.91536131
       mass2=158.08463869
if randomnumber >0.870173005 and randomnumber <=0.872898303:
       m1=96
       m2=156
       mass1=95.91589134
       mass2=156.08410866
```

```
if randomnumber >0.872898303 and randomnumber <=0.875602073:
    m1=148
    m2=104
    mass1=147.922135
    mass2=104.077865
if randomnumber >0.875602073 and randomnumber <=0.878182213:
    m1=140
    m2=112
    mass1=139.9106045
    mass2=112.0893955
if randomnumber >0.878182213 and randomnumber <=0.880694753:
    m1=93
    m2=159
    mass1=92.92204188
    mass2=159.07795812
if randomnumber >0.880694753 and randomnumber <=0.883015948:
    m1=102
    m2=150
    mass1=101.9102974
    mass2=150.0897026
if randomnumber >0.883015948 and randomnumber <=0.885307348:
    m1=156
    m2=96
    mass1=155.9310567
    mass2=96.0689433
if randomnumber >0.885307348 and randomnumber <=0.887576278:
    m1=94
    m2=158
    mass1=93.92640495
    mass2=158.07359505
if randomnumber >0.887576278 and randomnumber <=0.889797353:
    m1=130
    m2=122
    mass1=129.9116563
    mass2=122.0883437
if randomnumber >0.889797353 and randomnumber <=0.892001768:
    m1=106
    m2=146
    mass1=105.92797
    mass2=146.07203
if randomnumber >0.892001768 and randomnumber <=0.894204018:
    m1=155
    m2=97
    mass1=154.9281013
    mass2=97.0718987
if randomnumber >0.894204018 and randomnumber <=0.896357483:
    m1=104
    m2=148
    mass1=103.9114475
    mass2=148.0885525
if randomnumber >0.896357483 and randomnumber <=0.898451298:
    m1=154
    m2=98
    mass1=153.9294773
    mass2=98.0705227
if randomnumber >0.898451298 and randomnumber <=0.900520408:
    m1=142
    m2=110
    mass1=141.9140791
    mass2=110.0859209
if randomnumber >0.900520408 and randomnumber <=0.902577428:
    m1=135
    m2=117
    mass1=134.9072275
    mass2=117.0927725
if randomnumber >0.902577428 and randomnumber <=0.904625838:
    m1=139
    m2=113
    mass1=138.9260995
    mass2=113.0739005
if randomnumber >0.904625838 and randomnumber <=0.906657008:
    m1=129
```

```
    m2=123
    mass1=128.913479
    mass2=123.086521
if randomnumber >0.906657008 and randomnumber <=0.908511223:
    m1=98
    m2=154
    mass1=97.92845293
    mass2=154.07154707
if randomnumber >0.908511223 and randomnumber <=0.910351338:
    m1=142
    m2=110
    mass1=141.9297096
    mass2=110.0702904
if randomnumber >0.910351338 and randomnumber <=0.912161208:
    m1=130
    m2=122
    mass1=129.9139673
    mass2=122.0860327
if randomnumber >0.912161208 and randomnumber <=0.913894033:
    m1=145
    m2=107
    mass1=144.9172331
    mass2=107.0827669
if randomnumber >0.913894033 and randomnumber <=0.915626543:
    m1=92
    m2=160
    mass1=91.9197289
    mass2=160.0802711
if randomnumber >0.915626543 and randomnumber <=0.917308573:
    m1=101
    m2=151
    mass1=100.9303139
    mass2=151.0696861
if randomnumber >0.917308573 and randomnumber <=0.918981558:
    m1=90
    m2=162
    mass1=89.91951656
    mass2=162.08048344
if randomnumber >0.918981558 and randomnumber <=0.920562048:
    m1=91
    m2=161
    mass1=90.92344522
    mass2=161.07655478
if randomnumber >0.920562048 and randomnumber <=0.92209017:
    m1=131
    m2=121
    mass1=130.9085239
    mass2=121.0914761
if randomnumber >0.92209017 and randomnumber <=0.92356834:
    m1=131
    m2=121
    mass1=130.9169998
    mass2=121.0830002
if randomnumber >0.92356834 and randomnumber <=0.925026875:
    m1=117
    m2=135
    mass1=116.9178413
    mass2=135.0821587
if randomnumber >0.925026875 and randomnumber <=0.926484385:
    m1=151
    m2=101
    mass1=150.9339762
    mass2=101.0660238
if randomnumber >0.926484385 and randomnumber <=0.92794121:
    m1=111
    m2=141
    mass1=110.9076707
    mass2=141.0923293
if randomnumber >0.92794121 and randomnumber <=0.929364795:
    m1=157
    m2=95
    mass1=156.9283587
```

```
        mass2=95.0716413
if randomnumber >0.929364795 and randomnumber <=0.93072539:
        m1=118
        m2=134
        mass1=117.9069145
        mass2=134.0930855
if randomnumber >0.93072539 and randomnumber <=0.93206608:
        m1=95
        m2=157
        mass1=94.92930289
        mass2=157.07069711
if randomnumber >0.93206608 and randomnumber <=0.933368765:
        m1=153
        m2=99
        mass1=152.9338389
        mass2=99.0661611
if randomnumber >0.933368765 and randomnumber <=0.93459149:
        m1=158
        m2=94
        mass1=157.9299913
        mass2=94.0700087
if randomnumber >0.93459149 and randomnumber <=0.935810525:
        m1=147
        m2=105
        mass1=146.934945
        mass2=105.065055
if randomnumber >0.935810525 and randomnumber <=0.937026685:
        m1=155
        m2=97
        mass1=154.932932
        mass2=97.067068
if randomnumber >0.937026685 and randomnumber <=0.938207665:
        m1=93
        m2=159
        mass1=92.91402563
        mass2=159.08597437
if randomnumber >0.938207665 and randomnumber <=0.939388425:
        m1=92
        m2=160
        mass1=91.92615621
        mass2=160.07384379
if randomnumber >0.939388425 and randomnumber <=0.940559635:
        m1=149
        m2=103
        mass1=148.934734
        mass2=103.065266
if randomnumber >0.940559635 and randomnumber <=0.941726775:
        m1=137
        m2=115
        mass1=136.925323
        mass2=115.074677
if randomnumber >0.941726775 and randomnumber <=0.942851786:
        m1=113
        m2=139
        mass1=112.9065666
        mass2=139.0934334
if randomnumber >0.942851786 and randomnumber <=0.943973431:
        m1=104
        m2=148
        mass1=103.92878
        mass2=148.07122
if randomnumber >0.943973431 and randomnumber <=0.945091221:
        m1=91
        m2=161
        mass1=90.91653696
        mass2=161.08346304
if randomnumber >0.945091221 and randomnumber <=0.946188491:
        m1=133
        m2=119
        mass1=132.9077969
        mass2=119.0922031
if randomnumber >0.946188491 and randomnumber <=0.947272156:
```

```
        m1=153
        m2=99
        mass1=152.9241169
        mass2=99.0758831
if randomnumber >0.947272156 and randomnumber <=0.948338226:
        m1=113
        m2=139
        mass1=112.9224872
        mass2=139.0775128
if randomnumber >0.948338226 and randomnumber <=0.949378991:
        m1=106
        m2=146
        mass1=105.9073294
        mass2=146.0926706
if randomnumber >0.949378991 and randomnumber <=0.950378246:
        m1=157
        m2=95
        mass1=156.9330394
        mass2=95.0669606
if randomnumber >0.950378246 and randomnumber <=0.951366971:
        m1=95
        m2=157
        mass1=94.91282062
        mass2=157.08717938
if randomnumber >0.951366971 and randomnumber <=0.952333681:
        m1=119
        m2=133
        mass1=118.9156651
        mass2=133.0843349
if randomnumber >0.952333681 and randomnumber <=0.953285596:
        m1=117
        m2=135
        mass1=116.9072186
        mass2=135.0927814
if randomnumber >0.953285596 and randomnumber <=0.954190101:
        m1=147
        m2=105
        mass1=146.918996
        mass2=105.081004
if randomnumber >0.954190101 and randomnumber <=0.955080809:
        m1=119
        m2=133
        mass1=118.9099216
        mass2=133.0900784
if randomnumber >0.955080809 and randomnumber <=0.955960974:
        m1=159
        m2=93
        mass1=158.9332113
        mass2=93.0667887
if randomnumber >0.955960974 and randomnumber <=0.956839999:
        m1=111
        m2=141
        mass1=110.9256928
        mass2=141.0743072
if randomnumber >0.956839999 and randomnumber <=0.957714897:
        m1=128
        m2=124
        mass1=127.9105366
        mass2=124.0894634
if randomnumber >0.957714897 and randomnumber <=0.958583377:
        m1=89
        m2=163
        mass1=88.91763058
        mass2=163.08236942
if randomnumber >0.958583377 and randomnumber <=0.959444412:
        m1=129
        m2=123
        mass1=128.9091484
        mass2=123.0908516
if randomnumber >0.959444412 and randomnumber <=0.960300437:
        m1=115
        m2=137
```

```
        mass1=114.920334
        mass2=137.079666
if randomnumber >0.960300437 and randomnumber <=0.961145162:
        m1=88
        m2=164
        mass1=87.92406593
        mass2=164.07593407
if randomnumber >0.961145162 and randomnumber <=0.961973802:
        m1=97
        m2=155
        mass1=96.91095311
        mass2=155.08904689
if randomnumber >0.961973802 and randomnumber <=0.962758902:
        m1=160
        m2=92
        mass1=159.931971
        mass2=92.068029
if randomnumber >0.962758902 and randomnumber <=0.963538937:
        m1=120
        m2=132
        mass1=119.9098501
        mass2=132.0901499
if randomnumber >0.963538937 and randomnumber <=0.964288837:
        m1=89
        m2=163
        mass1=88.92638533
        mass2=163.07361467
if randomnumber >0.964288837 and randomnumber <=0.965035547:
        m1=145
        m2=107
        mass1=144.9355262
        mass2=107.0644738
if randomnumber >0.965035547 and randomnumber <=0.965777427:
        m1=109
        m2=143
        mass1=108.92781
        mass2=143.07219
if randomnumber >0.965777427 and randomnumber <=0.966517652:
        m1=158
        m2=94
        mass1=157.9278453
        mass2=94.0721547
if randomnumber >0.966517652 and randomnumber <=0.967246422:
        m1=135
        m2=117
        mass1=134.9251658
        mass2=117.0748342
if randomnumber >0.967246422 and randomnumber <=0.967971292:
        m1=150
        m2=102
        mass1=149.9208909
        mass2=102.0791091
if randomnumber >0.967971292 and randomnumber <=0.968694157:
        m1=139
        m2=113
        mass1=138.9088413
        mass2=113.0911587
if randomnumber >0.968694157 and randomnumber <=0.969382647:
        m1=132
        m2=120
        mass1=131.9178157
        mass2=120.0821843
if randomnumber >0.969382647 and randomnumber <=0.970040747:
        m1=99
        m2=153
        mass1=98.93324093
        mass2=153.06675907
if randomnumber >0.970040747 and randomnumber <=0.970696052:
        m1=159
        m2=93
        mass1=158.9290889
        mass2=93.0709111
```

```
if randomnumber >0.970696052 and randomnumber <=0.971343672:
    m1=93
    m2=159
    mass1=92.93127436
    mass2=159.06872564
if randomnumber >0.971343672 and randomnumber <=0.971979312:
    m1=96
    m2=156
    mass1=95.93427264
    mass2=156.06572736
if randomnumber >0.971979312 and randomnumber <=0.972612942:
    m1=118
    m2=134
    mass1=117.9189843
    mass2=134.0810157
if randomnumber >0.972612942 and randomnumber <=0.973218697:
    m1=152
    m2=100
    mass1=151.9234968
    mass2=100.0765032
if randomnumber >0.973218697 and randomnumber <=0.973801646:
    m1=99
    m2=153
    mass1=98.91161838
    mass2=153.08838162
if randomnumber >0.973801646 and randomnumber <=0.974383601:
    m1=140
    m2=112
    mass1=139.931
    mass2=112.069
if randomnumber >0.974383601 and randomnumber <=0.974956637:
    m1=108
    m2=144
    mass1=107.908728
    mass2=144.091272
if randomnumber >0.974956637 and randomnumber <=0.975506447:
    m1=87
    m2=165
    mass1=86.92071132
    mass2=165.07928868
if randomnumber >0.975506447 and randomnumber <=0.976050762:
    m1=90
    m2=162
    mass1=89.93062774
    mass2=162.06937226
if randomnumber >0.976050762 and randomnumber <=0.976581317:
    m1=161
    m2=91
    mass1=160.93368
    mass2=91.06632
if randomnumber >0.976581317 and randomnumber <=0.977107617:
    m1=156
    m2=96
    mass1=155.9350181
    mass2=96.0649819
if randomnumber >0.977107617 and randomnumber <=0.977614392:
    m1=156
    m2=96
    mass1=155.9255279
    mass2=96.0744721
if randomnumber >0.977614392 and randomnumber <=0.978120077:
    m1=144
    m2=108
    mass1=143.9136473
    mass2=108.0863527
if randomnumber >0.978120077 and randomnumber <=0.978611379:
    m1=116
    m2=136
    mass1=115.9047558
    mass2=136.0952442
if randomnumber >0.978611379 and randomnumber <=0.979102192:
    m1=127
```

```
        m2=125
        mass1=126.91036
        mass2=125.08964
if randomnumber >0.979102192 and randomnumber <=0.979591465:
        m1=121
        m2=131
        mass1=120.9129774
        mass2=131.0870226
if randomnumber >0.979591465 and randomnumber <=0.980071153:
        m1=155
        m2=97
        mass1=154.9246402
        mass2=97.0753598
if randomnumber >0.980071153 and randomnumber <=0.980532702:
        m1=90
        m2=162
        mass1=89.91480169
        mass2=162.08519831
if randomnumber >0.980532702 and randomnumber <=0.980982329:
        m1=107
        m2=145
        mass1=106.93031
        mass2=145.06969
if randomnumber >0.980982329 and randomnumber <=0.981428728:
        m1=101
        m2=151
        mass1=100.910347
        mass2=151.089653
if randomnumber >0.981428728 and randomnumber <=0.981869007:
        m1=88
        m2=164
        mass1=87.91444697
        mass2=164.08555303
if randomnumber >0.981869007 and randomnumber <=0.982302741:
        m1=160
        m2=92
        mass1=159.93514
        mass2=92.06486
if randomnumber >0.982302741 and randomnumber <=0.982719946:
        m1=122
        m2=130
        mass1=121.9133324
        mass2=130.0866676
if randomnumber >0.982719946 and randomnumber <=0.983133055:
        m1=102
        m2=150
        mass1=101.9335557
        mass2=150.0664443
if randomnumber >0.983133055 and randomnumber <=0.98354022:
        m1=92
        m2=160
        mass1=91.91103786
        mass2=160.08896214
if randomnumber >0.98354022 and randomnumber <=0.98393752:
        m1=120
        m2=132
        mass1=119.9187874
        mass2=132.0812126
if randomnumber >0.98393752 and randomnumber <=0.984312521:
        m1=85
        m2=167
        mass1=84.92224505
        mass2=167.07775495
if randomnumber >0.984312521 and randomnumber <=0.984684812:
        m1=152
        m2=100
        mass1=151.93654
        mass2=100.06346
if randomnumber >0.984684812 and randomnumber <=0.985040168:
        m1=87
        m2=165
        mass1=86.92852136
```

```
        mass2=165.07147864
if randomnumber >0.985040168 and randomnumber <=0.985385874:
        m1=158
        m2=94
        mass1=157.9365614
        mass2=94.0634386
if randomnumber >0.985385874 and randomnumber <=0.985727346:
        m1=105
        m2=147
        mass1=104.9077529
        mass2=147.0922471
if randomnumber >0.985727346 and randomnumber <=0.986062442:
        m1=86
        m2=166
        mass1=85.92427158
        mass2=166.07572842
if randomnumber >0.986062442 and randomnumber <=0.986375474:
        m1=133
        m2=119
        mass1=132.9238292
        mass2=119.0761708
if randomnumber >0.986375474 and randomnumber <=0.986680692:
        m1=162
        m2=90
        mass1=161.9309848
        mass2=90.0690152
if randomnumber >0.986680692 and randomnumber <=0.986983194:
        m1=110
        m2=142
        mass1=109.9051533
        mass2=142.0948467
if randomnumber >0.986983194 and randomnumber <=0.987280982:
        m1=94
        m2=158
        mass1=93.91159525
        mass2=158.08840475
if randomnumber >0.987280982 and randomnumber <=0.987578359:
        m1=161
        m2=91
        mass1=160.9296692
        mass2=91.0703308
if randomnumber >0.987578359 and randomnumber <=0.987868467:
        m1=149
        m2=103
        mass1=148.9201488
        mass2=103.0798512
if randomnumber >0.987868467 and randomnumber <=0.98815123:
        m1=103
        m2=149
        mass1=102.9091814
        mass2=149.0908186
if randomnumber >0.98815123 and randomnumber <=0.988426528:
        m1=150
        m2=102
        mass1=149.93877
        mass2=102.06123
if randomnumber >0.988426528 and randomnumber <=0.988697166:
        m1=138
        m2=114
        mass1=137.92922
        mass2=114.07078
if randomnumber >0.988697166 and randomnumber <=0.988963635:
        m1=115
        m2=137
        mass1=114.905431
        mass2=137.094569
if randomnumber >0.988963635 and randomnumber <=0.989229943:
        m1=154
        m2=98
        mass1=153.9375182
        mass2=98.0624818
if randomnumber >0.989229943 and randomnumber <=0.989474247:
```

```
        m1=94
        m2=158
        mass1=93.93436
        mass2=158.06564
if randomnumber >0.989474247 and randomnumber <=0.989714076:
        m1=148
        m2=104
        mass1=147.93772
        mass2=104.06228
if randomnumber >0.989714076 and randomnumber <=0.98994899:
        m1=162
        m2=90
        mass1=161.93704
        mass2=90.06296
if randomnumber >0.98994899 and randomnumber <=0.990183219:
        m1=163
        m2=89
        mass1=162.93399
        mass2=89.06601
if randomnumber >0.990183219 and randomnumber <=0.990404249:
        m1=88
        m2=164
        mass1=87.931424
        mass2=164.068576
if randomnumber >0.990404249 and randomnumber <=0.990613964:
        m1=86
        m2=166
        mass1=85.91879758
        mass2=166.08120242
if randomnumber >0.990613964 and randomnumber <=0.990823344:
        m1=154
        m2=98
        mass1=153.9222093
        mass2=98.0777907
if randomnumber >0.990823344 and randomnumber <=0.991031778:
        m1=143
        m2=109
        mass1=142.93511
        mass2=109.06489
if randomnumber >0.991031778 and randomnumber <=0.991239293:
        m1=96
        m2=156
        mass1=95.90827339
        mass2=156.09172661
if randomnumber >0.991239293 and randomnumber <=0.991446048:
        m1=91
        m2=161
        mass1=90.9339681
        mass2=161.0660319
if randomnumber >0.991446048 and randomnumber <=0.99164092:
        m1=105
        m2=147
        mass1=104.93305
        mass2=147.06695
if randomnumber >0.99164092 and randomnumber <=0.991828126:
        m1=160
        m2=92
        mass1=159.9270541
        mass2=92.0729459
if randomnumber >0.991828126 and randomnumber <=0.992014061:
        m1=141
        m2=111
        mass1=140.9109622
        mass2=111.0890378
if randomnumber >0.992014061 and randomnumber <=0.992199827:
        m1=134
        m2=118
        mass1=133.9053945
        mass2=118.0946055
if randomnumber >0.992199827 and randomnumber <=0.992379887:
        m1=112
        m2=140
```

```
        mass1=111.9070048
        mass2=140.0929952
if randomnumber >0.992379887 and randomnumber <=0.992555828:
        m1=100
        m2=152
        mass1=99.93535191
        mass2=152.06464809
if randomnumber >0.992555828 and randomnumber <=0.992730633:
        m1=157
        m2=95
        mass1=156.9254236
        mass2=95.0745764
if randomnumber >0.992730633 and randomnumber <=0.992902579:
        m1=97
        m2=155
        mass1=96.93735192
        mass2=155.06264808
if randomnumber >0.992902579 and randomnumber <=0.99306968:
        m1=123
        m2=129
        mass1=122.917003
        mass2=129.082997
if randomnumber >0.99306968 and randomnumber <=0.993223411:
        m1=146
        m2=106
        mass1=145.9176443
        mass2=106.0823557
if randomnumber >0.993223411 and randomnumber <=0.993377057:
        m1=130
        m2=122
        mass1=129.9062244
        mass2=122.0937756
if randomnumber >0.993377057 and randomnumber <=0.993527958:
        m1=136
        m2=116
        mass1=135.93035
        mass2=116.06965
if randomnumber >0.993527958 and randomnumber <=0.993673844:
        m1=136
        m2=116
        mass1=135.9073116
        mass2=116.0926884
if randomnumber >0.993673844 and randomnumber <=0.99381179:
        m1=141
        m2=111
        mass1=140.93503
        mass2=111.06497
if randomnumber >0.99381179 and randomnumber <=0.993941552:
        m1=85
        m2=167
        mass1=84.93202
        mass2=167.06798
if randomnumber >0.993941552 and randomnumber <=0.994070564:
        m1=164
        m2=88
        mass1=163.93586
        mass2=88.06414
if randomnumber >0.994070564 and randomnumber <=0.994199501:
        m1=146
        m2=106
        mass1=145.9402894
        mass2=106.0597106
if randomnumber >0.994199501 and randomnumber <=0.994326873:
        m1=84
        m2=168
        mass1=83.91846235
        mass2=168.08153765
if randomnumber >0.994326873 and randomnumber <=0.994451555:
        m1=161
        m2=91
        mass1=160.93883
        mass2=91.06117
```

```
if randomnumber >0.994451555 and randomnumber <=0.994567562:
    m1=83
    m2=169
    mass1=82.92498002
    mass2=169.07501998
if randomnumber >0.994567562 and randomnumber <=0.994683109:
    m1=110
    m2=142
    mass1=109.92973
    mass2=142.07027
if randomnumber >0.994683109 and randomnumber <=0.994797696:
    m1=112
    m2=140
    mass1=111.9291465
    mass2=140.0708535
if randomnumber >0.994797696 and randomnumber <=0.994910813:
    m1=116
    m2=136
    mass1=115.924062
    mass2=136.075938
if randomnumber >0.994910813 and randomnumber <=0.99502269:
    m1=87
    m2=165
    mass1=86.91335486
    mass2=165.08664514
if randomnumber >0.99502269 and randomnumber <=0.995132172:
    m1=84
    m2=168
    mass1=83.929058
    mass2=168.070942
if randomnumber >0.995132172 and randomnumber <=0.995240424:
    m1=98
    m2=154
    mass1=97.91032841
    mass2=154.08967159
if randomnumber >0.995240424 and randomnumber <=0.995347727:
    m1=151
    m2=101
    mass1=150.921207
    mass2=101.078793
if randomnumber >0.995347727 and randomnumber <=0.995453069:
    m1=132
    m2=120
    mass1=131.9079974
    mass2=120.0920026
if randomnumber >0.995453069 and randomnumber <=0.995555091:
    m1=159
    m2=93
    mass1=158.93897
    mass2=93.06103
if randomnumber >0.995555091 and randomnumber <=0.995655099:
    m1=89
    m2=163
    mass1=88.91227802
    mass2=163.08772198
if randomnumber >0.995655099 and randomnumber <=0.995753886:
    m1=114
    m2=138
    mass1=113.9033585
    mass2=138.0966415
if randomnumber >0.995753886 and randomnumber <=0.995849994:
    m1=85
    m2=167
    mass1=84.9156084
    mass2=167.0843916
if randomnumber >0.995849994 and randomnumber <=0.995945181:
    m1=114
    m2=138
    mass1=113.924281
    mass2=138.075719
if randomnumber >0.995945181 and randomnumber <=0.996039989:
    m1=121
```

```
    m2=131
    mass1=120.919848
    mass2=131.080152
if randomnumber >0.996039989 and randomnumber <=0.996128947:
    m1=91
    m2=161
    mass1=90.9102031
    mass2=161.0897969
if randomnumber >0.996128947 and randomnumber <=0.996217455:
    m1=103
    m2=149
    mass1=102.93673
    mass2=149.06327
if randomnumber >0.996217455 and randomnumber <=0.996305943:
    m1=157
    m2=95
    mass1=156.93903
    mass2=95.06097
if randomnumber >0.996305943 and randomnumber <=0.996394201:
    m1=126
    m2=126
    mass1=125.9076533
    mass2=126.0923467
if randomnumber >0.996394201 and randomnumber <=0.996476749:
    m1=164
    m2=88
    mass1=163.9333508
    mass2=88.0666492
if randomnumber >0.996476749 and randomnumber <=0.996558977:
    m1=143
    m2=109
    mass1=142.9123859
    mass2=109.0876141
if randomnumber >0.996558977 and randomnumber <=0.996638185:
    m1=107
    m2=145
    mass1=106.9067484
    mass2=145.0932516
if randomnumber >0.996638185 and randomnumber <=0.996714763:
    m1=89
    m2=163
    mass1=88.93645
    mass2=163.06355
if randomnumber >0.996714763 and randomnumber <=0.996790546:
    m1=163
    m2=89
    mass1=162.93921
    mass2=89.06079
if randomnumber >0.996790546 and randomnumber <=0.996866019:
    m1=165
    m2=87
    mass1=164.93488
    mass2=87.06512
if randomnumber >0.996866019 and randomnumber <=0.996941457:
    m1=134
    m2=118
    mass1=133.9282918
    mass2=118.0717082
if randomnumber >0.996941457 and randomnumber <=0.997016695:
    m1=128
    m2=124
    mass1=127.909169
    mass2=124.090831
if randomnumber >0.997016695 and randomnumber <=0.997090908:
    m1=100
    m2=152
    mass1=99.90747734
    mass2=152.09252266
if randomnumber >0.997090908 and randomnumber <=0.997157191:
    m1=148
    m2=104
    mass1=147.9168933
```

```
        mass2=104.0831067
if randomnumber >0.997157191 and randomnumber <=0.997221625:
        m1=138
        m2=114
        mass1=137.9052472
        mass2=114.0947528
if randomnumber >0.997221625 and randomnumber <=0.997285858:
        m1=163
        m2=89
        mass1=162.9306475
        mass2=89.0693525
if randomnumber >0.997285858 and randomnumber <=0.997347837:
        m1=159
        m2=93
        mass1=158.9263887
        mass2=93.0736113
if randomnumber >0.997347837 and randomnumber <=0.997407735:
        m1=92
        m2=160
        mass1=91.93925871
        mass2=160.06074129
if randomnumber >0.997407735 and randomnumber <=0.997465454:
        m1=144
        m2=108
        mass1=143.93851
        mass2=108.06149
if randomnumber >0.997465454 and randomnumber <=0.997522802:
        m1=155
        m2=97
        mass1=154.94012
        mass2=97.05988
if randomnumber >0.997522802 and randomnumber <=0.997578431:
        m1=83
        m2=169
        mass1=82.91911847
        mass2=169.08088153
if randomnumber >0.997578431 and randomnumber <=0.997633634:
        m1=124
        m2=128
        mass1=123.9176476
        mass2=128.0823524
if randomnumber >0.997633634 and randomnumber <=0.997688531:
        m1=95
        m2=157
        mass1=94.93984
        mass2=157.06016
if randomnumber >0.997688531 and randomnumber <=0.997741985:
        m1=93
        m2=159
        mass1=92.90958271
        mass2=159.09041729
if randomnumber >0.997741985 and randomnumber <=0.997793763:
        m1=166
        m2=86
        mass1=165.937992
        mass2=86.062008
if randomnumber >0.997793763 and randomnumber <=0.997844687:
        m1=130
        m2=122
        mass1=129.92497
        mass2=122.07503
if randomnumber >0.997844687 and randomnumber <=0.99789559:
        m1=153
        m2=99
        mass1=152.94058
        mass2=99.05942
if randomnumber >0.99789559 and randomnumber <=0.997946379:
        m1=108
        m2=144
        mass1=107.93484
        mass2=144.06516
if randomnumber >0.997946379 and randomnumber <=0.997996188:
```

```
        m1=165
        m2=87
        mass1=164.93938
        mass2=87.06062
if randomnumber >0.997996188 and randomnumber <=0.998045796:
        m1=156
        m2=96
        mass1=155.9247522
        mass2=96.0752478
if randomnumber >0.998045796 and randomnumber <=0.998094625:
        m1=129
        m2=123
        mass1=128.921697
        mass2=123.078303
if randomnumber >0.998094625 and randomnumber <=0.998141949:
        m1=124
        m2=128
        mass1=123.9131752
        mass2=128.0868248
if randomnumber >0.998141949 and randomnumber <=0.998188698:
        m1=86
        m2=166
        mass1=85.9365
        mass2=166.0635
if randomnumber >0.998188698 and randomnumber <=0.998231162:
        m1=119
        m2=133
        mass1=118.92311
        mass2=133.07689
if randomnumber >0.998231162 and randomnumber <=0.998272246:
        m1=139
        m2=113
        mass1=138.93473
        mass2=113.06527
if randomnumber >0.998272246 and randomnumber <=0.998313265:
        m1=98
        m2=154
        mass1=97.94179067
        mass2=154.05820933
if randomnumber >0.998313265 and randomnumber <=0.998353739:
        m1=109
        m2=143
        mass1=108.9059505
        mass2=143.0940495
if randomnumber >0.998353739 and randomnumber <=0.998393708:
        m1=82
        m2=170
        mass1=81.92450407
        mass2=170.07549593
if randomnumber >0.998393708 and randomnumber <=0.998433627:
        m1=126
        m2=126
        mass1=125.9164639
        mass2=126.0835361
if randomnumber >0.998433627 and randomnumber <=0.998470206:
        m1=125
        m2=127
        mass1=124.9136006
        mass2=127.0863994
if randomnumber >0.998470206 and randomnumber <=0.998504485:
        m1=162
        m2=90
        mass1=161.9294882
        mass2=90.0705118
if randomnumber >0.998504485 and randomnumber <=0.998537274:
        m1=153
        m2=99
        mass1=152.9220974
        mass2=99.0779026
if randomnumber >0.998537274 and randomnumber <=0.998569238:
        m1=83
        m2=169
```

```
        mass1=82.93462
        mass2=169.06538
if randomnumber >0.998569238 and randomnumber <=0.99860074:
        m1=147
        m2=105
        mass1=146.944155
        mass2=105.055845
if randomnumber >0.99860074 and randomnumber <=0.998632149:
        m1=125
        m2=127
        mass1=124.9077841
        mass2=127.0922159
if randomnumber >0.998632149 and randomnumber <=0.99866274:
        m1=151
        m2=101
        mass1=150.94172
        mass2=101.05828
if randomnumber >0.99866274 and randomnumber <=0.998693027:
        m1=106
        m2=146
        mass1=105.93591
        mass2=146.06409
if randomnumber >0.998693027 and randomnumber <=0.998722436:
        m1=102
        m2=150
        mass1=101.909215
        mass2=150.090785
if randomnumber >0.998722436 and randomnumber <=0.998751795:
        m1=95
        m2=157
        mass1=94.9080426
        mass2=157.0919574
if randomnumber >0.998751795 and randomnumber <=0.998780052:
        m1=101
        m2=151
        mass1=100.9405179
        mass2=151.0594821
if randomnumber >0.998780052 and randomnumber <=0.998807956:
        m1=158
        m2=94
        mass1=157.9241039
        mass2=94.0758961
if randomnumber >0.998807956 and randomnumber <=0.998834921:
        m1=82
        m2=170
        mass1=81.92954973
        mass2=170.07045027
if randomnumber >0.998834921 and randomnumber <=0.998860075:
        m1=140
        m2=112
        mass1=139.9094776
        mass2=112.0905224
if randomnumber >0.998860075 and randomnumber <=0.998884359:
        m1=166
        m2=86
        mass1=165.9328067
        mass2=86.0671933
if randomnumber >0.998884359 and randomnumber <=0.998908139:
        m1=127
        m2=125
        mass1=126.9173531
        mass2=125.0826469
if randomnumber >0.998908139 and randomnumber <=0.998931518:
        m1=122
        m2=130
        mass1=121.92353
        mass2=130.07647
if randomnumber >0.998931518 and randomnumber <=0.998954503:
        m1=81
        m2=171
        mass1=80.92882047
        mass2=171.07117953
```

```
if randomnumber >0.998954503 and randomnumber <=0.998977367:
    m1=162
    m2=90
    mass1=161.94122
    mass2=90.05878
if randomnumber >0.998977367 and randomnumber <=0.998999917:
    m1=167
    m2=85
    mass1=166.9356555
    mass2=85.0643445
if randomnumber >0.998999917 and randomnumber <=0.999021146:
    m1=145
    m2=107
    mass1=144.9145117
    mass2=107.0854883
if randomnumber >0.999021146 and randomnumber <=0.999041916:
    m1=119
    m2=133
mass1=118.9058454
    mass2=133.0941546
if randomnumber >0.999041916 and randomnumber <=0.999062644:
    m1=90
    m2=162
    mass1=89.93996
    mass2=162.06004
if randomnumber >0.999062644 and randomnumber <=0.999083354:
    m1=167
    m2=85
    mass1=166.94005
    mass2=85.05995
if randomnumber >0.999083354 and randomnumber <=0.999103963:
    m1=123
    m2=129
    mass1=122.9104383
    mass2=129.0895617
if randomnumber >0.999103963 and randomnumber <=0.999124136:
    m1=149
    m2=103
    mass1=148.94258
    mass2=103.05742
if randomnumber >0.999124136 and randomnumber <=0.999143626:
    m1=160
    m2=92
    mass1=159.94299
    mass2=92.05701
if randomnumber >0.999143626 and randomnumber <=0.99916252:
    m1=87
    m2=165
    mass1=86.9399
    mass2=165.0601
if randomnumber >0.99916252 and randomnumber <=0.99918126:
    m1=142
    m2=110
    mass1=141.94018
    mass2=110.05982
if randomnumber >0.99918126 and randomnumber <=0.99919957:
    m1=88
    m2=164
    mass1=87.91131559
    mass2=164.08868441
if randomnumber >0.99919957 and randomnumber <=0.999217184:
    m1=118
    m2=134
    mass1=117.9063544
    mass2=134.0936456
if randomnumber >0.999217184 and randomnumber <=0.999234774:
    m1=164
    m2=88
    mass1=163.94299
    mass2=88.05701
if randomnumber >0.999234774 and randomnumber <=0.999252183:
    m1=111
```

```
        m2=141
        mass1=110.9052912
        mass2=141.0947088
if randomnumber >0.999252183 and randomnumber <=0.999269189:
        m1=99
        m2=153
        mass1=98.94537928
        mass2=153.05462072
if randomnumber >0.999269189 and randomnumber <=0.999285884:
        m1=123
        m2=129
        mass1=122.9249
        mass2=129.0751
if randomnumber >0.999285884 and randomnumber <=0.999302464:
        m1=128
        m2=124
        mass1=127.9201723
        mass2=124.0798277
if randomnumber >0.999302464 and randomnumber <=0.999318818:
        m1=86
        m2=166
        mass1=85.91061073
        mass2=166.08938927
if randomnumber >0.999318818 and randomnumber <=0.999334828:
        m1=168
        m2=84
        mass1=167.9371288
        mass2=84.0628712
if randomnumber >0.999334828 and randomnumber <=0.999350532:
        m1=104
        m2=148
        mass1=103.9054327
        mass2=148.0945673
if randomnumber >0.999350532 and randomnumber <=0.999365952:
        m1=120
        m2=132
        mass1=119.9079596
        mass2=132.0920404
if randomnumber >0.999365952 and randomnumber <=0.999380942:
        m1=165
        m2=87
        mass1=164.9317033
        mass2=87.0682967
if randomnumber >0.999380942 and randomnumber <=0.999395636:
        m1=90
        m2=162
        mass1=89.90773789
        mass2=162.09226211
if randomnumber >0.999395636 and randomnumber <=0.999410231:
        m1=166
        m2=86
        mass1=165.9416
        mass2=86.0584
if randomnumber >0.999410231 and randomnumber <=0.999424781:
        m1=80
        m2=172
        mass1=79.92537239
        mass2=172.07462761
if randomnumber >0.999424781 and randomnumber <=0.999439165:
        m1=81
        m2=171
        mass1=80.92213229
        mass2=171.07786771
if randomnumber >0.999439165 and randomnumber <=0.99945274:
        m1=161
        m2=91
        mass1=160.9275699
        mass2=91.0724301
if randomnumber >0.99945274 and randomnumber <=0.999466169:
        m1=125
        m2=127
        mass1=124.9212464
```

```
        mass2=127.0787536
if randomnumber >0.999466169 and randomnumber <=0.999479589:
        m1=127
        m2=125
        mass1=126.9069236
        mass2=125.0930764
if randomnumber >0.999479589 and randomnumber <=0.999492689:
        m1=131
        m2=121
        mass1=130.9268518
        mass2=121.0731482
if randomnumber >0.999492689 and randomnumber <=0.999505424:
        m1=84
        m2=168
        mass1=83.91647897
        mass2=168.08352103
if randomnumber >0.999505424 and randomnumber <=0.99951804:
        m1=93
        m2=159
        mass1=92.94305
        mass2=159.05695
if randomnumber >0.99951804 and randomnumber <=0.999530539:
        m1=137
        m2=115
        mass1=136.93531
        mass2=115.06469
if randomnumber >0.999530539 and randomnumber <=0.999542619:
        m1=124
        m2=128
        mass1=123.92864
        mass2=128.07136
if randomnumber >0.999542619 and randomnumber <=0.999554609:
        m1=84
        m2=168
        mass1=83.93747
        mass2=168.06253
if randomnumber >0.999554609 and randomnumber <=0.999566594:
        m1=113
        m2=139
        mass1=112.9044017
        mass2=139.0955983
if randomnumber >0.999566594 and randomnumber <=0.999578113:
        m1=133
        m2=119
        mass1=132.9059107
        mass2=119.0940893
if randomnumber >0.999578113 and randomnumber <=0.999589493:
        m1=158
        m2=94
        mass1=157.9416
        mass2=94.0584
if randomnumber >0.999589493 and randomnumber <=0.999600833:
        m1=124
        m2=128
        mass1=123.9052739
        mass2=128.0947261
if randomnumber >0.999600833 and randomnumber <=0.999611677:
        m1=97
        m2=155
        mass1=96.90809856
        mass2=155.09190144
if randomnumber >0.999611677 and randomnumber <=0.999622442:
        m1=117
        m2=135
        mass1=116.92598
        mass2=135.07402
if randomnumber >0.999622442 and randomnumber <=0.999632792:
        m1=135
        m2=117
        mass1=134.905977
        mass2=117.094023
if randomnumber >0.999632792 and randomnumber <=0.999642717:
```

```
        m1=96
        m2=156
        mass1=95.94307
        mass2=156.05693
if randomnumber >0.999642717 and randomnumber <=0.999652331:
        m1=150
        m2=102
        mass1=149.9209836
        mass2=102.0790164
if randomnumber >0.999652331 and randomnumber <=0.999661416:
        m1=156
        m2=96
        mass1=155.94427
        mass2=96.05573
if randomnumber >0.999661416 and randomnumber <=0.999670496:
        m1=126
        m2=126
        mass1=125.9072475
        mass2=126.0927525
if randomnumber >0.999670496 and randomnumber <=0.999679171:
        m1=79
        m2=173
        mass1=78.925401
        mass2=173.074599
if randomnumber >0.999679171 and randomnumber <=0.999687795:
        m1=155
        m2=97
        mass1=154.9228933
        mass2=97.0771067
if randomnumber >0.999687795 and randomnumber <=0.999696005:
        m1=104
        m2=148
        mass1=103.94105
        mass2=148.05895
if randomnumber >0.999696005 and randomnumber <=0.999704213:
        m1=113
        m2=139
        mass1=112.93159
        mass2=139.06841
if randomnumber >0.999704213 and randomnumber <=0.999712038:
        m1=142
        m2=110
        mass1=141.9092442
        mass2=110.0907558        if randomnumber >0.999712038 and randomnumber <=0.999719793:
        m1=82
        m2=170
        mass1=81.9166994
        mass2=170.0833006
if randomnumber >0.999719793 and randomnumber <=0.999726968:
        m1=147
        m2=105
        mass1=146.9161004
        mass2=105.0838996
if randomnumber >0.999726968 and randomnumber <=0.999734061:
        m1=111
        m2=141
        mass1=110.93441
        mass2=141.06559
if randomnumber >0.999734061 and randomnumber <=0.999741121:
        m1=131
        m2=121
        mass1=130.9061246
        mass2=121.0938754
if randomnumber >0.999741121 and randomnumber <=0.999747951:
        m1=79
        m2=173
        mass1=78.93289326
        mass2=173.06710674
if randomnumber >0.999747951 and randomnumber <=0.999754556:
        m1=152
        m2=100
        mass1=151.9197324
```

```
        mass2=100.0802676
if randomnumber >0.999754556 and randomnumber <=0.999761146:
        m1=164
        m2=88
        mass1=163.9291748
        mass2=88.0708252
if randomnumber >0.999761146 and randomnumber <=0.999767541:
        m1=137
        m2=115
        mass1=136.9058274
        mass2=115.0941726
if randomnumber >0.999767541 and randomnumber <=0.999773736:
        m1=168
        m2=84
        mass1=167.94364
        mass2=84.05636
if randomnumber >0.999773736 and randomnumber <=0.999779924:
        m1=135
        m2=117
        mass1=134.93473
        mass2=117.06527
if randomnumber >0.999779924 and randomnumber <=0.999786109:
        m1=92
        m2=160
        mass1=91.90894914
        mass2=160.09105086
if randomnumber >0.999786109 and randomnumber <=0.999792029:
        m1=106
        m2=146
        mass1=105.9072871
        mass2=146.0927129
if randomnumber >0.999792029 and randomnumber <=0.99979792:
        m1=115
        m2=137
        mass1=114.9286862
        mass2=137.0713138
if randomnumber >0.99979792 and randomnumber <=0.99980364:
        m1=99
        m2=153
        mass1=98.90771187
        mass2=153.09228813
if randomnumber >0.99980364 and randomnumber <=0.999809305:
        m1=78
        m2=174
        mass1=77.93160818
        mass2=174.06839182
if randomnumber >0.999809305 and randomnumber <=0.999814965:
        m1=125
        m2=127
        mass1=124.9052538
        mass2=127.0947462
if randomnumber >0.999814965 and randomnumber <=0.999820544:
        m1=145
        m2=107
        mass1=144.94407
        mass2=107.05593
if randomnumber >0.999820544 and randomnumber <=0.999825869:
        m1=85
        m2=167
        mass1=84.94303
        mass2=167.05697
if randomnumber >0.999825869 and randomnumber <=0.999830683:
        m1=80
        m2=172
        mass1=79.93651578
        mass2=172.06348422
if randomnumber >0.999830683 and randomnumber <=0.999835483:
        m1=169
        m2=83
        mass1=168.9403076
        mass2=83.0596924
if randomnumber >0.999835483 and randomnumber <=0.999839803:
```

```
    m1=88
    m2=164
    mass1=87.94494
    mass2=164.05506
if randomnumber >0.999839803 and randomnumber <=0.999844043:
    m1=140
    m2=112
    mass1=139.93885
    mass2=112.06115
if randomnumber >0.999844043 and randomnumber <=0.999848262:
    m1=117
    m2=135
    mass1=116.9045136
    mass2=135.0954864
if randomnumber >0.999848262 and randomnumber <=0.999852256:
    m1=109
    m2=143
    mass1=108.93763
    mass2=143.06237
if randomnumber >0.999852256 and randomnumber <=0.999856156:
    m1=80
    m2=172
    mass1=79.92253382
    mass2=172.07746618
if randomnumber >0.999856156 and randomnumber <=0.999859821:
    m1=154
    m2=98
    mass1=153.94342
    mass2=98.05658
if randomnumber >0.999859821 and randomnumber <=0.999863486:
    m1=168
    m2=84
    mass1=167.9355157
    mass2=84.0644843
if randomnumber >0.999863486 and randomnumber <=0.999867006:
    m1=121
    m2=131
    mass1=120.9078458
    mass2=131.0921542
if randomnumber >0.999867006 and randomnumber <=0.999870486:
    m1=170
    m2=82
    mass1=169.9396189
    mass2=82.0603811
if randomnumber >0.999870486 and randomnumber <=0.999873851:
    m1=160
    m2=92
    mass1=159.9271676
    mass2=92.0728324
if randomnumber >0.999873851 and randomnumber <=0.999877156:
    m1=94
    m2=158
    mass1=93.90631519
    mass2=158.09368481
if randomnumber >0.999877156 and randomnumber <=0.999880361:
    m1=81
    m2=171
    mass1=80.93775236
    mass2=171.06224764
if randomnumber >0.999880361 and randomnumber <=0.999883466:
    m1=129
    m2=123
    mass1=128.9065982
    mass2=123.0934018
if randomnumber >0.999883466 and randomnumber <=0.999886571:
    m1=78
    m2=174
    mass1=77.92285274
    mass2=174.07714726
if randomnumber >0.999886571 and randomnumber <=0.999889611:
    m1=108
    m2=144
```

```
        mass1=107.9038917
        mass2=144.0961083
if randomnumber >0.999889611 and randomnumber <=0.999892525:
        m1=91
        m2=161
        mass1=90.94596
        mass2=161.05404
if randomnumber >0.999892525 and randomnumber <=0.999895414:
        m1=163
        m2=89
        mass1=162.94536
        mass2=89.05464
if randomnumber >0.999895414 and randomnumber <=0.999898254:
        m1=85
        m2=167
        mass1=84.91252733
        mass2=167.08747267
if randomnumber >0.999898254 and randomnumber <=0.999901049:
        m1=152
        m2=100
        mass1=151.94625
        mass2=100.05375
if randomnumber >0.999901049 and randomnumber <=0.999903794:
        m1=170
        m2=82
        mass1=169.94239
        mass2=82.05761
if randomnumber >0.999903794 and randomnumber <=0.999906509:
        m1=165
        m2=87
        mass1=164.94572
        mass2=87.05428
if randomnumber >0.999906509 and randomnumber <=0.999909079:
        m1=132
        m2=120
        mass1=131.9329903
        mass2=120.0670097
if randomnumber >0.999909079 and randomnumber <=0.999911649:
        m1=169
        m2=83
        mass1=168.9368723
        mass2=83.0631277
if randomnumber >0.999911649 and randomnumber <=0.999914084:
        m1=167
        m2=85
        mass1=166.94557
        mass2=85.05443
if randomnumber >0.999914084 and randomnumber <=0.999916474:
        m1=102
        m2=150
        mass1=101.943019
        mass2=150.056981
if randomnumber >0.999916474 and randomnumber <=0.999918819:
        m1=157
        m2=95
        mass1=156.9239601
        mass2=95.0760399
if randomnumber >0.999918819 and randomnumber <=0.999921049:
        m1=101
        m2=151
        mass1=100.9073147
        mass2=151.0926853
if randomnumber >0.999921049 and randomnumber <=0.999923253:
        m1=161
        m2=91
        mass1=160.94586
        mass2=91.05414
if randomnumber >0.999923253 and randomnumber <=0.999925398:
        m1=83
        m2=169
        mass1=82.91518042
        mass2=169.08481958
```

```
if randomnumber >0.999925398 and randomnumber <=0.999927498:
    m1=167
    m2=85
    mass1=166.9331326
    mass2=85.0668674
if randomnumber >0.999927498 and randomnumber <=0.999929543:
    m1=163
    m2=89
    mass1=162.9287312
    mass2=89.0712688
if randomnumber >0.999929543 and randomnumber <=0.999931578:
    m1=139
    m2=113
    mass1=138.9063533
    mass2=113.0936467
if randomnumber >0.999931578 and randomnumber <=0.999933603:
    m1=120
    m2=132
    mass1=119.9246919
    mass2=132.0753081
if randomnumber >0.999933603 and randomnumber <=0.999935623:
    m1=171
    m2=81
    mass1=170.9414652
    mass2=81.0585348
if randomnumber >0.999935623 and randomnumber <=0.999937523:
    m1=144
    m2=108
    mass1=143.9133052
    mass2=108.0866948
if randomnumber >0.999937523 and randomnumber <=0.999939313:
    m1=94
    m2=158
    mass1=93.94868
    mass2=158.05132
if randomnumber >0.999939313 and randomnumber <=0.999941083:
    m1=118
    m2=134
    mass1=117.93007
    mass2=134.06993
if randomnumber >0.999941083 and randomnumber <=0.999942793:
    m1=77
    m2=175
    mass1=76.9291543
    mass2=175.0708457
if randomnumber >0.999942793 and randomnumber <=0.999944483:
    m1=87
    m2=165
    mass1=86.90918053
    mass2=165.09081947
if randomnumber >0.999944483 and randomnumber <=0.999946163:
    m1=122
    m2=130
    mass1=121.910276
    mass2=130.089724
if randomnumber >0.999946163 and randomnumber <=0.999947798:
    m1=150
    m2=102
    mass1=149.94568
    mass2=102.05432
if randomnumber >0.999947798 and randomnumber <=0.999949303:
    m1=82
    m2=170
    mass1=81.94299
    mass2=170.05701
if randomnumber >0.999949303 and randomnumber <=0.999950733:
    m1=149
    m2=103
    mass1=148.9183342
    mass2=103.0816658
if randomnumber >0.999950733 and randomnumber <=0.999952104:
    m1=107
```

```
        m2=145
        mass1=106.94075
        mass2=145.05925
if randomnumber >0.999952104 and randomnumber <=0.999953464:
        m1=78
        m2=174
        mass1=77.93844022
        mass2=174.06155978
if randomnumber >0.999953464 and randomnumber <=0.999954754:
        m1=154
        m2=98
        mass1=153.9229792
        mass2=98.0770208
if randomnumber >0.999954754 and randomnumber <=0.999956024:
        m1=159
        m2=93
        mass1=158.94609
        mass2=93.05391
if randomnumber >0.999956024 and randomnumber <=0.999957263:
        m1=116
        m2=136
        mass1=115.9052597
        mass2=136.0947403
if randomnumber >0.999957263 and randomnumber <=0.999958428:
        m1=126
        m2=126
        mass1=125.9223533
        mass2=126.0776467
if randomnumber >0.999958428 and randomnumber <=0.999959573:
        m1=89
        m2=163
        mass1=88.90745068
        mass2=163.09254932
if randomnumber >0.999959573 and randomnumber <=0.999960694:
        m1=81
        m2=171
        mass1=80.91799247
        mass2=171.08200753
if randomnumber >0.999960694 and randomnumber <=0.999961774:
        m1=96
        m2=156
        mass1=95.90810065
        mass2=156.09189935
if randomnumber >0.999961774 and randomnumber <=0.999962789:
        m1=125
        m2=127
        mass1=124.93043
        mass2=127.06957
if randomnumber >0.999962789 and randomnumber <=0.999963804:
        m1=138
        m2=114
        mass1=137.94079
        mass2=114.05921
if randomnumber >0.999963804 and randomnumber <=0.999964804:
        m1=166
        m2=86
        mass1=165.9322842
        mass2=86.0677158
if randomnumber >0.999964804 and randomnumber <=0.999965799:
        m1=97
        m2=155
        mass1=96.94856
        mass2=155.05144
if randomnumber >0.999965799 and randomnumber <=0.999966774:
        m1=133
        m2=119
        mass1=132.93781
        mass2=119.06219
if randomnumber >0.999966774 and randomnumber <=0.999967739:
        m1=77
        m2=175
        mass1=76.93695897
```

```
        mass2=175.06304103
if randomnumber >0.999967739 and randomnumber <=0.999968689:
        m1=79
        m2=173
        mass1=78.92094793
        mass2=173.07905207
if randomnumber >0.999968689 and randomnumber <=0.999969581:
        m1=110
        m2=142
        mass1=109.9061072
        mass2=142.0938928
if randomnumber >0.999969581 and randomnumber <=0.999970401:
        m1=76
        m2=176
        mass1=75.93329357
        mass2=176.06670643
if randomnumber >0.999970401 and randomnumber <=0.999971216:
        m1=172
        m2=80
        mass1=171.94482
        mass2=80.05518
if randomnumber >0.999971216 and randomnumber <=0.999972011:
        m1=171
        m2=81
        mass1=170.9380298
        mass2=81.0619702
if randomnumber >0.999972011 and randomnumber <=0.999972796:
        m1=169
        m2=83
        mass1=168.94622
        mass2=83.05378
if randomnumber >0.999972796 and randomnumber <=0.999973566:
        m1=148
        m2=104
        mass1=147.9492182
        mass2=104.0507818
if randomnumber >0.999973566 and randomnumber <=0.999974306:
        m1=172
        m2=80
        mass1=171.9393561
        mass2=80.0606439
if randomnumber >0.999974306 and randomnumber <=0.999975016:
        m1=86
        m2=166
        mass1=85.94649
        mass2=166.05351
if randomnumber >0.999975016 and randomnumber <=0.999975726:
        m1=124
        m2=128
        mass1=123.93688
        mass2=128.06312
if randomnumber >0.999975726 and randomnumber <=0.999976411:
        m1=171
        m2=81
        mass1=170.9462
        mass2=81.0538
if randomnumber >0.999976411 and randomnumber <=0.999977091:
        m1=79
        m2=173
        mass1=78.942652
        mass2=173.057348
if randomnumber >0.999977091 and randomnumber <=0.999977766:
        m1=83
        m2=169
        mass1=82.94698
        mass2=169.05302
if randomnumber >0.999977766 and randomnumber <=0.999978421:
        m1=103
        m2=149
        mass1=102.9063238
        mass2=149.0936762
if randomnumber >0.999978421 and randomnumber <=0.999979031:
```

```
        m1=76
        m2=176
        mass1=75.92882763
        mass2=176.07117237
if randomnumber >0.999979031 and randomnumber <=0.999979618:
        m1=115
        m2=137
        mass1=114.9038785
        mass2=137.0961215
if randomnumber >0.999979618 and randomnumber <=0.999980193:
        m1=170
        m2=82
        mass1=169.9354643
        mass2=82.0645357
if randomnumber >0.999980193 and randomnumber <=0.999980738:
        m1=134
        m2=118
        mass1=133.9067185
        mass2=118.0932815
if randomnumber >0.999980738 and randomnumber <=0.999981283:
        m1=89
        m2=163
        mass1=88.94939
        mass2=163.05061
if randomnumber >0.999981283 and randomnumber <=0.999981823:
        m1=91
        m2=161
        mass1=90.90730479
        mass2=161.09269521
if randomnumber >0.999981823 and randomnumber <=0.999982363:
        m1=141
        m2=111
        mass1=140.9082763
        mass2=111.0917237
if randomnumber >0.999982363 and randomnumber <=0.999982903:
        m1=157
        m2=95
        mass1=156.94743
        mass2=95.05257
if randomnumber >0.999982903 and randomnumber <=0.999983427:
        m1=100
        m2=152
        mass1=99.94987
        mass2=152.05013
if randomnumber >0.999983427 and randomnumber <=0.999983927:
        m1=112
        m2=140
        mass1=111.9027578
        mass2=140.0972422
if randomnumber >0.999983927 and randomnumber <=0.999984414:
        m1=124
        m2=128
        mass1=123.9059357
        mass2=128.0940643
if randomnumber >0.999984414 and randomnumber <=0.999984883:
        m1=75
        m2=177
        mass1=74.93293674
        mass2=177.06706326
if randomnumber >0.999984883 and randomnumber <=0.999985344:
        m1=146
        m2=106
        mass1=145.9131169
        mass2=106.0868831
if randomnumber >0.999985344 and randomnumber <=0.999985782:
        m1=136
        m2=116
        mass1=135.9045759
        mass2=116.0954241
if randomnumber >0.999985782 and randomnumber <=0.999986216:
        m1=136
        m2=116
```

```
        mass1=135.93934
        mass2=116.06066
if randomnumber >0.999986216 and randomnumber <=0.999986644:
        m1=151
        m2=101
        mass1=150.9199324
        mass2=101.0800676
if randomnumber >0.999986644 and randomnumber <=0.999987069:
        m1=143
        m2=109
        mass1=142.94456
        mass2=109.05544
if randomnumber >0.999987069 and randomnumber <=0.99998749:
        m1=141
        m2=111
        mass1=140.94465
        mass2=111.05535
if randomnumber >0.99998749 and randomnumber <=0.999987902:
        m1=162
        m2=90
        mass1=161.9267984
        mass2=90.0732016
if randomnumber >0.999987902 and randomnumber <=0.999988306:
        m1=159
        m2=93
        mass1=158.9253468
        mass2=93.0746532
if randomnumber >0.999988306 and randomnumber <=0.999988705:
        m1=77
        m2=175
        mass1=76.92354859
        mass2=175.07645141
if randomnumber >0.999988705 and randomnumber <=0.999989103:
        m1=105
        m2=147
        mass1=104.94487
        mass2=147.05513
if randomnumber >0.999989103 and randomnumber <=0.999989492:
        m1=98
        m2=154
        mass1=97.90540817
        mass2=154.09459183
if randomnumber >0.999989492 and randomnumber <=0.999989817:
        m1=146
        m2=106
        mass1=145.94775
        mass2=106.05225
if randomnumber >0.999989817 and randomnumber <=0.999990135:
        m1=105
        m2=147
        mass1=104.9056938
        mass2=147.0943062
if randomnumber >0.999990135 and randomnumber <=0.99999045:
        m1=166
        m2=86
        mass1=165.94997
        mass2=86.05003
if randomnumber >0.99999045 and randomnumber <=0.999990757:
        m1=125
        m2=127
        mass1=124.9044307
        mass2=127.0955693
if randomnumber >0.999990757 and randomnumber <=0.999991061:
        m1=92
        m2=160
        mass1=91.94992
        mass2=160.05008
if randomnumber >0.999991061 and randomnumber <=0.999991348:
        m1=168
        m2=84
        mass1=167.94836
        mass2=84.05164
```

```
if randomnumber >0.999991348 and randomnumber <=0.999991618:
    m1=155
    m2=97
    mass1=154.94804
    mass2=97.05196
if randomnumber >0.999991618 and randomnumber <=0.999991888:
    m1=103
    m2=149
    mass1=102.94895
    mass2=149.05105
if randomnumber >0.999991888 and randomnumber <=0.999992155:
    m1=112
    m2=140
    mass1=111.93684
    mass2=140.06316
if randomnumber >0.999992155 and randomnumber <=0.999992416:
    m1=164
    m2=88
    mass1=163.94828
    mass2=88.05172
if randomnumber >0.999992416 and randomnumber <=0.999992656:
    m1=130
    m2=122
    mass1=129.9066742
    mass2=122.0933258
if randomnumber >0.999992656 and randomnumber <=0.999992894:
    m1=156
    m2=96
    mass1=155.9221227
    mass2=96.0778773
if randomnumber >0.999992894 and randomnumber <=0.999993115:
    m1=165
    m2=87
    mass1=164.9303221
    mass2=87.0696779
if randomnumber >0.999993115 and randomnumber <=0.999993327:
    m1=93
    m2=159
    mass1=92.90647601
    mass2=159.09352399
if randomnumber >0.999993327 and randomnumber <=0.999993526:
    m1=110
    m2=142
    mass1=109.94244
    mass2=142.05756
if randomnumber >0.999993526 and randomnumber <=0.999993719:
    m1=114
    m2=138
    mass1=113.93588
    mass2=138.06412
if randomnumber >0.999993719 and randomnumber <=0.99999391:
    m1=74
    m2=178
    mass1=73.92945861
    mass2=178.07054139
if randomnumber >0.99999391 and randomnumber <=0.999994098:
    m1=80
    m2=172
    mass1=79.94434235
    mass2=172.05565765
if randomnumber >0.999994098 and randomnumber <=0.999994279:
    m1=170
    m2=82
    mass1=169.95025
    mass2=82.04975
if randomnumber >0.999994279 and randomnumber <=0.999994453:
    m1=114
    m2=138
    mass1=113.9049139
    mass2=138.0950861
if randomnumber >0.999994453 and randomnumber <=0.999994623:
    m1=169
```

```
        m2=83
        mass1=168.9345904
        mass2=83.0654096
if randomnumber >0.999994623 and randomnumber <=0.999994778:
        m1=162
        m2=90
        mass1=161.95029
        mass2=90.04971
if randomnumber >0.999994778 and randomnumber <=0.999994928:
        m1=75
        m2=177
        mass1=74.92650025
        mass2=177.07349975
if randomnumber >0.999994928 and randomnumber <=0.999995066:
        m1=78
        m2=174
        mass1=77.92182728
        mass2=174.07817272
if randomnumber >0.999995066 and randomnumber <=0.999995201:
        m1=84
        m2=168
        mass1=83.91150669
        mass2=168.08849331
if randomnumber >0.999995201 and randomnumber <=0.999995333:
        m1=107
        m2=145
        mass1=106.9051335
        mass2=145.0948665
if randomnumber >0.999995333 and randomnumber <=0.999995463:
        m1=75
        m2=177
        mass1=74.9419
        mass2=177.0581
if randomnumber >0.999995463 and randomnumber <=0.999995592:
        m1=134
        m2=118
        mass1=133.94415
        mass2=118.05585
if randomnumber >0.999995592 and randomnumber <=0.999995722:
        m1=153
        m2=99
        mass1=152.94962
        mass2=99.05038
if randomnumber >0.999995722 and randomnumber <=0.999995848:
        m1=100
        m2=152
        mass1=99.90765778
        mass2=152.09234222
if randomnumber >0.999995848 and randomnumber <=0.999995974:
        m1=74
        m2=178
        mass1=73.93987486
        mass2=178.06012514
if randomnumber >0.999995974 and randomnumber <=0.999996096:
        m1=132
        m2=120
        mass1=131.9041535
        mass2=120.0958465
if randomnumber >0.999996096 and randomnumber <=0.999996217:
        m1=80
        m2=172
        mass1=79.91652127
        mass2=172.08347873
if randomnumber >0.999996217 and randomnumber <=0.999996332:
        m1=172
        m2=80
        mass1=171.94876
        mass2=80.05124
if randomnumber >0.999996332 and randomnumber <=0.999996446:
        m1=116
        m2=136
        mass1=115.93081
```

```
        mass2=136.06919
if randomnumber >0.999996446 and randomnumber <=0.99999656:
        m1=143
        m2=109
        mass1=142.9108169
        mass2=109.0891831
if randomnumber >0.99999656 and randomnumber <=0.999996672:
        m1=95
        m2=157
        mass1=94.95287
        mass2=157.04713
if randomnumber >0.999996672 and randomnumber <=0.999996783:
        m1=82
        m2=170
        mass1=81.91680412
        mass2=170.08319588
if randomnumber >0.999996783 and randomnumber <=0.999996888:
        m1=148
        m2=104
        mass1=147.9174746
        mass2=104.0825254
if randomnumber >0.999996888 and randomnumber <=0.999996989:
        m1=87
        m2=165
        mass1=86.95251
        mass2=165.04749
if randomnumber >0.999996989 and randomnumber <=0.999997089:
        m1=144
        m2=108
        mass1=143.94999
        mass2=108.05001
if randomnumber >0.999997089 and randomnumber <=0.999997185:
        m1=147
        m2=105
        mass1=146.95356
        mass2=105.04644
if randomnumber >0.999997185 and randomnumber <=0.999997281:
        m1=168
        m2=84
        mass1=167.9323702
        mass2=84.0676298
if randomnumber >0.999997281 and randomnumber <=0.999997376:
        m1=76
        m2=176
        mass1=75.94527503
        mass2=176.05472497
if randomnumber >0.999997376 and randomnumber <=0.999997469:
        m1=151
        m2=101
        mass1=150.95081
        mass2=101.04919
if randomnumber >0.999997469 and randomnumber <=0.999997562:
        m1=84
        m2=168
        mass1=83.95265
        mass2=168.04735
if randomnumber >0.999997562 and randomnumber <=0.999997649:
        m1=160
        m2=92
        mass1=159.94909
        mass2=92.05091
if randomnumber >0.999997649 and randomnumber <=0.999997735:
        m1=138
        m2=114
        mass1=137.9071119
        mass2=114.0928881
if randomnumber >0.999997735 and randomnumber <=0.999997821:
        m1=98
        m2=154
        mass1=97.95191
        mass2=154.04809
if randomnumber >0.999997821 and randomnumber <=0.999997906:
```

```
    m1=73
    m2=179
    mass1=72.93667528
    mass2=179.06332472
if randomnumber >0.999997906 and randomnumber <=0.999997981:
    m1=88
    m2=164
    mass1=87.90561212
    mass2=164.09438788
if randomnumber >0.999997981 and randomnumber <=0.999998053:
    m1=108
    m2=144
    mass1=107.94396
    mass2=144.05604
if randomnumber >0.999998053 and randomnumber <=0.999998122:
    m1=153
    m2=99
    mass1=152.9212303
    mass2=99.0787697
if randomnumber >0.999998122 and randomnumber <=0.999998189:
    m1=158
    m2=94
    mass1=157.9254131
    mass2=94.0745869
if randomnumber >0.999998189 and randomnumber <=0.99999825:
    m1=161
    m2=91
    mass1=160.9269334
    mass2=91.0730666
if randomnumber >0.99999825 and randomnumber <=0.999998308:
    m1=101
    m2=151
    mass1=100.9531964
    mass2=151.0468036
if randomnumber >0.999998308 and randomnumber <=0.999998365:
    m1=76
    m2=176
    mass1=75.92140256
    mass2=176.07859744
if randomnumber >0.999998365 and randomnumber <=0.999998423:
    m1=172
    m2=80
    mass1=171.9384
    mass2=80.0616
if randomnumber >0.999998423 and randomnumber <=0.999998479:
    m1=95
    m2=157
    mass1=94.90683579
    mass2=157.09316421
if randomnumber >0.999998479 and randomnumber <=0.999998535:
    m1=73
    m2=179
    mass1=72.9297791
    mass2=179.0702209
if randomnumber >0.999998535 and randomnumber <=0.999998588:
    m1=126
    m2=126
    mass1=125.9033117
    mass2=126.0966883
if randomnumber >0.999998588 and randomnumber <=0.99999864:
    m1=106
    m2=146
    mass1=105.94979
    mass2=146.05021
if randomnumber >0.99999864 and randomnumber <=0.999998692:
    m1=99
    m2=153
    mass1=98.9576
    mass2=153.0424
if randomnumber >0.999998692 and randomnumber <=0.999998743:
    m1=139
    m2=113
```

```
        mass1=138.94598
        mass2=113.05402
if randomnumber >0.999998743 and randomnumber <=0.999998792:
        m1=81
        m2=171
        mass1=80.95048
        mass2=171.04952
if randomnumber >0.999998792 and randomnumber <=0.999998837:
        m1=77
        m2=175
        mass1=76.94785
        mass2=175.05215
if randomnumber >0.999998837 and randomnumber <=0.999998881:
        m1=130
        m2=122
        mass1=129.9339019
        mass2=122.0660981
if randomnumber >0.999998881 and randomnumber <=0.999998922:
        m1=149
        m2=103
        mass1=148.95293
        mass2=103.04707
if randomnumber >0.999998922 and randomnumber <=0.999998962:
        m1=72
        m2=180
        mass1=71.93582031
        mass2=180.06417969
if randomnumber >0.999998962 and randomnumber <=0.999999:
        m1=109
        m2=143
        mass1=108.9047523
        mass2=143.0952477
if randomnumber >0.999999 and randomnumber <=0.999999039:
        m1=93
        m2=159
        mass1=92.95629
        mass2=159.04371
if randomnumber >0.999999039 and randomnumber <=0.999999077:
        m1=102
        m2=150
        mass1=101.9043493
        mass2=150.0956507
if randomnumber >0.999999077 and randomnumber <=0.999999113:
        m1=164
        m2=88
        mass1=163.9302335
        mass2=88.0697665
if randomnumber >0.999999113 and randomnumber <=0.999999149:
        m1=90
        m2=162
        mass1=89.9555
        mass2=162.0445
if randomnumber >0.999999149 and randomnumber <=0.999999179:
        m1=90
        m2=162
        mass1=89.90715189
        mass2=162.09284811
if randomnumber >0.999999179 and randomnumber <=0.999999206:
        m1=86
        m2=166
        mass1=85.91116742
        mass2=166.08883258
if randomnumber >0.999999206 and randomnumber <=0.999999232:
        m1=140
        m2=112
        mass1=139.9054387
        mass2=112.0945613
if randomnumber >0.999999232 and randomnumber <=0.999999257:
        m1=119
        m2=133
        mass1=118.93211
        mass2=133.06789
```

```
if randomnumber >0.999999257 and randomnumber <=0.999999283:
    m1=74
    m2=178
    mass1=73.92694576
    mass2=178.07305424
if randomnumber >0.999999283 and randomnumber <=0.999999307:
    m1=78
    m2=174
    mass1=77.95196
    mass2=174.04804
if randomnumber >0.999999307 and randomnumber <=0.999999332:
    m1=171
    m2=81
    mass1=170.9364294
    mass2=81.0635706
if randomnumber >0.999999332 and randomnumber <=0.999999356:
    m1=158
    m2=94
    mass1=157.95198
    mass2=94.04802
if randomnumber >0.999999356 and randomnumber <=0.999999378:
    m1=125
    m2=127
    mass1=125.0
    mass2=127.0
if randomnumber >0.999999378 and randomnumber <=0.9999994:
    m1=145
    m2=107
    mass1=144.9125736
    mass2=107.0874264
if randomnumber >0.9999994 and randomnumber <=0.999999421:
    m1=150
    m2=102
    mass1=149.9172755
    mass2=102.0827245
if randomnumber >0.999999421 and randomnumber <=0.999999442:
    m1=167
    m2=85
    mass1=166.9320482
    mass2=85.0679518
if randomnumber >0.999999442 and randomnumber <=0.999999462:
    m1=167
    m2=85
    mass1=166.95321
    mass2=85.04679
if randomnumber >0.999999462 and randomnumber <=0.999999481:
    m1=72
    m2=180
    mass1=71.94209268
    mass2=180.05790732
if randomnumber >0.999999481 and randomnumber <=0.999999499:
    m1=171
    m2=81
    mass1=170.9533
    mass2=81.0467
if randomnumber >0.999999499 and randomnumber <=0.999999516:
    m1=142
    m2=110
    mass1=141.94908
    mass2=110.05092
if randomnumber >0.999999516 and randomnumber <=0.999999533:
    m1=73
    m2=179
    mass1=72.94647
    mass2=179.05353
if randomnumber >0.999999533 and randomnumber <=0.999999549:
    m1=111
    m2=141
    mass1=110.9041781
    mass2=141.0958219
if randomnumber >0.999999549 and randomnumber <=0.999999564:
    m1=97
```

```
        m2=155
        mass1=96.90602147
        mass2=155.09397853
if randomnumber >0.999999564 and randomnumber <=0.999999579:
        m1=165
        m2=87
        mass1=164.95298
        mass2=87.04702
if randomnumber >0.999999579 and randomnumber <=0.999999594:
        m1=156
        m2=96
        mass1=155.95126
        mass2=96.04874
if randomnumber >0.999999594 and randomnumber <=0.999999608:
        m1=123
        m2=129
        mass1=122.9057208
        mass2=129.0942792
if randomnumber >0.999999608 and randomnumber <=0.999999623:
        m1=71
        m2=181
        mass1=70.94073628
        mass2=181.05926372
if randomnumber >0.999999623 and randomnumber <=0.999999637:
        m1=169
        m2=83
        mass1=168.95287
        mass2=83.04713
if randomnumber >0.999999637 and randomnumber <=0.999999651:
        m1=85
        m2=167
        mass1=84.957
        mass2=167.043
if randomnumber >0.999999651 and randomnumber <=0.999999665:
        m1=155
        m2=97
        mass1=154.922622
        mass2=97.077378
if randomnumber >0.999999665 and randomnumber <=0.999999677:
        m1=71
        m2=181
        mass1=70.93267683
        mass2=181.06732317
if randomnumber >0.999999677 and randomnumber <=0.99999969:
        m1=137
        m2=115
        mass1=136.94599
        mass2=115.05401
if randomnumber >0.99999969 and randomnumber <=0.999999701:
        m1=79
        m2=173
        mass1=78.9184991
        mass2=173.0815009
if randomnumber >0.999999701 and randomnumber <=0.999999712:
        m1=72
        m2=180
        mass1=71.92685795
        mass2=180.07314205
if randomnumber >0.999999712 and randomnumber <=0.999999722:
        m1=104
        m2=148
        mass1=103.9066555
        mass2=148.0933445
if randomnumber >0.999999722 and randomnumber <=0.999999733:
        m1=74
        m2=178
        mass1=73.94807
        mass2=178.05193
if randomnumber >0.999999733 and randomnumber <=0.999999743:
        m1=135
        m2=117
        mass1=134.9056886
```

```
        mass2=117.0943114
if randomnumber >0.999999743 and randomnumber <=0.999999752:
        m1=96
        m2=156
        mass1=95.95853
        mass2=156.04147
if randomnumber >0.999999752 and randomnumber <=0.999999761:
        m1=119
        m2=133
        mass1=118.9033076
        mass2=133.0966924
if randomnumber >0.999999761 and randomnumber <=0.99999977:
        m1=123
        m2=129
        mass1=122.93493
        mass2=129.06507
if randomnumber >0.99999977 and randomnumber <=0.999999779:
        m1=92
        m2=160
        mass1=91.90504085
        mass2=160.09495915
if randomnumber >0.999999779 and randomnumber <=0.999999788:
        m1=82
        m2=170
        mass1=81.95442
        mass2=170.04558
if randomnumber >0.999999788 and randomnumber <=0.999999796:
        m1=88
        m2=164
        mass1=87.95691
        mass2=164.04309
if randomnumber >0.999999796 and randomnumber <=0.999999803:
        m1=83
        m2=169
        mass1=82.9141361
        mass2=169.0858639
if randomnumber >0.999999803 and randomnumber <=0.999999811:
        m1=113
        m2=139
        mass1=112.9040578
        mass2=139.0959422
if randomnumber >0.999999811 and randomnumber <=0.999999818:
        m1=70
        m2=182
        mass1=69.9365
        mass2=182.0635
if randomnumber >0.999999818 and randomnumber <=0.999999826:
        m1=124
        m2=128
        mass1=124.0
        mass2=128.0
if randomnumber >0.999999826 and randomnumber <=0.999999833:
        m1=163
        m2=89
        mass1=162.95368
        mass2=89.04632
if randomnumber >0.999999833 and randomnumber <=0.99999984:
        m1=77
        m2=175
        mass1=76.92064729
        mass2=175.07935271
if randomnumber >0.99999984 and randomnumber <=0.999999847:
        m1=170
        m2=82
        mass1=169.9358014
        mass2=82.0641986
if randomnumber >0.999999847 and randomnumber <=0.999999853:
        m1=81
        m2=171
        mass1=80.91629056
        mass2=171.08370944
if randomnumber >0.999999853 and randomnumber <=0.999999859:
```

```
        m1=91
        m2=161
        mass1=90.96043
        mass2=161.03957
if randomnumber >0.999999859 and randomnumber <=0.999999864:
        m1=118
        m2=134
        mass1=117.9016032
        mass2=134.0983968
if randomnumber >0.999999864 and randomnumber <=0.99999987:
        m1=133
        m2=119
        mass1=132.9054519
        mass2=119.0945481
if randomnumber >0.99999987 and randomnumber <=0.999999876:
        m1=75
        m2=177
        mass1=74.92285895
        mass2=177.07714105
if randomnumber >0.999999876 and randomnumber <=0.999999881:
        m1=160
        m2=92
        mass1=159.9251975
        mass2=92.0748025
if randomnumber >0.999999881 and randomnumber <=0.999999887:
        m1=104
        m2=148
        mass1=103.95233
        mass2=148.04767
if randomnumber >0.999999887 and randomnumber <=0.999999892:
        m1=85
        m2=167
        mass1=84.91178974
        mass2=167.08821026
if randomnumber >0.999999892 and randomnumber <=0.999999897:
        m1=124
        m2=128
        mass1=123.9028179
        mass2=128.0971821
if randomnumber >0.999999897 and randomnumber <=0.999999902:
        m1=79
        m2=173
        mass1=78.95456
        mass2=173.04544
if randomnumber >0.999999902 and randomnumber <=0.999999907:
        m1=152
        m2=100
        mass1=151.9217445
        mass2=100.0782555
if randomnumber >0.999999907 and randomnumber <=0.999999911:
        m1=129
        m2=123
        mass1=128.93215
        mass2=123.06785
if randomnumber >0.999999911 and randomnumber <=0.999999915:
        m1=163
        m2=89
        mass1=162.9287339
        mass2=89.0712661
if randomnumber >0.999999915 and randomnumber <=0.999999919:
        m1=75
        m2=177
        mass1=74.95287
        mass2=177.04713
if randomnumber >0.999999919 and randomnumber <=0.999999923:
        m1=121
        m2=131
        mass1=120.92887
        mass2=131.07113
if randomnumber >0.999999923 and randomnumber <=0.999999927:
        m1=115
        m2=137
```

```
        mass1=114.93869
        mass2=137.06131
if randomnumber >0.999999927 and randomnumber <=0.999999931:
        m1=142
        m2=110
        mass1=141.9100448
        mass2=110.0899552
if randomnumber >0.999999931 and randomnumber <=0.999999935:
        m1=147
        m2=105
        mass1=146.9151385
        mass2=105.0848615
if randomnumber >0.999999935 and randomnumber <=0.999999938:
        m1=166
        m2=86
        mass1=165.9302931
        mass2=86.0697069
if randomnumber >0.999999938 and randomnumber <=0.999999942:
        m1=161
        m2=91
        mass1=160.95388
        mass2=91.04612
if randomnumber >0.999999942 and randomnumber <=0.999999945:
        m1=99
        m2=153
        mass1=98.90625475
        mass2=153.09374525
if randomnumber >0.999999945 and randomnumber <=0.999999949:
        m1=131
        m2=121
        mass1=130.94067
        mass2=121.05933
if randomnumber >0.999999949 and randomnumber <=0.999999952:
        m1=125
        m2=127
        mass1=124.9046302
        mass2=127.0953698
if randomnumber >0.999999952 and randomnumber <=0.999999955:
        m1=106
        m2=146
        mass1=105.9034857
        mass2=146.0965143
if randomnumber >0.999999955 and randomnumber <=0.999999958:
        m1=154
        m2=98
        mass1=153.9545
        mass2=98.0455
if randomnumber >0.999999958 and randomnumber <=0.999999961:
        m1=73
        m2=179
        mass1=72.92517468
        mass2=179.07482532
if randomnumber >0.999999961 and randomnumber <=0.999999964:
        m1=137
        m2=115
        mass1=136.9064936
        mass2=115.0935064
if randomnumber >0.999999964 and randomnumber <=0.999999967:
        m1=69
        m2=183
        mass1=68.93561027
        mass2=183.06438973
if randomnumber >0.999999967 and randomnumber <=0.99999997:
        m1=70
        m2=182
        mass1=69.93239234
        mass2=182.06760766
if randomnumber >0.99999997 and randomnumber <=0.999999972:
        m1=87
        m2=165
        mass1=86.90887712
        mass2=165.09112288
```

```
if randomnumber >0.999999972 and randomnumber <=0.999999974:
    m1=94
    m2=158
    mass1=93.90728389
    mass2=158.09271611
if randomnumber >0.999999974 and randomnumber <=0.999999976:
    m1=157
    m2=95
    mass1=156.9240246
    mass2=95.0759754
if randomnumber >0.999999976 and randomnumber <=0.999999978:
    m1=152
    m2=100
    mass1=151.95427
    mass2=100.04573
if randomnumber >0.999999978 and randomnumber <=0.99999998:
    m1=117
    m2=135
    mass1=116.93558
    mass2=135.06442
if randomnumber >0.99999998 and randomnumber <=0.999999982:
    m1=113
    m2=139
    mass1=112.94188
    mass2=139.05812
if randomnumber >0.999999982 and randomnumber <=0.999999983:
    m1=70
    m2=182
    mass1=69.951
    mass2=182.049
if randomnumber >0.999999983 and randomnumber <=0.999999985:
    m1=69
    m2=183
    mass1=68.94632
    mass2=183.05368
if randomnumber >0.999999985 and randomnumber <=0.999999986:
    m1=71
    m2=181
    mass1=70.9277216
    mass2=181.0722784
if randomnumber >0.999999986 and randomnumber <=0.999999988:
    m1=71
    m2=181
    mass1=70.9529
    mass2=181.0471
if randomnumber >0.999999988 and randomnumber <=0.999999989:
    m1=83
    m2=169
    mass1=82.96103
    mass2=169.03897
if randomnumber >0.999999989 and randomnumber <=0.99999999:
    m1=170
    m2=82
    mass1=170.0
    mass2=82.0
if randomnumber >0.99999999 and randomnumber <=0.999999991:
    m1=76
    m2=176
    mass1=75.95533
    mass2=176.04467
if randomnumber >0.999999991 and randomnumber <=0.999999993:
    m1=94
    m2=158
    mass1=93.96049
    mass2=158.03951
if randomnumber >0.999999993 and randomnumber <=0.999999994:
    m1=172
    m2=80
    mass1=172.0
    mass2=80.0
if randomnumber >0.999999994 and randomnumber <=0.999999995:
    m1=131
```

```
        m2=121
        mass1=130.9050824
        mass2=121.0949176
if randomnumber >0.999999995 and randomnumber <=0.999999996:
        m1=120
        m2=132
        mass1=119.9021947
        mass2=132.0978053
if randomnumber >0.999999996 and randomnumber <=0.999999997:
        m1=111
        m2=141
        mass1=110.94565
        mass2=141.05435
if randomnumber >0.999999997 and randomnumber <=0.999999998:
        m1=126
        m2=126
        mass1=125.9345
        mass2=126.0655
if randomnumber >0.999999998 and randomnumber <=0.999999999:
        m1=159
        m2=93
        mass1=158.9555
        mass2=93.0445
if randomnumber >0.999999999 and randomnumber <=1.0:
        m1=68
        m2=184
        mass1=67.94487306
        mass2=184.05512694
```

Kinetic Energy of the Fission Fragments from a Spontaneously Fissioning ^{252}Cf Source
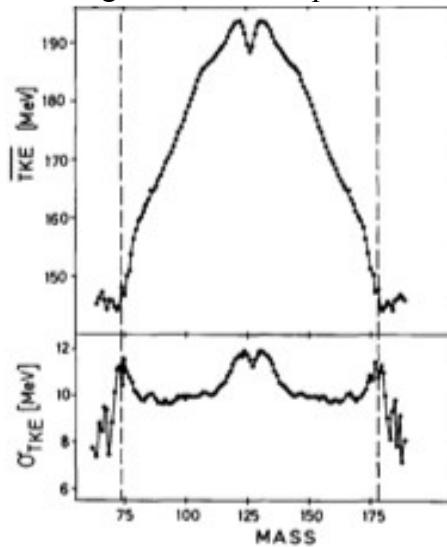
This plot was taken from Ref. 6.

In the simulation, data about the kinetic energy of the fission fragments was obtained by fitting piece-wise defined functions to these plots. Specifically, they are the average total kinetic energy and the square root of the variance of the total kinetic energy as functions of fragment mass for the spontaneous fission of ^{252}Cf.

The section of the Python code that simulates the kinetic energy of the fission fragments is given below. The piece-wise defined functions embedded within this code.

```
def trange7376(x):

        return ((((147.1-143.6)/(76.8-73.2))*x)+(147.1-(((147.1-143.6)/(76.8-
73.2))*76.8))

    def trange7680(x):

        return ((((156.4-147.1)/(80.4-76.8))*x)+(156.4-(((156.4-147.1)/(80.4-
76.8))*80.4))

    def trange80107(x):

        return ((((183.6-156.4)/(107.1-80.4))*x)+(183.6-(((183.6-156.4)/(107.1-
80.4))*107.1))

    def trange107114(x):

        return ((((190-183.6)/(114.3-107.1))*x)+(190-(((190-183.6)/(114.3-
107.1))*114.3))

    def trange114121(x):

        return ((((193.9-190)/(121.4-114.3))*x)+(193.9-(((193.9-190)/(121.4-
114.3))*121.4))

    def trange121125(x):

        return ((((187.9-193.9)/(125-121.4))*x)+(187.9-(((187.9-193.9)/(125-
121.4))*125))

    def trange125134(x):

        return ((((193.9-187.9)/(133.9-125))*x)+(193.9-(((193.9-187.9)/(133.9-
```

```
125))*133.9))

    def trange134140(x):

        return (((191.1-193.9)/(139.3-133.9))*x)+(191.1-(((191.1-193.9)/(139.3-
133.9))*139.3))

    def trange140148(x):

        return (((185-191.1)/(148.2-139.3))*x)+(185-(((185-191.1)/(148.2-
139.3))*148.2))

    def trange148173(x):

        return (((157.1-185)/(173.1-148.2))*x)+(157.1-(((157.1-185)/(173.1-
148.2))*173.1))

    def trange173177(x):

        return (((147.1-157.1)/(176.8-173.1))*x)+(147.1-(((147.1-157.1)/(176.8-
173.1))*176.8))

    def trange177179(x):

        return (((143.6-147.1)/(178.6-176.8))*x)+(143.6-(((143.6-147.1)/(178.6-
176.8))*178.6))

    def trange179190(x):

        return (((146.3-143.6)/(190.2-178.6))*x)+(146.3-(((146.3-143.6)/(190.2-
178.6))*190.2))

    def urange6875(x):
```

```
        return (((11.3-10.1)/(75-67.9))*x)+(11.3-(((11.3-10.1)/(75-67.9))*75))

    def urange75121(x):

        return (0.0036956171*(x**2))+(-0.7107330003*x)+43.81712859

    def urange121127(x):

        return (((11.3-12)/(126.8-121.4))*x)+(11.3-(((11.3-12)/(126.8-121.4))*126.8))

    def urange127131(x):

        return (((12-11.3)/(131.3-126.8))*x)+(12-(((12-11.3)/(131.3-126.8))*131.3))

    def urange131134(x):

        return (((11.6-12)/(133.9-131.25))*x)+(11.6-(((11.6-12)/(133.9-

131.25))*133.9))

    def urange134177(x):

        return (0.0044526553*(x**2))+(-1.389733708*x)+117.8827515

    def urange177184(x):

        return (((8.4-11.4)/(183.9-176.8))*x)+(8.4-(((8.4-11.4)/(183.9-176.8))*183.9))

# How much kinetic energy does each fragment have? (m equals A, not mass)

# Which interpolation to use? for m1

    if m1 >= 70 and m1 < 77:

        Av1=trange7376(m1)

    if m1 >= 77 and m1 < 81:

        Av1=trange7680(m1)
```

```
if m1 >= 81 and m1 < 107:

    Av1=trange80107(m1)

if m1 >= 107 and m1 < 114:

    Av1=trange107114(m1)

if m1 >= 114 and m1 < 121:

    Av1=trange114121(m1)

if m1 >= 121 and m1 < 125:

    Av1=trange121125(m1)

if m1 >= 125 and m1 < 134:

    Av1=trange125134(m1)

if m1 >= 134 and m1 < 140:

    Av1=trange134140(m1)

if m1 >= 140 and m1 < 148:

    Av1=trange140148(m1)

if m1 >= 148 and m1 < 173:

    Av1=trange148173(m1)

if m1 >= 173 and m1 < 177:

    Av1=trange173177(m1)

if m1 >= 177 and m1 < 179:

    Av1=trange177179(m1)
```

```
    if m1 >= 179 and m1 < 190:

        Av1=trange179190(m1)

    if m1 >= 190 and m1 < 190:

        Av1=trange179190(m1)

    if m1 >=68 and m1 <75:

        Sd1=urange6875(m1)

    if m1 >=75 and m1 <121:

        Sd1=urange75121(m1)

    if m1 >=121 and m1 <127:

        Sd1=urange121127(m1)

    if m1 >=127 and m1 <131:

        Sd1=urange127131(m1)

    if m1 >=131 and m1 <134:

        Sd1=urange131134(m1)

    if m1 >=134 and m1 <177:

        Sd1=urange134177(m1)

    if m1 >=177 and m1 <184:

        Sd1=urange177184(m1)

# end linear interpolation definitions for m1

# Which interpolation to use? m2
```

```
if m2 >= 70 and m2 < 77:

        Av2=trange7376(m2)

if m2 >= 77 and m2 < 81:

        Av2=trange7680(m2)

if m2 >= 81 and m2 < 107:

        Av2=trange80107(m2)

if m2 >= 107 and m2 < 114:

        Av2=trange107114(m2)

if m2 >= 114 and m2 < 121:

        Av2=trange114121(m2)

if m2 >= 121 and m2 < 125:

        Av2=trange121125(m2)

if m2 >= 125 and m2 < 134:

        Av2=trange125134(m2)

if m2 >= 134 and m2 < 140:

        Av2=trange134140(m2)

if m2 >= 140 and m2 < 148:

        Av2=trange140148(m2)

if m2 >= 148 and m2 < 173:

        Av2=trange148173(m2)
```

```
if m2 >= 173 and m2 < 177:

    Av2=trange173177(m2)

if m2 >= 177 and m2 < 179:

    Av2=trange177179(m2)

if m2 >= 179 and m2 < 190:

    Av2=trange179190(m2)

if m2 >= 190 and m2 < 190:

    Av2=trange179190(m2)

if m2 >=68 and m2 <75:

    Sd2=urange6875(m2)

if m2 >=75 and m2 <121:

    Sd2=urange75121(m2)

if m2 >=121 and m2 <127:

    Sd2=urange121127(m2)

if m2 >=127 and m2 <131:

    Sd2=urange127131(m2)

if m2 >=131 and m2 <134:

    Sd2=urange131134(m2)

if m2 >=134 and m2 <177:

    Sd2=urange134177(m2)
```

```python
    if m2 >=177 and m2 <184:

        Sd2=urange177184(m2)

# end linear interpolation definitions for m2

    Em1=random.gauss(Av1,Sd1)

    Em2=random.gauss(Av2,Sd2)
```

Neutrons Released from Each Fragment from a Spontaneously Fissioning ^{252}Cf Source

This plot was taken from Ref. 6.
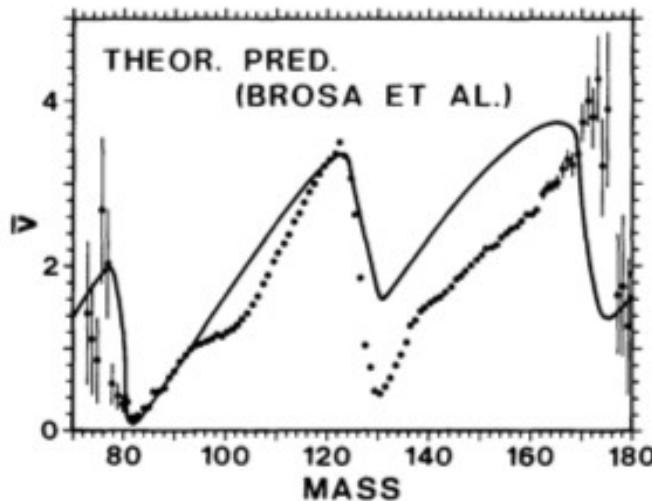
This is a plot of the average neutron multiplicity as a function of fragment mass for a spontaneously fissioning ^{252}Cf source. A Piece-wise defined function was fit to the dots in this plot which represent experimentally obtained values.

This is the section of the python code that simulates the number of neutrons emitted from each fragment. Embedded within this code are the piece-wise defined functions.

```python
# How many neutrons are released off of each fragment?

# Use a Gaussian distribution with mean=vaverage and sigma=sqrt of mean

def numnrange7382(x):

    return (((0.1-1.4)/(82-73))*x)+(0.1-(((0.1-1.4)/(82-73))*82))

def numnrange82122(x):

    return (((3.4-0.1)/(122-82))*x)+(3.4-(((3.4-0.1)/(122-82))*122))

def numnrange122130(x):

    return (((0.4-3.4)/(130-122))*x)+(0.4-(((0.4-3.4)/(130-122))*130))

def numnrange130140(x):

    return (((1.4-0.4)/(140-130))*x)+(1.4-(((1.4-0.4)/(140-130))*140))

def numnrange140168(x):

    return (((3.2-1.4)/(168-140))*x)+(3.2-(((3.2-1.4)/(168-140))*168))

if m1 <= 82:

    numn1=numnrange7382(m1)

if m1 > 82 and m1 <= 122:

    numn1=numnrange82122(m1)

if m1 > 122 and m1 <= 130:

    numn1=numnrange122130(m1)

if m1 > 130 and m1 <= 140:

    numn1=numnrange130140(m1)
```

```python
if m1 > 140 and m1 <= 168:

    numn1=numnrange140168(m1)

if m2 <= 82:

    numn2=numnrange7382(m2)

if m2 > 82 and m2 <= 122:

    numn2=numnrange82122(m2)

if m2 > 122 and m2 <= 130:

    numn2=numnrange122130(m2)

if m2 > 130 and m2 <= 140:

    numn2=numnrange130140(m2)

if m2 > 140 and m2 <= 168:

    numn2=numnrange140168(m2)

nm1=int(round(numn1))

nm2=int(round(numn2))
```

Code to Simulate the Distribution of Angles Between Neutrons from a Spontaneously
Fissioning ^{252}Cf Source

Below is the python code used to simulate the distribution of angles between neutrons
from a spontaneously fissioning ^{252}Cf source. This data is size 7 font to conserve space.
If you wish to use this data, please copy and paste it from the electronic version of this
thesis. If this code is executed, it will generate an output file entitled angbins.txt. For a
given run, one must execute the code twice. First one must generate data for the angular
bins for neutrons from the same fission fragment. This is done by commenting out
"probdet.append(probf12)" and "diffsamearray.append(diffsamef12)" in the code. One
must ensure that "probdet.append(probf1)", "diffsamearray.append(diffsamef1)",
"probdet.append(probf2)", and "diffsamearray.append(diffsamef2)" are not commented.
Once the output file is generated one must normalize the angular frequencies by dividing
by the sum of all of the angular bins from the same fission fragment. Next, one must
generate data for the angular bins for neutrons from opposite fission fragments. This is
done by commenting "probdet.append(probf1)", "diffsamearray.append(diffsamef1)",
"probdet.append(probf2)", and "diffsamearray.append(diffsamef2)". One must ensure
that "probdet.append(probf12)" and "diffsamearray.append(diffsamef12)" are not
commented. Delete the old output file. Once the output file is generated one must
normalize the angular frequencies by dividing by the sum of all of the angular bins from
opposite fission fragments. One can then sum the normalized frequencies from the same
and opposite fission fragments. This process is equivalent to assuming that it is equally

likely that a pair of neutrons be emitted from the same fragment as opposite fragments.

The resulting distribution will have the correct shape but not the correct magnitude. One

needs to normalize the results to the magnitude of the experimental results. An easy way

to do this is to divide both the simulated distribution and the experimental distribution by

their respective averages.

```
import random
import math
import sys
import re
random.seed()
filename1 = "Wattenergy.txt"
filename2 = "Wattcumuprob.txt"
pin1 = open(filename1,'r')
lines1 = pin1.readlines();
pin2 = open(filename2,'r')
lines2 = pin2.readlines();
Wattenergy=[]
Wattcumuprob=[]
for line in lines1:
    values1 = re.split('\s+', line);
    Wattenergy.append(float(values1[0]))
for line in lines2:
    values2 = re.split('\s+', line);
    Wattcumuprob.append(float(values2[0]))
filename3 = "energyefficiency.txt"
pin3 = open(filename3,'r')
lines3 = pin3.readlines();
energyE=[]
efficiencyE=[]
for line in lines3:
    values3 = re.split('\s+', line);
    energyE.append(float(values3[0]))
    efficiencyE.append(float(values3[1]))
bin0=0
bin1=0
bin2=0
bin3=0
bin4=0
bin5=0
bin6=0
bin7=0
bin8=0
bin9=0
bin10=0
bin11=0
bin12=0
bin13=0
bin14=0
bin15=0
bin16=0
bin17=0
bin18=0
bin19=0
bin20=0
bin21=0
bin22=0
bin23=0
bin24=0
bin25=0
```

```
bin26=0
bin27=0
bin28=0
bin29=0
bin30=0
bin31=0
bin32=0
bin33=0
bin34=0
bin35=0
bin36=0
bin37=0
bin38=0
bin39=0
bin40=0
bin41=0
bin42=0
bin43=0
bin44=0
bin45=0
bin46=0
bin47=0
bin48=0
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bin57=0
bin58=0
bin59=0
bin60=0
bin61=0
bin62=0
bin63=0
bin64=0
bin65=0
bin66=0
bin67=0
bin68=0
bin69=0
bin70=0
bin71=0
bin72=0
bin73=0
bin74=0
bin75=0
bin76=0
bin77=0
bin78=0
bin79=0
bin80=0
bin81=0
bin82=0
bin83=0
bin84=0
bin85=0
bin86=0
bin87=0
bin88=0
bin89=0
bin90=0
bin91=0
bin92=0
bin93=0
bin94=0
bin95=0
bin96=0
bin97=0
```

bin98=0
bin99=0
bin100=0
bin101=0
bin102=0
bin103=0
bin104=0
bin105=0
bin106=0
bin107=0
bin108=0
bin109=0
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bin151=0
bin152=0
bin153=0
bin154=0
bin155=0
bin156=0
bin157=0
bin158=0
bin159=0
bin160=0
bin161=0
bin162=0
bin163=0
bin164=0
bin165=0
bin166=0
bin167=0
bin168=0
bin169=0

```
bin170=0
bin171=0
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bin360=0
# What fission fragments does Cf-252 break into?
# numbers that yield masses for random number (inclusive)
count=0
# upper range is how many spontaneous fissions you want to simulate
for count in range(0,50000):
    n1count=0
    n2count=0
    x=random.random()
    randomnumber=x
    if randomnumber < 0.021975:
        m1=143
        m2=109
        mass1=142.9206267
        mass2=109.0793733
    if randomnumber >0.021975 and randomnumber <=0.04094195:
        m1=141
        m2=111
        mass1=140.9200458
        mass2=111.0799542
    if randomnumber >0.04094195 and randomnumber <=0.05911515:
        m1=138
        m2=114
        mass1=137.9139545
        mass2=114.0860455
    if randomnumber >0.05911515 and randomnumber <=0.07728085:
```

```
        m1=107
        m2=145
        mass1=106.9150796
        mass2=145.0849204
if randomnumber >0.07728085 and randomnumber <=0.0953971:
        m1=110
        m2=142
        mass1=109.914136
        mass2=142.085864
if randomnumber >0.0953971 and randomnumber <=0.1128725:
        m1=139
        m2=113
        mass1=138.9187929
        mass2=113.0812071
if randomnumber >0.1128725 and randomnumber <=0.13020445:
        m1=106
        m2=146
        mass1=105.9181368
        mass2=146.0818632
if randomnumber >0.13020445 and randomnumber <=0.1470724:
        m1=144
        m2=108
        mass1=143.9229529
        mass2=108.0770471
if randomnumber >0.1470724 and randomnumber <=0.16373185:
        m1=108
        m2=144
        mass1=107.9184612
        mass2=144.0815388
if randomnumber >0.16373185 and randomnumber <=0.1790354:
        m1=103
        m2=149
        mass1=102.9191438
        mass2=149.0808562
if randomnumber >0.1790354 and randomnumber <=0.19413195:
        m1=105
        m2=147
        mass1=104.9169746
        mass2=147.0830254
if randomnumber >0.19413195 and randomnumber <=0.20906925:
        m1=109
        m2=143
        mass1=108.9132032
        mass2=143.0867968
if randomnumber >0.20906925 and randomnumber <=0.22320745:
        m1=104
        m2=148
        mass1=103.9137636
        mass2=148.0862364
if randomnumber >0.22320745 and randomnumber <=0.2370592:
        m1=140
        m2=112
        mass1=139.9172824
        mass2=112.0827176
if randomnumber >0.2370592 and randomnumber <=0.25053655:
        m1=142
        m2=110
        mass1=141.9164534
        mass2=110.0835466
if randomnumber >0.25053655 and randomnumber <=0.2634984:
        m1=137
        m2=115
        mass1=136.9115621
        mass2=115.0884379
if randomnumber >0.2634984 and randomnumber <=0.27626545:
        m1=140
        m2=112
        mass1=139.9216409
        mass2=112.0783591
if randomnumber >0.27626545 and randomnumber <=0.28893515:
        m1=142
        m2=110
```

```
        mass1=141.9242989
        mass2=110.0757011
if randomnumber >0.28893515 and randomnumber <=0.30147595:
        m1=145
        m2=107
        mass1=144.9216454
        mass2=107.0783546
if randomnumber >0.30147595 and randomnumber <=0.31375775:
        m1=111
        m2=141
        mass1=110.9115859
        mass2=141.0884141
if randomnumber >0.31375775 and randomnumber <=0.32572425:
        m1=113
        m2=139
        mass1=112.9101529
        mass2=139.0898471
if randomnumber >0.32572425 and randomnumber <=0.33768795:
        m1=112
        m2=140
        mass1=111.9143942
        mass2=140.0856058
if randomnumber >0.33768795 and randomnumber <=0.34963665:
        m1=146
        m2=106
        mass1=145.9257935
        mass2=106.0742065
if randomnumber >0.34963665 and randomnumber <=0.3614111:
        m1=148
        m2=104
        mass1=147.9244324
        mass2=104.0755676
if randomnumber >0.3614111 and randomnumber <=0.3731691:
        m1=134
        m2=118
        mass1=133.9113687
        mass2=118.0886313
if randomnumber >0.3731691 and randomnumber <=0.3846241:
        m1=136
        m2=116
        mass1=135.914654
        mass2=116.085346
if randomnumber >0.3846241 and randomnumber <=0.3959194:
        m1=111
        m2=141
        mass1=110.917696
        mass2=141.082304
if randomnumber >0.3959194 and randomnumber <=0.4069142:
        m1=101
        m2=151
        mass1=100.9211404
        mass2=151.0788596
if randomnumber >0.4069142 and randomnumber <=0.4178794:
        m1=106
        m2=146
        mass1=105.9143579
        mass2=146.0856421
if randomnumber >0.4178794 and randomnumber <=0.4286153:
        m1=104
        m2=148
        mass1=103.9224647
        mass2=148.0775353
if randomnumber >0.4286153 and randomnumber <=0.43913875:
        m1=105
        m2=147
        mass1=104.9116606
        mass2=147.0883394
if randomnumber >0.43913875 and randomnumber <=0.44943355:
        m1=145
        m2=107
        mass1=144.927627
        mass2=107.072373
```

```
if randomnumber >0.44943355 and randomnumber <=0.45971395:
    m1=100
    m2=152
    mass1=99.91776189
    mass2=152.08223811
if randomnumber >0.45971395 and randomnumber <=0.46990475:
    m1=102
    m2=150
    mass1=101.9180376
    mass2=150.0819624
if randomnumber >0.46990475 and randomnumber <=0.4799411:
    m1=107
    m2=145
    mass1=106.9216926
    mass2=145.0783074
if randomnumber >0.4799411 and randomnumber <=0.4898566:
    m1=108
    m2=144
    mass1=107.9101735
    mass2=144.0898265
if randomnumber >0.4898566 and randomnumber <=0.4995924:
    m1=113
    m2=139
    mass1=112.9155306
    mass2=139.0844694
if randomnumber >0.4995924 and randomnumber <=0.50928715:
    m1=147
    m2=105
    mass1=146.9282353
    mass2=105.0717647
if randomnumber >0.50928715 and randomnumber <=0.51883275:
    m1=147
    m2=105
    mass1=146.922674
    mass2=105.077326
if randomnumber >0.51883275 and randomnumber <=0.52826645:
    m1=109
    m2=143
    mass1=108.9199827
    mass2=143.0800173
if randomnumber >0.52826645 and randomnumber <=0.53757305:
    m1=144
    m2=108
    mass1=143.9195996
    mass2=108.0804004
if randomnumber >0.53757305 and randomnumber <=0.546835:
    m1=135
    m2=117
    mass1=134.9100481
    mass2=117.0899519
if randomnumber >0.546835 and randomnumber <=0.5559655:
    m1=139
    m2=113
    mass1=138.913364
    mass2=113.086636
if randomnumber >0.5559655 and randomnumber <=0.5650483:
    m1=114
    m2=138
    mass1=113.9103626
    mass2=138.0896374
if randomnumber >0.5650483 and randomnumber <=0.574090515:
    m1=133
    m2=119
    mass1=132.9109553
    mass2=119.0890447
if randomnumber >0.574090515 and randomnumber <=0.583010665:
    m1=135
    m2=117
    mass1=134.9164486
    mass2=117.0835514
if randomnumber >0.583010665 and randomnumber <=0.591485465:
    m1=115
```

```
        m2=137
        mass1=114.9136838
        mass2=137.0863162
if randomnumber >0.591485465 and randomnumber <=0.599348115:
        m1=137
        m2=115
        mass1=136.9178708
        mass2=115.0821292
if randomnumber >0.599348115 and randomnumber <=0.606829965:
        m1=149
        m2=103
        mass1=148.9283999
        mass2=103.0716001
if randomnumber >0.606829965 and randomnumber <=0.614168715:
        m1=103
        m2=149
        mass1=102.9132071
        mass2=149.0867929
if randomnumber >0.614168715 and randomnumber <=0.621398815:
        m1=102
        m2=150
        mass1=101.9229813
        mass2=150.0770187
if randomnumber >0.621398815 and randomnumber <=0.62813008:
        m1=110
        m2=142
        mass1=109.9111364
        mass2=142.0888636
if randomnumber >0.62813008 and randomnumber <=0.63464558:
        m1=101
        m2=151
        mass1=100.915252
        mass2=151.084748
if randomnumber >0.63464558 and randomnumber <=0.64115528:
        m1=150
        m2=102
        mass1=149.926673
        mass2=102.073327
if randomnumber >0.64115528 and randomnumber <=0.64758609:
        m1=98
        m2=154
        mass1=97.92220302
        mass2=154.07779698
if randomnumber >0.64758609 and randomnumber <=0.65383179:
        m1=99
        m2=153
        mass1=98.91651211
        mass2=153.08348789
if randomnumber >0.65383179 and randomnumber <=0.659914525:
        m1=132
        m2=120
        mass1=131.9144669
        mass2=120.0855331
if randomnumber >0.659914525 and randomnumber <=0.66585235:
        m1=116
        m2=136
        mass1=115.9113599
        mass2=136.0886401
if randomnumber >0.66585235 and randomnumber <=0.6715992:
        m1=99
        m2=153
        mass1=98.9246362
        mass2=153.0753638
if randomnumber >0.6715992 and randomnumber <=0.67714825:
        m1=141
        m2=111
        mass1=140.914411
        mass2=111.085589
if randomnumber >0.67714825 and randomnumber <=0.68249485:
        m1=151
        m2=101
        mass1=150.9283186
```

```
        mass2=101.0716814
if randomnumber >0.68249485 and randomnumber <=0.68777615:
        m1=133
        m2=119
        mass1=132.9152516
        mass2=119.0847484
if randomnumber >0.68777615 and randomnumber <=0.6930442:
        m1=143
        m2=109
        mass1=142.9160627
        mass2=109.0839373
if randomnumber >0.6930442 and randomnumber <=0.698121845:
        m1=117
        m2=135
        mass1=116.9116846
        mass2=135.0883154
if randomnumber >0.698121845 and randomnumber <=0.703171645:
        m1=146
        m2=106
        mass1=145.918759
        mass2=106.081241
if randomnumber >0.703171645 and randomnumber <=0.708193695:
        m1=138
        m2=114
        mass1=137.9223496
        mass2=114.0776504
if randomnumber >0.708193695 and randomnumber <=0.713202545:
        m1=141
        m2=111
        mass1=140.926648
        mass2=111.073352
if randomnumber >0.713202545 and randomnumber <=0.718199805:
        m1=105
        m2=147
        mass1=104.9239365
        mass2=147.0760635
if randomnumber >0.718199805 and randomnumber <=0.723172315:
        m1=131
        m2=121
        mass1=130.9119823
        mass2=121.0880177
if randomnumber >0.723172315 and randomnumber <=0.728102715:
        m1=148
        m2=104
        mass1=147.9322289
        mass2=104.0677711
if randomnumber >0.728102715 and randomnumber <=0.733006875:
        m1=146
        m2=106
        mass1=145.9302196
        mass2=106.0697804
if randomnumber >0.733006875 and randomnumber <=0.737888785:
        m1=115
        m2=137
        mass1=114.9087627
        mass2=137.0912373
if randomnumber >0.737888785 and randomnumber <=0.742593185:
        m1=150
        m2=102
        mass1=149.9304089
        mass2=102.0695911
if randomnumber >0.742593185 and randomnumber <=0.74728587:
        m1=112
        m2=140
        mass1=111.918965
        mass2=140.081035
if randomnumber >0.74728587 and randomnumber <=0.75192925:
        m1=149
        m2=103
        mass1=148.9237177
        mass2=103.0762823
if randomnumber >0.75192925 and randomnumber <=0.75649834:
```

```
        m1=134
        m2=118
        mass1=133.9097445
        mass2=118.0902555
if randomnumber >0.75649834 and randomnumber <=0.76106155:
        m1=114
        m2=138
        mass1=113.9088037
        mass2=138.0911963
if randomnumber >0.76106155 and randomnumber <=0.765620685:
        m1=136
        m2=116
        mass1=135.9201012
        mass2=116.0798988
if randomnumber >0.765620685 and randomnumber <=0.770147345:
        m1=109
        m2=143
        mass1=108.9087373
        mass2=143.0912627
if randomnumber >0.770147345 and randomnumber <=0.774585405:
        m1=96
        m2=156
        mass1=95.9216968
        mass2=156.0783032
if randomnumber >0.774585405 and randomnumber <=0.77895539:
        m1=138
        m2=114
        mass1=137.9110167
        mass2=114.0889833
if randomnumber >0.77895539 and randomnumber <=0.78331321:
        m1=107
        m2=145
        mass1=106.9099051
        mass2=145.0900949
if randomnumber >0.78331321 and randomnumber <=0.78766198:
        m1=97
        m2=155
        mass1=96.918134
        mass2=155.081866
if randomnumber >0.78766198 and randomnumber <=0.79193763:
        m1=110
        m2=142
        mass1=109.9238205
        mass2=142.0761795
if randomnumber >0.79193763 and randomnumber <=0.796154335:
        m1=103
        m2=149
        mass1=102.9265996
        mass2=149.0734004
if randomnumber >0.796154335 and randomnumber <=0.800294375:
        m1=152
        m2=100
        mass1=151.9246822
        mass2=100.0753178
if randomnumber >0.800294375 and randomnumber <=0.804386955:
        m1=116
        m2=136
        mass1=115.9141587
        mass2=136.0858413
if randomnumber >0.804386955 and randomnumber <=0.808467075:
        m1=136
        m2=116
        mass1=135.9072188
        mass2=116.0927812
if randomnumber >0.808467075 and randomnumber <=0.812461315:
        m1=153
        m2=99
        mass1=152.9276982
        mass2=99.0723018
if randomnumber >0.812461315 and randomnumber <=0.81635148:
        m1=100
        m2=152
```

```
        mass1=99.92775659
        mass2=152.07224341
if randomnumber >0.81635148 and randomnumber <=0.820235065:
        m1=132
        m2=120
        mass1=131.9085532
        mass2=120.0914468
if randomnumber >0.820235065 and randomnumber <=0.824068945:
        m1=95
        m2=157
        mass1=94.91935877
        mass2=157.08064123
if randomnumber >0.824068945 and randomnumber <=0.82779406:
        m1=112
        m2=140
        mass1=111.9073141
        mass2=140.0926859
if randomnumber >0.82779406 and randomnumber <=0.83150695:
        m1=143
        m2=109
        mass1=142.9273518
        mass2=109.0726482
if randomnumber >0.83150695 and randomnumber <=0.834987735:
        m1=152
        m2=100
        mass1=151.9314992
        mass2=100.0685008
if randomnumber >0.834987735 and randomnumber <=0.83845031:
        m1=137
        m2=115
        mass1=136.9070895
        mass2=115.0929105
if randomnumber >0.83845031 and randomnumber <=0.84178469:
        m1=108
        m2=144
        mass1=107.923453
        mass2=144.076547
if randomnumber >0.84178469 and randomnumber <=0.84479219:
        m1=97
        m2=155
        mass1=96.92615292
        mass2=155.07384708
if randomnumber >0.84479219 and randomnumber <=0.84774779:
        m1=118
        m2=134
        mass1=117.9145828
        mass2=134.0854172
if randomnumber >0.84774779 and randomnumber <=0.850684675:
        m1=98
        m2=154
        mass1=97.91273489
        mass2=154.08726511
if randomnumber >0.850684675 and randomnumber <=0.853537945:
        m1=100
        m2=152
        mass1=99.91418162
        mass2=152.08581838
if randomnumber >0.853537945 and randomnumber <=0.8563397:
        m1=151
        m2=101
        mass1=150.9238289
        mass2=101.0761711
if randomnumber >0.8563397 and randomnumber <=0.85914106:
        m1=114
        m2=138
        mass1=113.918806
        mass2=138.081194
if randomnumber >0.85914106 and randomnumber <=0.86193259:
        m1=134
        m2=118
        mass1=133.9203797
        mass2=118.0796203
```

```
if randomnumber >0.86193259 and randomnumber <=0.86469434:
    m1=154
    m2=98
    mass1=153.9264639
    mass2=98.0735361
if randomnumber >0.86469434 and randomnumber <=0.867437005:
    m1=144
    m2=108
    mass1=143.9320769
    mass2=108.0679231
if randomnumber >0.867437005 and randomnumber <=0.870173005:
    m1=94
    m2=158
    mass1=93.91536131
    mass2=158.08463869
if randomnumber >0.870173005 and randomnumber <=0.872898303:
    m1=96
    m2=156
    mass1=95.91589134
    mass2=156.08410866
if randomnumber >0.872898303 and randomnumber <=0.875602073:
    m1=148
    m2=104
    mass1=147.922135
    mass2=104.077865
if randomnumber >0.875602073 and randomnumber <=0.878182213:
    m1=140
    m2=112
    mass1=139.9106045
    mass2=112.0893955
if randomnumber >0.878182213 and randomnumber <=0.880694753:
    m1=93
    m2=159
    mass1=92.92204188
    mass2=159.07795812
if randomnumber >0.880694753 and randomnumber <=0.883015948:
    m1=102
    m2=150
    mass1=101.9102974
    mass2=150.0897026
if randomnumber >0.883015948 and randomnumber <=0.885307348:
    m1=156
    m2=96
    mass1=155.9310567
    mass2=96.0689433
if randomnumber >0.885307348 and randomnumber <=0.887576278:
    m1=94
    m2=158
    mass1=93.92640495
    mass2=158.07359505
if randomnumber >0.887576278 and randomnumber <=0.889797353:
    m1=130
    m2=122
    mass1=129.9116563
    mass2=122.0883437
if randomnumber >0.889797353 and randomnumber <=0.892001768:
    m1=106
    m2=146
    mass1=105.92797
    mass2=146.07203
if randomnumber >0.892001768 and randomnumber <=0.894204018:
    m1=155
    m2=97
    mass1=154.9281013
    mass2=97.0718987
if randomnumber >0.894204018 and randomnumber <=0.896357483:
    m1=104
    m2=148
    mass1=103.9114475
    mass2=148.0885525
if randomnumber >0.896357483 and randomnumber <=0.898451298:
    m1=154
```

```
        m2=98
        mass1=153.9294773
        mass2=98.0705227
if randomnumber >0.898451298 and randomnumber <=0.900520408:
        m1=142
        m2=110
        mass1=141.9140791
        mass2=110.0859209
if randomnumber >0.900520408 and randomnumber <=0.902577428:
        m1=135
        m2=117
        mass1=134.9072275
        mass2=117.0927725
if randomnumber >0.902577428 and randomnumber <=0.904625838:
        m1=139
        m2=113
        mass1=138.9260995
        mass2=113.0739005
if randomnumber >0.904625838 and randomnumber <=0.906657008:
        m1=129
        m2=123
        mass1=128.913479
        mass2=123.086521
if randomnumber >0.906657008 and randomnumber <=0.908511223:
        m1=98
        m2=154
        mass1=97.92845293
        mass2=154.07154707
if randomnumber >0.908511223 and randomnumber <=0.910351338:
        m1=142
        m2=110
        mass1=141.9297096
        mass2=110.0702904
if randomnumber >0.910351338 and randomnumber <=0.912161208:
        m1=130
        m2=122
        mass1=129.9139673
        mass2=122.0860327
if randomnumber >0.912161208 and randomnumber <=0.913894033:
        m1=145
        m2=107
        mass1=144.9172331
        mass2=107.0827669
if randomnumber >0.913894033 and randomnumber <=0.915626543:
        m1=92
        m2=160
        mass1=91.9197289
        mass2=160.0802711
if randomnumber >0.915626543 and randomnumber <=0.917308573:
        m1=101
        m2=151
        mass1=100.9303139
        mass2=151.0696861
if randomnumber >0.917308573 and randomnumber <=0.918981558:
        m1=90
        m2=162
        mass1=89.91951656
        mass2=162.08048344
if randomnumber >0.918981558 and randomnumber <=0.920562048:
        m1=91
        m2=161
        mass1=90.92344522
        mass2=161.07655478
if randomnumber >0.920562048 and randomnumber <=0.92209017:
        m1=131
        m2=121
        mass1=130.9085239
        mass2=121.0914761
if randomnumber >0.92209017 and randomnumber <=0.92356834:
        m1=131
        m2=121
        mass1=130.9169998
```

```
        mass2=121.0830002
if randomnumber >0.92356834 and randomnumber <=0.925026875:
        m1=117
        m2=135
        mass1=116.9178413
        mass2=135.0821587
if randomnumber >0.925026875 and randomnumber <=0.926484385:
        m1=151
        m2=101
        mass1=150.9339762
        mass2=101.0660238
if randomnumber >0.926484385 and randomnumber <=0.92794121:
        m1=111
        m2=141
        mass1=110.9076707
        mass2=141.0923293
if randomnumber >0.92794121 and randomnumber <=0.929364795:
        m1=157
        m2=95
        mass1=156.9283587
        mass2=95.0716413
if randomnumber >0.929364795 and randomnumber <=0.93072539:
        m1=118
        m2=134
        mass1=117.9069145
        mass2=134.0930855
if randomnumber >0.93072539 and randomnumber <=0.93206608:
        m1=95
        m2=157
        mass1=94.92930289
        mass2=157.07069711
if randomnumber >0.93206608 and randomnumber <=0.933368765:
        m1=153
        m2=99
        mass1=152.9338389
        mass2=99.0661611
if randomnumber >0.933368765 and randomnumber <=0.93459149:
        m1=158
        m2=94
        mass1=157.9299913
        mass2=94.0700087
if randomnumber >0.93459149 and randomnumber <=0.935810525:
        m1=147
        m2=105
        mass1=146.934945
        mass2=105.065055
if randomnumber >0.935810525 and randomnumber <=0.937026685:
        m1=155
        m2=97
        mass1=154.932932
        mass2=97.067068
if randomnumber >0.937026685 and randomnumber <=0.938207665:
        m1=93
        m2=159
        mass1=92.91402563
        mass2=159.08597437
if randomnumber >0.938207665 and randomnumber <=0.939388425:
        m1=92
        m2=160
        mass1=91.92615621
        mass2=160.07384379
if randomnumber >0.939388425 and randomnumber <=0.940559635:
        m1=149
        m2=103
        mass1=148.934734
        mass2=103.065266
if randomnumber >0.940559635 and randomnumber <=0.941726775:
        m1=137
        m2=115
        mass1=136.925323
        mass2=115.074677
if randomnumber >0.941726775 and randomnumber <=0.942851786:
```

```
        m1=113
        m2=139
        mass1=112.9065666
        mass2=139.0934334
if randomnumber >0.942851786 and randomnumber <=0.943973431:
        m1=104
        m2=148
        mass1=103.92878
        mass2=148.07122
if randomnumber >0.943973431 and randomnumber <=0.945091221:
        m1=91
        m2=161
        mass1=90.91653696
        mass2=161.08346304
if randomnumber >0.945091221 and randomnumber <=0.946188491:
        m1=133
        m2=119
        mass1=132.9077969
        mass2=119.0922031
if randomnumber >0.946188491 and randomnumber <=0.947272156:
        m1=153
        m2=99
        mass1=152.9241169
        mass2=99.0758831
if randomnumber >0.947272156 and randomnumber <=0.948338226:
        m1=113
        m2=139
        mass1=112.9224872
        mass2=139.0775128
if randomnumber >0.948338226 and randomnumber <=0.949378991:
        m1=106
        m2=146
        mass1=105.9073294
        mass2=146.0926706
if randomnumber >0.949378991 and randomnumber <=0.950378246:
        m1=157
        m2=95
        mass1=156.9330394
        mass2=95.0669606
if randomnumber >0.950378246 and randomnumber <=0.951366971:
        m1=95
        m2=157
        mass1=94.91282062
        mass2=157.08717938
if randomnumber >0.951366971 and randomnumber <=0.952333681:
        m1=119
        m2=133
        mass1=118.9156651
        mass2=133.0843349
if randomnumber >0.952333681 and randomnumber <=0.953285596:
        m1=117
        m2=135
        mass1=116.9072186
        mass2=135.0927814
if randomnumber >0.953285596 and randomnumber <=0.954190101:
        m1=147
        m2=105
        mass1=146.918996
        mass2=105.081004
if randomnumber >0.954190101 and randomnumber <=0.955080809:
        m1=119
        m2=133
        mass1=118.9099216
        mass2=133.0900784
if randomnumber >0.955080809 and randomnumber <=0.955960974:
        m1=159
        m2=93
        mass1=158.9332113
        mass2=93.0667887
if randomnumber >0.955960974 and randomnumber <=0.956839999:
        m1=111
        m2=141
```

```
        mass1=110.9256928
        mass2=141.0743072
if randomnumber >0.956839999 and randomnumber <=0.957714897:
        m1=128
        m2=124
        mass1=127.9105366
        mass2=124.0894634
if randomnumber >0.957714897 and randomnumber <=0.958583377:
        m1=89
        m2=163
        mass1=88.91763058
        mass2=163.08236942
if randomnumber >0.958583377 and randomnumber <=0.959444412:
        m1=129
        m2=123
        mass1=128.9091484
        mass2=123.0908516
if randomnumber >0.959444412 and randomnumber <=0.960300437:
        m1=115
        m2=137
        mass1=114.920334
        mass2=137.079666
if randomnumber >0.960300437 and randomnumber <=0.961145162:
        m1=88
        m2=164
        mass1=87.92406593
        mass2=164.07593407
if randomnumber >0.961145162 and randomnumber <=0.961973802:
        m1=97
        m2=155
        mass1=96.91095311
        mass2=155.08904689
if randomnumber >0.961973802 and randomnumber <=0.962758902:
        m1=160
        m2=92
        mass1=159.931971
        mass2=92.068029
if randomnumber >0.962758902 and randomnumber <=0.963538937:
        m1=120
        m2=132
        mass1=119.9098501
        mass2=132.0901499
if randomnumber >0.963538937 and randomnumber <=0.964288837:
        m1=89
        m2=163
        mass1=88.92638533
        mass2=163.07361467
if randomnumber >0.964288837 and randomnumber <=0.965035547:
        m1=145
        m2=107
        mass1=144.9355262
        mass2=107.0644738
if randomnumber >0.965035547 and randomnumber <=0.965777427:
        m1=109
        m2=143
        mass1=108.92781
        mass2=143.07219
if randomnumber >0.965777427 and randomnumber <=0.966517652:
        m1=158
        m2=94
        mass1=157.9278453
        mass2=94.0721547
if randomnumber >0.966517652 and randomnumber <=0.967246422:
        m1=135
        m2=117
        mass1=134.9251658
        mass2=117.0748342
if randomnumber >0.967246422 and randomnumber <=0.967971292:
        m1=150
        m2=102
        mass1=149.9208909
        mass2=102.0791091
```

```
if randomnumber >0.967971292 and randomnumber <=0.968694157:
    m1=139
    m2=113
    mass1=138.9088413
    mass2=113.0911587
if randomnumber >0.968694157 and randomnumber <=0.969382647:
    m1=132
    m2=120
    mass1=131.9178157
    mass2=120.0821843
if randomnumber >0.969382647 and randomnumber <=0.970040747:
    m1=99
    m2=153
    mass1=98.93324093
    mass2=153.06675907
if randomnumber >0.970040747 and randomnumber <=0.970696052:
    m1=159
    m2=93
    mass1=158.9290889
    mass2=93.0709111
if randomnumber >0.970696052 and randomnumber <=0.971343672:
    m1=93
    m2=159
    mass1=92.93127436
    mass2=159.06872564
if randomnumber >0.971343672 and randomnumber <=0.971979312:
    m1=96
    m2=156
    mass1=95.93427264
    mass2=156.06572736
if randomnumber >0.971979312 and randomnumber <=0.972612942:
    m1=118
    m2=134
    mass1=117.9189843
    mass2=134.0810157
if randomnumber >0.972612942 and randomnumber <=0.973218697:
    m1=152
    m2=100
    mass1=151.9234968
    mass2=100.0765032
if randomnumber >0.973218697 and randomnumber <=0.973801646:
    m1=99
    m2=153
    mass1=98.91161838
    mass2=153.08838162
if randomnumber >0.973801646 and randomnumber <=0.974383601:
    m1=140
    m2=112
    mass1=139.931
    mass2=112.069
if randomnumber >0.974383601 and randomnumber <=0.974956637:
    m1=108
    m2=144
    mass1=107.908728
    mass2=144.091272
if randomnumber >0.974956637 and randomnumber <=0.975506447:
    m1=87
    m2=165
    mass1=86.92071132
    mass2=165.07928868
if randomnumber >0.975506447 and randomnumber <=0.976050762:
    m1=90
    m2=162
    mass1=89.93062774
    mass2=162.06937226
if randomnumber >0.976050762 and randomnumber <=0.976581317:
    m1=161
    m2=91
    mass1=160.93368
    mass2=91.06632
if randomnumber >0.976581317 and randomnumber <=0.977107617:
    m1=156
```

```
        m2=96
        mass1=155.9350181
        mass2=96.0649819
if randomnumber >0.977107617 and randomnumber <=0.977614392:
        m1=156
        m2=96
        mass1=155.9255279
        mass2=96.0744721
if randomnumber >0.977614392 and randomnumber <=0.978120077:
        m1=144
        m2=108
        mass1=143.9136473
        mass2=108.0863527
if randomnumber >0.978120077 and randomnumber <=0.978611379:
        m1=116
        m2=136
        mass1=115.9047558
        mass2=136.0952442
if randomnumber >0.978611379 and randomnumber <=0.979102192:
        m1=127
        m2=125
        mass1=126.91036
        mass2=125.08964
if randomnumber >0.979102192 and randomnumber <=0.979591465:
        m1=121
        m2=131
        mass1=120.9129774
        mass2=131.0870226
if randomnumber >0.979591465 and randomnumber <=0.980071153:
        m1=155
        m2=97
        mass1=154.9246402
        mass2=97.0753598
if randomnumber >0.980071153 and randomnumber <=0.980532702:
        m1=90
        m2=162
        mass1=89.91480169
        mass2=162.08519831
if randomnumber >0.980532702 and randomnumber <=0.980982329:
        m1=107
        m2=145
        mass1=106.93031
        mass2=145.06969
if randomnumber >0.980982329 and randomnumber <=0.981428728:
        m1=101
        m2=151
        mass1=100.910347
        mass2=151.089653
if randomnumber >0.981428728 and randomnumber <=0.981869007:
        m1=88
        m2=164
        mass1=87.91444697
        mass2=164.08555303
if randomnumber >0.981869007 and randomnumber <=0.982302741:
        m1=160
        m2=92
        mass1=159.93514
        mass2=92.06486
if randomnumber >0.982302741 and randomnumber <=0.982719946:
        m1=122
        m2=130
        mass1=121.9133324
        mass2=130.0866676
if randomnumber >0.982719946 and randomnumber <=0.983133055:
        m1=102
        m2=150
        mass1=101.9335557
        mass2=150.0664443
if randomnumber >0.983133055 and randomnumber <=0.98354022:
        m1=92
        m2=160
        mass1=91.91103786
```

```
        mass2=160.08896214
if randomnumber >0.98354022 and randomnumber <=0.98393752:
        m1=120
        m2=132
        mass1=119.9187874
        mass2=132.0812126
if randomnumber >0.98393752 and randomnumber <=0.984312521:
        m1=85
        m2=167
        mass1=84.92224505
        mass2=167.07775495
if randomnumber >0.984312521 and randomnumber <=0.984684812:
        m1=152
        m2=100
        mass1=151.93654
        mass2=100.06346
if randomnumber >0.984684812 and randomnumber <=0.985040168:
        m1=87
        m2=165
        mass1=86.92852136
        mass2=165.07147864
if randomnumber >0.985040168 and randomnumber <=0.985385874:
        m1=158
        m2=94
        mass1=157.9365614
        mass2=94.0634386
if randomnumber >0.985385874 and randomnumber <=0.985727346:
        m1=105
        m2=147
        mass1=104.9077529
        mass2=147.0922471
if randomnumber >0.985727346 and randomnumber <=0.986062442:
        m1=86
        m2=166
        mass1=85.92427158
        mass2=166.07572842
if randomnumber >0.986062442 and randomnumber <=0.986375474:
        m1=133
        m2=119
        mass1=132.9238292
        mass2=119.0761708
if randomnumber >0.986375474 and randomnumber <=0.986680692:
        m1=162
        m2=90
        mass1=161.9309848
        mass2=90.0690152
if randomnumber >0.986680692 and randomnumber <=0.986983194:
        m1=110
        m2=142
        mass1=109.9051533
        mass2=142.0948467
if randomnumber >0.986983194 and randomnumber <=0.987280982:
        m1=94
        m2=158
        mass1=93.91159525
        mass2=158.08840475
if randomnumber >0.987280982 and randomnumber <=0.987578359:
        m1=161
        m2=91
        mass1=160.9296692
        mass2=91.0703308
if randomnumber >0.987578359 and randomnumber <=0.987868467:
        m1=149
        m2=103
        mass1=148.9201488
        mass2=103.0798512
if randomnumber >0.987868467 and randomnumber <=0.98815123:
        m1=103
        m2=149
        mass1=102.9091814
        mass2=149.0908186
if randomnumber >0.98815123 and randomnumber <=0.988426528:
```

```
        m1=150
        m2=102
        mass1=149.93877
        mass2=102.06123
if randomnumber >0.988426528 and randomnumber <=0.988697166:
        m1=138
        m2=114
        mass1=137.92922
        mass2=114.07078
if randomnumber >0.988697166 and randomnumber <=0.988963635:
        m1=115
        m2=137
        mass1=114.905431
        mass2=137.094569
if randomnumber >0.988963635 and randomnumber <=0.989229943:
        m1=154
        m2=98
        mass1=153.9375182
        mass2=98.0624818
if randomnumber >0.989229943 and randomnumber <=0.989474247:
        m1=94
        m2=158
        mass1=93.93436
        mass2=158.06564
if randomnumber >0.989474247 and randomnumber <=0.989714076:
        m1=148
        m2=104
        mass1=147.93772
        mass2=104.06228
if randomnumber >0.989714076 and randomnumber <=0.98994899:
        m1=162
        m2=90
        mass1=161.93704
        mass2=90.06296
if randomnumber >0.98994899 and randomnumber <=0.990183219:
        m1=163
        m2=89
        mass1=162.93399
        mass2=89.06601
if randomnumber >0.990183219 and randomnumber <=0.990404249:
        m1=88
        m2=164
        mass1=87.931424
        mass2=164.068576
if randomnumber >0.990404249 and randomnumber <=0.990613964:
        m1=86
        m2=166
        mass1=85.91879758
        mass2=166.08120242
if randomnumber >0.990613964 and randomnumber <=0.990823344:
        m1=154
        m2=98
        mass1=153.9222093
        mass2=98.0777907
if randomnumber >0.990823344 and randomnumber <=0.991031778:
        m1=143
        m2=109
        mass1=142.93511
        mass2=109.06489
if randomnumber >0.991031778 and randomnumber <=0.991239293:
        m1=96
        m2=156
        mass1=95.90827339
        mass2=156.09172661
if randomnumber >0.991239293 and randomnumber <=0.991446048:
        m1=91
        m2=161
        mass1=90.9339681
        mass2=161.0660319
if randomnumber >0.991446048 and randomnumber <=0.99164092:
        m1=105
        m2=147
```

```
        mass1=104.93305
        mass2=147.06695
if randomnumber >0.99164092 and randomnumber <=0.991828126:
        m1=160
        m2=92
        mass1=159.9270541
        mass2=92.0729459
if randomnumber >0.991828126 and randomnumber <=0.992014061:
        m1=141
        m2=111
        mass1=140.9109622
        mass2=111.0890378
if randomnumber >0.992014061 and randomnumber <=0.992199827:
        m1=134
        m2=118
        mass1=133.9053945
        mass2=118.0946055
if randomnumber >0.992199827 and randomnumber <=0.992379887:
        m1=112
        m2=140
        mass1=111.9070048
        mass2=140.0929952
if randomnumber >0.992379887 and randomnumber <=0.992555828:
        m1=100
        m2=152
        mass1=99.93535191
        mass2=152.06464809
if randomnumber >0.992555828 and randomnumber <=0.992730633:
        m1=157
        m2=95
        mass1=156.9254236
        mass2=95.0745764
if randomnumber >0.992730633 and randomnumber <=0.992902579:
        m1=97
        m2=155
        mass1=96.93735192
        mass2=155.06264808
if randomnumber >0.992902579 and randomnumber <=0.99306968:
        m1=123
        m2=129
        mass1=122.917003
        mass2=129.082997
if randomnumber >0.99306968 and randomnumber <=0.993223411:
        m1=146
        m2=106
        mass1=145.9176443
        mass2=106.0823557
if randomnumber >0.993223411 and randomnumber <=0.993377057:
        m1=130
        m2=122
        mass1=129.9062244
        mass2=122.0937756
if randomnumber >0.993377057 and randomnumber <=0.993527958:
        m1=136
        m2=116
        mass1=135.93035
        mass2=116.06965
if randomnumber >0.993527958 and randomnumber <=0.993673844:
        m1=136
        m2=116
        mass1=135.9073116
        mass2=116.0926884
if randomnumber >0.993673844 and randomnumber <=0.99381179:
        m1=141
        m2=111
        mass1=140.93503
        mass2=111.06497
if randomnumber >0.99381179 and randomnumber <=0.993941552:
        m1=85
        m2=167
        mass1=84.93202
        mass2=167.06798
```

```
if randomnumber >0.993941552 and randomnumber <=0.994070564:
    m1=164
    m2=88
    mass1=163.93586
    mass2=88.06414
if randomnumber >0.994070564 and randomnumber <=0.994199501:
    m1=146
    m2=106
    mass1=145.9402894
    mass2=106.0597106
if randomnumber >0.994199501 and randomnumber <=0.994326873:
    m1=84
    m2=168
    mass1=83.91846235
    mass2=168.08153765
if randomnumber >0.994326873 and randomnumber <=0.994451555:
    m1=161
    m2=91
    mass1=160.93883
    mass2=91.06117
if randomnumber >0.994451555 and randomnumber <=0.994567562:
    m1=83
    m2=169
    mass1=82.92498002
    mass2=169.07501998
if randomnumber >0.994567562 and randomnumber <=0.994683109:
    m1=110
    m2=142
    mass1=109.92973
    mass2=142.07027
if randomnumber >0.994683109 and randomnumber <=0.994797696:
    m1=112
    m2=140
    mass1=111.9291465
    mass2=140.0708535
if randomnumber >0.994797696 and randomnumber <=0.994910813:
    m1=116
    m2=136
    mass1=115.924062
    mass2=136.075938
if randomnumber >0.994910813 and randomnumber <=0.99502269:
    m1=87
    m2=165
    mass1=86.91335486
    mass2=165.08664514
if randomnumber >0.99502269 and randomnumber <=0.995132172:
    m1=84
    m2=168
    mass1=83.929058
    mass2=168.070942
if randomnumber >0.995132172 and randomnumber <=0.995240424:
    m1=98
    m2=154
    mass1=97.91032841
    mass2=154.08967159
if randomnumber >0.995240424 and randomnumber <=0.995347727:
    m1=151
    m2=101
    mass1=150.921207
    mass2=101.078793
if randomnumber >0.995347727 and randomnumber <=0.995453069:
    m1=132
    m2=120
    mass1=131.9079974
    mass2=120.0920026
if randomnumber >0.995453069 and randomnumber <=0.995555091:
    m1=159
    m2=93
    mass1=158.93897
    mass2=93.06103
if randomnumber >0.995555091 and randomnumber <=0.995655099:
    m1=89
```

```
        m2=163
        mass1=88.91227802
        mass2=163.08772198
if randomnumber >0.995655099 and randomnumber <=0.995753886:
        m1=114
        m2=138
        mass1=113.9033585
        mass2=138.0966415
if randomnumber >0.995753886 and randomnumber <=0.995849994:
        m1=85
        m2=167
        mass1=84.9156084
        mass2=167.0843916
if randomnumber >0.995849994 and randomnumber <=0.995945181:
        m1=114
        m2=138
        mass1=113.924281
        mass2=138.075719
if randomnumber >0.995945181 and randomnumber <=0.996039989:
        m1=121
        m2=131
        mass1=120.919848
        mass2=131.080152
if randomnumber >0.996039989 and randomnumber <=0.996128947:
        m1=91
        m2=161
        mass1=90.9102031
        mass2=161.0897969
if randomnumber >0.996128947 and randomnumber <=0.996217455:
        m1=103
        m2=149
        mass1=102.93673
        mass2=149.06327
if randomnumber >0.996217455 and randomnumber <=0.996305943:
        m1=157
        m2=95
        mass1=156.93903
        mass2=95.06097
if randomnumber >0.996305943 and randomnumber <=0.996394201:
        m1=126
        m2=126
        mass1=125.9076533
        mass2=126.0923467
if randomnumber >0.996394201 and randomnumber <=0.996476749:
        m1=164
        m2=88
        mass1=163.9333508
        mass2=88.0666492
if randomnumber >0.996476749 and randomnumber <=0.996558977:
        m1=143
        m2=109
        mass1=142.9123859
        mass2=109.0876141
if randomnumber >0.996558977 and randomnumber <=0.996638185:
        m1=107
        m2=145
        mass1=106.9067484
        mass2=145.0932516
if randomnumber >0.996638185 and randomnumber <=0.996714763:
        m1=89
        m2=163
        mass1=88.93645
        mass2=163.06355
if randomnumber >0.996714763 and randomnumber <=0.996790546:
        m1=163
        m2=89
        mass1=162.93921
        mass2=89.06079
if randomnumber >0.996790546 and randomnumber <=0.996866019:
        m1=165
        m2=87
        mass1=164.93488
```

```
        mass2=87.06512
if randomnumber >0.996866019 and randomnumber <=0.996941457:
        m1=134
        m2=118
        mass1=133.9282918
        mass2=118.0717082
if randomnumber >0.996941457 and randomnumber <=0.997016695:
        m1=128
        m2=124
        mass1=127.909169
        mass2=124.090831
if randomnumber >0.997016695 and randomnumber <=0.997090908:
        m1=100
        m2=152
        mass1=99.90747734
        mass2=152.09252266
if randomnumber >0.997090908 and randomnumber <=0.997157191:
        m1=148
        m2=104
        mass1=147.9168933
        mass2=104.0831067
if randomnumber >0.997157191 and randomnumber <=0.997221625:
        m1=138
        m2=114
        mass1=137.9052472
        mass2=114.0947528
if randomnumber >0.997221625 and randomnumber <=0.997285858:
        m1=163
        m2=89
        mass1=162.9306475
        mass2=89.0693525
if randomnumber >0.997285858 and randomnumber <=0.997347837:
        m1=159
        m2=93
        mass1=158.9263887
        mass2=93.0736113
if randomnumber >0.997347837 and randomnumber <=0.997407735:
        m1=92
        m2=160
        mass1=91.93925871
        mass2=160.06074129
if randomnumber >0.997407735 and randomnumber <=0.997465454:
        m1=144
        m2=108
        mass1=143.93851
        mass2=108.06149
if randomnumber >0.997465454 and randomnumber <=0.997522802:
        m1=155
        m2=97
        mass1=154.94012
        mass2=97.05988
if randomnumber >0.997522802 and randomnumber <=0.997578431:
        m1=83
        m2=169
        mass1=82.91911847
        mass2=169.08088153
if randomnumber >0.997578431 and randomnumber <=0.997633634:
        m1=124
        m2=128
        mass1=123.9176476
        mass2=128.0823524
if randomnumber >0.997633634 and randomnumber <=0.997688531:
        m1=95
        m2=157
        mass1=94.93984
        mass2=157.06016
if randomnumber >0.997688531 and randomnumber <=0.997741985:
        m1=93
        m2=159
        mass1=92.90958271
        mass2=159.09041729
if randomnumber >0.997741985 and randomnumber <=0.997793763:
```

```
        m1=166
        m2=86
        mass1=165.937992
        mass2=86.062008
if randomnumber >0.997793763 and randomnumber <=0.997844687:
        m1=130
        m2=122
        mass1=129.92497
        mass2=122.07503
if randomnumber >0.997844687 and randomnumber <=0.99789559:
        m1=153
        m2=99
        mass1=152.94058
        mass2=99.05942
if randomnumber >0.99789559 and randomnumber <=0.997946379:
        m1=108
        m2=144
        mass1=107.93484
        mass2=144.06516
if randomnumber >0.997946379 and randomnumber <=0.997996188:
        m1=165
        m2=87
        mass1=164.93938
        mass2=87.06062
if randomnumber >0.997996188 and randomnumber <=0.998045796:
        m1=156
        m2=96
        mass1=155.9247522
        mass2=96.0752478
if randomnumber >0.998045796 and randomnumber <=0.998094625:
        m1=129
        m2=123
        mass1=128.921697
        mass2=123.078303
if randomnumber >0.998094625 and randomnumber <=0.998141949:
        m1=124
        m2=128
        mass1=123.9131752
        mass2=128.0868248
if randomnumber >0.998141949 and randomnumber <=0.998188698:
        m1=86
        m2=166
        mass1=85.9365
        mass2=166.0635
if randomnumber >0.998188698 and randomnumber <=0.998231162:
        m1=119
        m2=133
        mass1=118.92311
        mass2=133.07689
if randomnumber >0.998231162 and randomnumber <=0.998272246:
        m1=139
        m2=113
        mass1=138.93473
        mass2=113.06527
if randomnumber >0.998272246 and randomnumber <=0.998313265:
        m1=98
        m2=154
        mass1=97.94179067
        mass2=154.05820933
if randomnumber >0.998313265 and randomnumber <=0.998353739:
        m1=109
        m2=143
        mass1=108.9059505
        mass2=143.0940495
if randomnumber >0.998353739 and randomnumber <=0.998393708:
        m1=82
        m2=170
        mass1=81.92450407
        mass2=170.07549593
if randomnumber >0.998393708 and randomnumber <=0.998433627:
        m1=126
        m2=126
```

```
        mass1=125.9164639
        mass2=126.0835361
if randomnumber >0.998433627 and randomnumber <=0.998470206:
        m1=125
        m2=127
        mass1=124.9136006
        mass2=127.0863994
if randomnumber >0.998470206 and randomnumber <=0.998504485:
        m1=162
        m2=90
        mass1=161.9294882
        mass2=90.0705118
if randomnumber >0.998504485 and randomnumber <=0.998537274:
        m1=153
        m2=99
        mass1=152.9220974
        mass2=99.0779026
if randomnumber >0.998537274 and randomnumber <=0.998569238:
        m1=83
        m2=169
        mass1=82.93462
        mass2=169.06538
if randomnumber >0.998569238 and randomnumber <=0.99860074:
        m1=147
        m2=105
        mass1=146.944155
        mass2=105.055845
if randomnumber >0.99860074 and randomnumber <=0.998632149:
        m1=125
        m2=127
        mass1=124.9077841
        mass2=127.0922159
if randomnumber >0.998632149 and randomnumber <=0.99866274:
        m1=151
        m2=101
        mass1=150.94172
        mass2=101.05828
if randomnumber >0.99866274 and randomnumber <=0.998693027:
        m1=106
        m2=146
        mass1=105.93591
        mass2=146.06409
if randomnumber >0.998693027 and randomnumber <=0.998722436:
        m1=102
        m2=150
        mass1=101.909215
        mass2=150.090785
if randomnumber >0.998722436 and randomnumber <=0.998751795:
        m1=95
        m2=157
        mass1=94.9080426
        mass2=157.0919574
if randomnumber >0.998751795 and randomnumber <=0.998780052:
        m1=101
        m2=151
        mass1=100.9405179
        mass2=151.0594821
if randomnumber >0.998780052 and randomnumber <=0.998807956:
        m1=158
        m2=94
        mass1=157.9241039
        mass2=94.0758961
if randomnumber >0.998807956 and randomnumber <=0.998834921:
        m1=82
        m2=170
        mass1=81.92954973
        mass2=170.07045027
if randomnumber >0.998834921 and randomnumber <=0.998860075:
        m1=140
        m2=112
        mass1=139.9094776
        mass2=112.0905224
```

```
if randomnumber >0.998860075 and randomnumber <=0.998884359:
    m1=166
    m2=86
    mass1=165.9328067
    mass2=86.0671933
if randomnumber >0.998884359 and randomnumber <=0.998908139:
    m1=127
    m2=125
    mass1=126.9173531
    mass2=125.0826469
if randomnumber >0.998908139 and randomnumber <=0.998931518:
    m1=122
    m2=130
    mass1=121.92353
    mass2=130.07647
if randomnumber >0.998931518 and randomnumber <=0.998954503:
    m1=81
    m2=171
    mass1=80.92882047
    mass2=171.07117953
if randomnumber >0.998954503 and randomnumber <=0.998977367:
    m1=162
    m2=90
    mass1=161.94122
    mass2=90.05878
if randomnumber >0.998977367 and randomnumber <=0.998999917:
    m1=167
    m2=85
    mass1=166.9356555
    mass2=85.0643445
if randomnumber >0.998999917 and randomnumber <=0.999021146:
    m1=145
    m2=107
    mass1=144.9145117
    mass2=107.0854883
if randomnumber >0.999021146 and randomnumber <=0.999041916:
    m1=119
    m2=133
    mass1=118.9058454
    mass2=133.0941546
if randomnumber >0.999041916 and randomnumber <=0.999062644:
    m1=90
    m2=162
    mass1=89.93996
    mass2=162.06004
if randomnumber >0.999062644 and randomnumber <=0.999083354:
    m1=167
    m2=85
    mass1=166.94005
    mass2=85.05995
if randomnumber >0.999083354 and randomnumber <=0.999103963:
    m1=123
    m2=129
    mass1=122.9104383
    mass2=129.0895617
if randomnumber >0.999103963 and randomnumber <=0.999124136:
    m1=149
    m2=103
    mass1=148.94258
    mass2=103.05742
if randomnumber >0.999124136 and randomnumber <=0.999143626:
    m1=160
    m2=92
    mass1=159.94299
    mass2=92.05701
if randomnumber >0.999143626 and randomnumber <=0.99916252:
    m1=87
    m2=165
    mass1=86.9399
    mass2=165.0601
if randomnumber >0.99916252 and randomnumber <=0.99918126:
    m1=142
```

```
        m2=110
        mass1=141.94018
        mass2=110.05982
if randomnumber >0.99918126 and randomnumber <=0.99919957:
        m1=88
        m2=164
        mass1=87.91131559
        mass2=164.08868441
if randomnumber >0.99919957 and randomnumber <=0.999217184:
        m1=118
        m2=134
        mass1=117.9063544
        mass2=134.0936456
if randomnumber >0.999217184 and randomnumber <=0.999234774:
        m1=164
        m2=88
        mass1=163.94299
        mass2=88.05701
if randomnumber >0.999234774 and randomnumber <=0.999252183:
        m1=111
        m2=141
        mass1=110.9052912
        mass2=141.0947088
if randomnumber >0.999252183 and randomnumber <=0.999269189:
        m1=99
        m2=153
        mass1=98.94537928
        mass2=153.05462072
if randomnumber >0.999269189 and randomnumber <=0.999285884:
        m1=123
        m2=129
        mass1=122.9249
        mass2=129.0751
if randomnumber >0.999285884 and randomnumber <=0.999302464:
        m1=128
        m2=124
        mass1=127.9201723
        mass2=124.0798277
if randomnumber >0.999302464 and randomnumber <=0.999318818:
        m1=86
        m2=166
        mass1=85.91061073
        mass2=166.08938927
if randomnumber >0.999318818 and randomnumber <=0.999334828:
        m1=168
        m2=84
        mass1=167.9371288
        mass2=84.0628712
if randomnumber >0.999334828 and randomnumber <=0.999350532:
        m1=104
        m2=148
        mass1=103.9054327
        mass2=148.0945673
if randomnumber >0.999350532 and randomnumber <=0.999365952:
        m1=120
        m2=132
        mass1=119.9079596
        mass2=132.0920404
if randomnumber >0.999365952 and randomnumber <=0.999380942:
        m1=165
        m2=87
        mass1=164.9317033
        mass2=87.0682967
if randomnumber >0.999380942 and randomnumber <=0.999395636:
        m1=90
        m2=162
        mass1=89.90773789
        mass2=162.09226211
if randomnumber >0.999395636 and randomnumber <=0.999410231:
        m1=166
        m2=86
        mass1=165.9416
```

```
        mass2=86.0584
if randomnumber >0.999410231 and randomnumber <=0.999424781:
        m1=80
        m2=172
        mass1=79.92537239
        mass2=172.07462761
if randomnumber >0.999424781 and randomnumber <=0.999439165:
        m1=81
        m2=171
        mass1=80.92213229
        mass2=171.07786771
if randomnumber >0.999439165 and randomnumber <=0.99945274:
        m1=161
        m2=91
        mass1=160.9275699
        mass2=91.0724301
if randomnumber >0.99945274 and randomnumber <=0.999466169:
        m1=125
        m2=127
        mass1=124.9212464
        mass2=127.0787536
if randomnumber >0.999466169 and randomnumber <=0.999479589:
        m1=127
        m2=125
        mass1=126.9069236
        mass2=125.0930764
if randomnumber >0.999479589 and randomnumber <=0.999492689:
        m1=131
        m2=121
        mass1=130.9268518
        mass2=121.0731482
if randomnumber >0.999492689 and randomnumber <=0.999505424:
        m1=84
        m2=168
        mass1=83.91647897
        mass2=168.08352103
if randomnumber >0.999505424 and randomnumber <=0.99951804:
        m1=93
        m2=159
        mass1=92.94305
        mass2=159.05695
if randomnumber >0.99951804 and randomnumber <=0.999530539:
        m1=137
        m2=115
        mass1=136.93531
        mass2=115.06469
if randomnumber >0.999530539 and randomnumber <=0.999542619:
        m1=124
        m2=128
        mass1=123.92864
        mass2=128.07136
if randomnumber >0.999542619 and randomnumber <=0.999554609:
        m1=84
        m2=168
        mass1=83.93747
        mass2=168.06253
if randomnumber >0.999554609 and randomnumber <=0.999566594:
        m1=113
        m2=139
        mass1=112.9044017
        mass2=139.0955983
if randomnumber >0.999566594 and randomnumber <=0.999578113:
        m1=133
        m2=119
        mass1=132.9059107
        mass2=119.0940893
if randomnumber >0.999578113 and randomnumber <=0.999589493:
        m1=158
        m2=94
        mass1=157.9416
        mass2=94.0584
if randomnumber >0.999589493 and randomnumber <=0.999600833:
```

```
        m1=124
        m2=128
        mass1=123.9052739
        mass2=128.0947261
if randomnumber >0.999600833 and randomnumber <=0.999611677:
        m1=97
        m2=155
        mass1=96.90809856
        mass2=155.09190144
if randomnumber >0.999611677 and randomnumber <=0.999622442:
        m1=117
        m2=135
        mass1=116.92598
        mass2=135.07402
if randomnumber >0.999622442 and randomnumber <=0.999632792:
        m1=135
        m2=117
        mass1=134.905977
        mass2=117.094023
if randomnumber >0.999632792 and randomnumber <=0.999642717:
        m1=96
        m2=156
        mass1=95.94307
        mass2=156.05693
if randomnumber >0.999642717 and randomnumber <=0.999652331:
        m1=150
        m2=102
        mass1=149.9209836
        mass2=102.0790164
if randomnumber >0.999652331 and randomnumber <=0.999661416:
        m1=156
        m2=96
        mass1=155.94427
        mass2=96.05573
if randomnumber >0.999661416 and randomnumber <=0.999670496:
        m1=126
        m2=126
        mass1=125.9072475
        mass2=126.0927525
if randomnumber >0.999670496 and randomnumber <=0.999679171:
        m1=79
        m2=173
        mass1=78.925401
        mass2=173.074599
if randomnumber >0.999679171 and randomnumber <=0.999687795:
        m1=155
        m2=97
        mass1=154.9228933
        mass2=97.0771067
if randomnumber >0.999687795 and randomnumber <=0.999696005:
        m1=104
        m2=148
        mass1=103.94105
        mass2=148.05895
if randomnumber >0.999696005 and randomnumber <=0.999704213:
        m1=113
        m2=139
        mass1=112.93159
        mass2=139.06841
if randomnumber >0.999704213 and randomnumber <=0.999712038:
        m1=142
        m2=110
        mass1=141.9092442
        mass2=110.0907558
if randomnumber >0.999712038 and randomnumber <=0.999719793:
        m1=82
        m2=170
        mass1=81.9166994
        mass2=170.0833006
if randomnumber >0.999719793 and randomnumber <=0.999726968:
        m1=147
        m2=105
```

```
        mass1=146.9161004
        mass2=105.0838996
if randomnumber >0.999726968 and randomnumber <=0.999734061:
        m1=111
        m2=141
        mass1=110.93441
        mass2=141.06559
if randomnumber >0.999734061 and randomnumber <=0.999741121:
        m1=131
        m2=121
        mass1=130.9061246
        mass2=121.0938754
if randomnumber >0.999741121 and randomnumber <=0.999747951:
        m1=79
        m2=173
        mass1=78.93289326
        mass2=173.06710674
if randomnumber >0.999747951 and randomnumber <=0.999754556:
        m1=152
        m2=100
        mass1=151.9197324
        mass2=100.0802676
if randomnumber >0.999754556 and randomnumber <=0.999761146:
        m1=164
        m2=88
        mass1=163.9291748
        mass2=88.0708252
if randomnumber >0.999761146 and randomnumber <=0.999767541:
        m1=137
        m2=115
        mass1=136.9058274
        mass2=115.0941726
if randomnumber >0.999767541 and randomnumber <=0.999773736:
        m1=168
        m2=84
        mass1=167.94364
        mass2=84.05636
if randomnumber >0.999773736 and randomnumber <=0.999779924:
        m1=135
        m2=117
        mass1=134.93473
        mass2=117.06527
if randomnumber >0.999779924 and randomnumber <=0.999786109:
        m1=92
        m2=160
        mass1=91.90894914
        mass2=160.09105086
if randomnumber >0.999786109 and randomnumber <=0.999792029:
        m1=106
        m2=146
        mass1=105.9072871
        mass2=146.0927129
if randomnumber >0.999792029 and randomnumber <=0.99979792:
        m1=115
        m2=137
        mass1=114.9286862
        mass2=137.0713138
if randomnumber >0.99979792 and randomnumber <=0.99980364:
        m1=99
        m2=153
        mass1=98.90771187
        mass2=153.09228813
if randomnumber >0.99980364 and randomnumber <=0.999809305:
        m1=78
        m2=174
        mass1=77.93160818
        mass2=174.06839182
if randomnumber >0.999809305 and randomnumber <=0.999814965:
        m1=125
        m2=127
        mass1=124.9052538
        mass2=127.0947462
```

```
if randomnumber >0.999814965 and randomnumber <=0.999820544:
    m1=145
    m2=107
    mass1=144.94407
    mass2=107.05593
if randomnumber >0.999820544 and randomnumber <=0.999825869:
    m1=85
    m2=167
    mass1=84.94303
    mass2=167.05697
if randomnumber >0.999825869 and randomnumber <=0.999830683:
    m1=80
    m2=172
    mass1=79.93651578
    mass2=172.06348422
if randomnumber >0.999830683 and randomnumber <=0.999835483:
    m1=169
    m2=83
    mass1=168.9403076
    mass2=83.0596924
if randomnumber >0.999835483 and randomnumber <=0.999839803:
    m1=88
    m2=164
    mass1=87.94494
    mass2=164.05506
if randomnumber >0.999839803 and randomnumber <=0.999844043:
    m1=140
    m2=112
    mass1=139.93885
    mass2=112.06115
if randomnumber >0.999844043 and randomnumber <=0.999848262:
    m1=117
    m2=135
    mass1=116.9045136
    mass2=135.0954864
if randomnumber >0.999848262 and randomnumber <=0.999852256:
    m1=109
    m2=143
    mass1=108.93763
    mass2=143.06237
if randomnumber >0.999852256 and randomnumber <=0.999856156:
    m1=80
    m2=172
    mass1=79.92253382
    mass2=172.07746618
if randomnumber >0.999856156 and randomnumber <=0.999859821:
    m1=154
    m2=98
    mass1=153.94342
    mass2=98.05658
if randomnumber >0.999859821 and randomnumber <=0.999863486:
    m1=168
    m2=84
    mass1=167.9355157
    mass2=84.0644843
if randomnumber >0.999863486 and randomnumber <=0.999867006:
    m1=121
    m2=131
    mass1=120.9078458
    mass2=131.0921542
if randomnumber >0.999867006 and randomnumber <=0.999870486:
    m1=170
    m2=82
    mass1=169.9396189
    mass2=82.0603811
if randomnumber >0.999870486 and randomnumber <=0.999873851:
    m1=160
    m2=92
    mass1=159.9271676
    mass2=92.0728324
if randomnumber >0.999873851 and randomnumber <=0.999877156:
    m1=94
```

```
    m2=158
    mass1=93.90631519
    mass2=158.09368481
if randomnumber >0.999877156 and randomnumber <=0.999880361:
    m1=81
    m2=171
    mass1=80.93775236
    mass2=171.06224764
if randomnumber >0.999880361 and randomnumber <=0.999883466:
    m1=129
    m2=123
    mass1=128.9065982
    mass2=123.0934018
if randomnumber >0.999883466 and randomnumber <=0.999886571:
    m1=78
    m2=174
    mass1=77.92285274
    mass2=174.07714726
if randomnumber >0.999886571 and randomnumber <=0.999889611:
    m1=108
    m2=144
    mass1=107.9038917
    mass2=144.0961083
if randomnumber >0.999889611 and randomnumber <=0.999892525:
    m1=91
    m2=161
    mass1=90.94596
    mass2=161.05404
if randomnumber >0.999892525 and randomnumber <=0.999895414:
    m1=163
    m2=89
    mass1=162.94536
    mass2=89.05464
if randomnumber >0.999895414 and randomnumber <=0.999898254:
    m1=85
    m2=167
    mass1=84.91252733
    mass2=167.08747267
if randomnumber >0.999898254 and randomnumber <=0.999901049:
    m1=152
    m2=100
    mass1=151.94625
    mass2=100.05375
if randomnumber >0.999901049 and randomnumber <=0.999903794:
    m1=170
    m2=82
    mass1=169.94239
    mass2=82.05761
if randomnumber >0.999903794 and randomnumber <=0.999906509:
    m1=165
    m2=87
    mass1=164.94572
    mass2=87.05428
if randomnumber >0.999906509 and randomnumber <=0.999909079:
    m1=132
    m2=120
    mass1=131.9329903
    mass2=120.0670097
if randomnumber >0.999909079 and randomnumber <=0.999911649:
    m1=169
    m2=83
    mass1=168.9368723
    mass2=83.0631277
if randomnumber >0.999911649 and randomnumber <=0.999914084:
    m1=167
    m2=85
    mass1=166.94557
    mass2=85.05443
if randomnumber >0.999914084 and randomnumber <=0.999916474:
    m1=102
    m2=150
    mass1=101.943019
```

```
        mass2=150.056981
if randomnumber >0.999916474 and randomnumber <=0.999918819:
        m1=157
        m2=95
        mass1=156.9239601
        mass2=95.0760399
if randomnumber >0.999918819 and randomnumber <=0.999921049:
        m1=101
        m2=151
        mass1=100.9073147
        mass2=151.0926853
if randomnumber >0.999921049 and randomnumber <=0.999923253:
        m1=161
        m2=91
        mass1=160.94586
        mass2=91.05414
if randomnumber >0.999923253 and randomnumber <=0.999925398:
        m1=83
        m2=169
        mass1=82.91518042
        mass2=169.08481958
if randomnumber >0.999925398 and randomnumber <=0.999927498:
        m1=167
        m2=85
        mass1=166.9331326
        mass2=85.0668674
if randomnumber >0.999927498 and randomnumber <=0.999929543:
        m1=163
        m2=89
        mass1=162.9287312
        mass2=89.0712688
if randomnumber >0.999929543 and randomnumber <=0.999931578:
        m1=139
        m2=113
        mass1=138.9063533
        mass2=113.0936467
if randomnumber >0.999931578 and randomnumber <=0.999933603:
        m1=120
        m2=132
        mass1=119.9246919
        mass2=132.0753081
if randomnumber >0.999933603 and randomnumber <=0.999935623:
        m1=171
        m2=81
        mass1=170.9414652
        mass2=81.0585348
if randomnumber >0.999935623 and randomnumber <=0.999937523:
        m1=144
        m2=108
        mass1=143.9133052
        mass2=108.0866948
if randomnumber >0.999937523 and randomnumber <=0.999939313:
        m1=94
        m2=158
        mass1=93.94868
        mass2=158.05132
if randomnumber >0.999939313 and randomnumber <=0.999941083:
        m1=118
        m2=134
        mass1=117.93007
        mass2=134.06993
if randomnumber >0.999941083 and randomnumber <=0.999942793:
        m1=77
        m2=175
        mass1=76.9291543
        mass2=175.0708457
if randomnumber >0.999942793 and randomnumber <=0.999944483:
        m1=87
        m2=165
        mass1=86.90918053
        mass2=165.09081947
if randomnumber >0.999944483 and randomnumber <=0.999946163:
```

```
        m1=122
        m2=130
        mass1=121.910276
        mass2=130.089724
if randomnumber >0.999946163 and randomnumber <=0.999947798:
        m1=150
        m2=102
        mass1=149.94568
        mass2=102.05432
if randomnumber >0.999947798 and randomnumber <=0.999949303:
        m1=82
        m2=170
        mass1=81.94299
        mass2=170.05701
if randomnumber >0.999949303 and randomnumber <=0.999950733:
        m1=149
        m2=103
        mass1=148.9183342
        mass2=103.0816658
if randomnumber >0.999950733 and randomnumber <=0.999952104:
        m1=107
        m2=145
        mass1=106.94075
        mass2=145.05925
if randomnumber >0.999952104 and randomnumber <=0.999953464:
        m1=78
        m2=174
        mass1=77.93844022
        mass2=174.06155978
if randomnumber >0.999953464 and randomnumber <=0.999954754:
        m1=154
        m2=98
        mass1=153.9229792
        mass2=98.0770208
if randomnumber >0.999954754 and randomnumber <=0.999956024:
        m1=159
        m2=93
        mass1=158.94609
        mass2=93.05391
if randomnumber >0.999956024 and randomnumber <=0.999957263:
        m1=116
        m2=136
        mass1=115.9052597
        mass2=136.0947403
if randomnumber >0.999957263 and randomnumber <=0.999958428:
        m1=126
        m2=126
        mass1=125.9223533
        mass2=126.0776467
if randomnumber >0.999958428 and randomnumber <=0.999959573:
        m1=89
        m2=163
        mass1=88.90745068
        mass2=163.09254932
if randomnumber >0.999959573 and randomnumber <=0.999960694:
        m1=81
        m2=171
        mass1=80.91799247
        mass2=171.08200753
if randomnumber >0.999960694 and randomnumber <=0.999961774:
        m1=96
        m2=156
        mass1=95.90810065
        mass2=156.09189935
if randomnumber >0.999961774 and randomnumber <=0.999962789:
        m1=125
        m2=127
        mass1=124.93043
        mass2=127.06957
if randomnumber >0.999962789 and randomnumber <=0.999963804:
        m1=138
        m2=114
```

```
        mass1=137.94079
        mass2=114.05921
if randomnumber >0.999963804 and randomnumber <=0.999964804:
        m1=166
        m2=86
        mass1=165.9322842
        mass2=86.0677158
if randomnumber >0.999964804 and randomnumber <=0.999965799:
        m1=97
        m2=155
        mass1=96.94856
        mass2=155.05144
if randomnumber >0.999965799 and randomnumber <=0.999966774:
        m1=133
        m2=119
        mass1=132.93781
        mass2=119.06219
if randomnumber >0.999966774 and randomnumber <=0.999967739:
        m1=77
        m2=175
        mass1=76.93695897
        mass2=175.06304103
if randomnumber >0.999967739 and randomnumber <=0.999968689:
        m1=79
        m2=173
        mass1=78.92094793
        mass2=173.07905207
if randomnumber >0.999968689 and randomnumber <=0.999969581:
        m1=110
        m2=142
        mass1=109.9061072
        mass2=142.0938928
if randomnumber >0.999969581 and randomnumber <=0.999970401:
        m1=76
        m2=176
        mass1=75.93329357
        mass2=176.06670643
if randomnumber >0.999970401 and randomnumber <=0.999971216:
        m1=172
        m2=80
        mass1=171.94482
        mass2=80.05518
if randomnumber >0.999971216 and randomnumber <=0.999972011:
        m1=171
        m2=81
        mass1=170.9380298
        mass2=81.0619702
if randomnumber >0.999972011 and randomnumber <=0.999972796:
        m1=169
        m2=83
        mass1=168.94622
        mass2=83.05378
if randomnumber >0.999972796 and randomnumber <=0.999973566:
        m1=148
        m2=104
        mass1=147.9492182
        mass2=104.0507818
if randomnumber >0.999973566 and randomnumber <=0.999974306:
        m1=172
        m2=80
        mass1=171.9393561
        mass2=80.0606439
if randomnumber >0.999974306 and randomnumber <=0.999975016:
        m1=86
        m2=166
        mass1=85.94649
        mass2=166.05351
if randomnumber >0.999975016 and randomnumber <=0.999975726:
        m1=124
        m2=128
        mass1=123.93688
        mass2=128.06312
```

```
if randomnumber >0.999975726 and randomnumber <=0.999976411:
    m1=171
    m2=81
    mass1=170.9462
    mass2=81.0538
if randomnumber >0.999976411 and randomnumber <=0.999977091:
    m1=79
    m2=173
    mass1=78.942652
    mass2=173.057348
if randomnumber >0.999977091 and randomnumber <=0.999977766:
    m1=83
    m2=169
    mass1=82.94698
    mass2=169.05302
if randomnumber >0.999977766 and randomnumber <=0.999978421:
    m1=103
    m2=149
    mass1=102.9063238
    mass2=149.0936762
if randomnumber >0.999978421 and randomnumber <=0.999979031:
    m1=76
    m2=176
    mass1=75.92882763
    mass2=176.07117237
if randomnumber >0.999979031 and randomnumber <=0.999979618:
    m1=115
    m2=137
    mass1=114.9038785
    mass2=137.0961215
if randomnumber >0.999979618 and randomnumber <=0.999980193:
    m1=170
    m2=82
    mass1=169.9354643
    mass2=82.0645357
if randomnumber >0.999980193 and randomnumber <=0.999980738:
    m1=134
    m2=118
    mass1=133.9067185
    mass2=118.0932815
if randomnumber >0.999980738 and randomnumber <=0.999981283:
    m1=89
    m2=163
    mass1=88.94939
    mass2=163.05061
if randomnumber >0.999981283 and randomnumber <=0.999981823:
    m1=91
    m2=161
    mass1=90.90730479
    mass2=161.09269521
if randomnumber >0.999981823 and randomnumber <=0.999982363:
    m1=141
    m2=111
    mass1=140.9082763
    mass2=111.0917237
if randomnumber >0.999982363 and randomnumber <=0.999982903:
    m1=157
    m2=95
    mass1=156.94743
    mass2=95.05257
if randomnumber >0.999982903 and randomnumber <=0.999983427:
    m1=100
    m2=152
    mass1=99.94987
    mass2=152.05013
if randomnumber >0.999983427 and randomnumber <=0.999983927:
    m1=112
    m2=140
    mass1=111.9027578
    mass2=140.0972422
if randomnumber >0.999983927 and randomnumber <=0.999984414:
    m1=124
```

```
        m2=128
        mass1=123.9059357
        mass2=128.0940643
if randomnumber >0.999984414 and randomnumber <=0.999984883:
        m1=75
        m2=177
        mass1=74.93293674
        mass2=177.06706326
if randomnumber >0.999984883 and randomnumber <=0.999985344:
        m1=146
        m2=106
        mass1=145.9131169
        mass2=106.0868831
if randomnumber >0.999985344 and randomnumber <=0.999985782:
        m1=136
        m2=116
        mass1=135.9045759
        mass2=116.0954241
if randomnumber >0.999985782 and randomnumber <=0.999986216:
        m1=136
        m2=116
        mass1=135.93934
        mass2=116.06066
if randomnumber >0.999986216 and randomnumber <=0.999986644:
        m1=151
        m2=101
        mass1=150.9199324
        mass2=101.0800676
if randomnumber >0.999986644 and randomnumber <=0.999987069:
        m1=143
        m2=109
        mass1=142.94456
        mass2=109.05544
if randomnumber >0.999987069 and randomnumber <=0.99998749:
        m1=141
        m2=111
        mass1=140.94465
        mass2=111.05535
if randomnumber >0.99998749 and randomnumber <=0.999987902:
        m1=162
        m2=90
        mass1=161.9267984
        mass2=90.0732016
if randomnumber >0.999987902 and randomnumber <=0.999988306:
        m1=159
        m2=93
        mass1=158.9253468
        mass2=93.0746532
if randomnumber >0.999988306 and randomnumber <=0.999988705:
        m1=77
        m2=175
        mass1=76.92354859
        mass2=175.07645141
if randomnumber >0.999988705 and randomnumber <=0.999989103:
        m1=105
        m2=147
        mass1=104.94487
        mass2=147.05513
if randomnumber >0.999989103 and randomnumber <=0.999989492:
        m1=98
        m2=154
        mass1=97.90540817
        mass2=154.09459183
if randomnumber >0.999989492 and randomnumber <=0.999989817:
        m1=146
        m2=106
        mass1=145.94775
        mass2=106.05225
if randomnumber >0.999989817 and randomnumber <=0.999990135:
        m1=105
        m2=147
        mass1=104.9056938
```

```
        mass2=147.0943062
if randomnumber >0.999990135 and randomnumber <=0.99999045:
        m1=166
        m2=86
        mass1=165.94997
        mass2=86.05003
if randomnumber >0.99999045 and randomnumber <=0.999990757:
        m1=125
        m2=127
        mass1=124.9044307
        mass2=127.0955693
if randomnumber >0.999990757 and randomnumber <=0.999991061:
        m1=92
        m2=160
        mass1=91.94992
        mass2=160.05008
if randomnumber >0.999991061 and randomnumber <=0.999991348:
        m1=168
        m2=84
        mass1=167.94836
        mass2=84.05164
if randomnumber >0.999991348 and randomnumber <=0.999991618:
        m1=155
        m2=97
        mass1=154.94804
        mass2=97.05196
if randomnumber >0.999991618 and randomnumber <=0.999991888:
        m1=103
        m2=149
        mass1=102.94895
        mass2=149.05105
if randomnumber >0.999991888 and randomnumber <=0.999992155:
        m1=112
        m2=140
        mass1=111.93684
        mass2=140.06316
if randomnumber >0.999992155 and randomnumber <=0.999992416:
        m1=164
        m2=88
        mass1=163.94828
        mass2=88.05172
if randomnumber >0.999992416 and randomnumber <=0.999992656:
        m1=130
        m2=122
        mass1=129.9066742
        mass2=122.0933258
if randomnumber >0.999992656 and randomnumber <=0.999992894:
        m1=156
        m2=96
        mass1=155.9221227
        mass2=96.0778773
if randomnumber >0.999992894 and randomnumber <=0.999993115:
        m1=165
        m2=87
        mass1=164.9303221
        mass2=87.0696779
if randomnumber >0.999993115 and randomnumber <=0.999993327:
        m1=93
        m2=159
        mass1=92.90647601
        mass2=159.09352399
if randomnumber >0.999993327 and randomnumber <=0.999993526:
        m1=110
        m2=142
        mass1=109.94244
        mass2=142.05756
if randomnumber >0.999993526 and randomnumber <=0.999993719:
        m1=114
        m2=138
        mass1=113.93588
        mass2=138.06412
if randomnumber >0.999993719 and randomnumber <=0.99999391:
```

```
        m1=74
        m2=178
        mass1=73.92945861
        mass2=178.07054139
if randomnumber >0.99999391 and randomnumber <=0.999994098:
        m1=80
        m2=172
        mass1=79.94434235
        mass2=172.05565765
if randomnumber >0.999994098 and randomnumber <=0.999994279:
        m1=170
        m2=82
        mass1=169.95025
        mass2=82.04975
if randomnumber >0.999994279 and randomnumber <=0.999994453:
        m1=114
        m2=138
        mass1=113.9049139
        mass2=138.0950861
if randomnumber >0.999994453 and randomnumber <=0.999994623:
        m1=169
        m2=83
        mass1=168.9345904
        mass2=83.0654096
if randomnumber >0.999994623 and randomnumber <=0.999994778:
        m1=162
        m2=90
        mass1=161.95029
        mass2=90.04971
if randomnumber >0.999994778 and randomnumber <=0.999994928:
        m1=75
        m2=177
        mass1=74.92650025
        mass2=177.07349975
if randomnumber >0.999994928 and randomnumber <=0.999995066:
        m1=78
        m2=174
        mass1=77.92182728
        mass2=174.07817272
if randomnumber >0.999995066 and randomnumber <=0.999995201:
        m1=84
        m2=168
        mass1=83.91150669
        mass2=168.08849331
if randomnumber >0.999995201 and randomnumber <=0.999995333:
        m1=107
        m2=145
        mass1=106.9051335
        mass2=145.0948665
if randomnumber >0.999995333 and randomnumber <=0.999995463:
        m1=75
        m2=177
        mass1=74.9419
        mass2=177.0581
if randomnumber >0.999995463 and randomnumber <=0.999995592:
        m1=134
        m2=118
        mass1=133.94415
        mass2=118.05585
if randomnumber >0.999995592 and randomnumber <=0.999995722:
        m1=153
        m2=99
        mass1=152.94962
        mass2=99.05038
if randomnumber >0.999995722 and randomnumber <=0.999995848:
        m1=100
        m2=152
        mass1=99.90765778
        mass2=152.09234222
if randomnumber >0.999995848 and randomnumber <=0.999995974:
        m1=74
        m2=178
```

```
    mass1=73.93987486
    mass2=178.06012514
if randomnumber >0.999995974 and randomnumber <=0.999996096:
    m1=132
    m2=120
    mass1=131.9041535
    mass2=120.0958465
if randomnumber >0.999996096 and randomnumber <=0.999996217:
    m1=80
    m2=172
    mass1=79.91652127
    mass2=172.08347873
if randomnumber >0.999996217 and randomnumber <=0.999996332:
    m1=172
    m2=80
    mass1=171.94876
    mass2=80.05124
if randomnumber >0.999996332 and randomnumber <=0.999996446:
    m1=116
    m2=136
    mass1=115.93081
    mass2=136.06919
if randomnumber >0.999996446 and randomnumber <=0.99999656:
    m1=143
    m2=109
    mass1=142.9108169
    mass2=109.0891831
if randomnumber >0.99999656 and randomnumber <=0.999996672:
    m1=95
    m2=157
    mass1=94.95287
    mass2=157.04713
if randomnumber >0.999996672 and randomnumber <=0.999996783:
    m1=82
    m2=170
    mass1=81.91680412
    mass2=170.08319588
if randomnumber >0.999996783 and randomnumber <=0.999996888:
    m1=148
    m2=104
    mass1=147.9174746
    mass2=104.0825254
if randomnumber >0.999996888 and randomnumber <=0.999996989:
    m1=87
    m2=165
    mass1=86.95251
    mass2=165.04749
if randomnumber >0.999996989 and randomnumber <=0.999997089:
    m1=144
    m2=108
    mass1=143.94999
    mass2=108.05001
if randomnumber >0.999997089 and randomnumber <=0.999997185:
    m1=147
    m2=105
    mass1=146.95356
    mass2=105.04644
if randomnumber >0.999997185 and randomnumber <=0.999997281:
    m1=168
    m2=84
    mass1=167.9323702
    mass2=84.0676298
if randomnumber >0.999997281 and randomnumber <=0.999997376:
    m1=76
    m2=176
    mass1=75.94527503
    mass2=176.05472497
if randomnumber >0.999997376 and randomnumber <=0.999997469:
    m1=151
    m2=101
    mass1=150.95081
    mass2=101.04919
```

```
if randomnumber >0.999997469 and randomnumber <=0.999997562:
    m1=84
    m2=168
    mass1=83.95265
    mass2=168.04735
if randomnumber >0.999997562 and randomnumber <=0.999997649:
    m1=160
    m2=92
    mass1=159.94909
    mass2=92.05091
if randomnumber >0.999997649 and randomnumber <=0.999997735:
    m1=138
    m2=114
    mass1=137.9071119
    mass2=114.0928881
if randomnumber >0.999997735 and randomnumber <=0.999997821:
    m1=98
    m2=154
    mass1=97.95191
    mass2=154.04809
if randomnumber >0.999997821 and randomnumber <=0.999997906:
    m1=73
    m2=179
    mass1=72.93667528
    mass2=179.06332472
if randomnumber >0.999997906 and randomnumber <=0.999997981:
    m1=88
    m2=164
    mass1=87.90561212
    mass2=164.09438788
if randomnumber >0.999997981 and randomnumber <=0.999998053:
    m1=108
    m2=144
    mass1=107.94396
    mass2=144.05604
if randomnumber >0.999998053 and randomnumber <=0.999998122:
    m1=153
    m2=99
    mass1=152.9212303
    mass2=99.0787697
if randomnumber >0.999998122 and randomnumber <=0.999998189:
    m1=158
    m2=94
    mass1=157.9254131
    mass2=94.0745869
if randomnumber >0.999998189 and randomnumber <=0.99999825:
    m1=161
    m2=91
    mass1=160.9269334
    mass2=91.0730666
if randomnumber >0.99999825 and randomnumber <=0.999998308:
    m1=101
    m2=151
    mass1=100.9531964
    mass2=151.0468036
if randomnumber >0.999998308 and randomnumber <=0.999998365:
    m1=76
    m2=176
    mass1=75.92140256
    mass2=176.07859744
if randomnumber >0.999998365 and randomnumber <=0.999998423:
    m1=172
    m2=80
    mass1=171.9384
    mass2=80.0616
if randomnumber >0.999998423 and randomnumber <=0.999998479:
    m1=95
    m2=157
    mass1=94.90683579
    mass2=157.09316421
if randomnumber >0.999998479 and randomnumber <=0.999998535:
    m1=73
```

```
        m2=179
        mass1=72.9297791
        mass2=179.0702209
if randomnumber >0.999998535 and randomnumber <=0.999998588:
        m1=126
        m2=126
        mass1=125.9033117
        mass2=126.0966883
if randomnumber >0.999998588 and randomnumber <=0.99999864:
        m1=106
        m2=146
        mass1=105.94979
        mass2=146.05021
if randomnumber >0.99999864 and randomnumber <=0.999998692:
        m1=99
        m2=153
        mass1=98.9576
        mass2=153.0424
if randomnumber >0.999998692 and randomnumber <=0.999998743:
        m1=139
        m2=113
        mass1=138.94598
        mass2=113.05402
if randomnumber >0.999998743 and randomnumber <=0.999998792:
        m1=81
        m2=171
        mass1=80.95048
        mass2=171.04952
if randomnumber >0.999998792 and randomnumber <=0.999998837:
        m1=77
        m2=175
        mass1=76.94785
        mass2=175.05215
if randomnumber >0.999998837 and randomnumber <=0.999998881:
        m1=130
        m2=122
        mass1=129.9339019
        mass2=122.0660981
if randomnumber >0.999998881 and randomnumber <=0.999998922:
        m1=149
        m2=103
        mass1=148.95293
        mass2=103.04707
if randomnumber >0.999998922 and randomnumber <=0.999998962:
        m1=72
        m2=180
        mass1=71.93582031
        mass2=180.06417969
if randomnumber >0.999998962 and randomnumber <=0.999999:
        m1=109
        m2=143
        mass1=108.9047523
        mass2=143.0952477
if randomnumber >0.999999 and randomnumber <=0.999999039:
        m1=93
        m2=159
        mass1=92.95629
        mass2=159.04371
if randomnumber >0.999999039 and randomnumber <=0.999999077:
        m1=102
        m2=150
        mass1=101.9043493
        mass2=150.0956507
if randomnumber >0.999999077 and randomnumber <=0.999999113:
        m1=164
        m2=88
        mass1=163.9302335
        mass2=88.0697665
if randomnumber >0.999999113 and randomnumber <=0.999999149:
        m1=90
        m2=162
        mass1=89.9555
```

```
        mass2=162.0445
if randomnumber >0.999999149 and randomnumber <=0.999999179:
        m1=90
        m2=162
        mass1=89.90715189
        mass2=162.09284811
if randomnumber >0.999999179 and randomnumber <=0.999999206:
        m1=86
        m2=166
        mass1=85.91116742
        mass2=166.08883258
if randomnumber >0.999999206 and randomnumber <=0.999999232:
        m1=140
        m2=112
        mass1=139.9054387
        mass2=112.0945613
if randomnumber >0.999999232 and randomnumber <=0.999999257:
        m1=119
        m2=133
        mass1=118.93211
        mass2=133.06789
if randomnumber >0.999999257 and randomnumber <=0.999999283:
        m1=74
        m2=178
        mass1=73.92694576
        mass2=178.07305424
if randomnumber >0.999999283 and randomnumber <=0.999999307:
        m1=78
        m2=174
        mass1=77.95196
        mass2=174.04804
if randomnumber >0.999999307 and randomnumber <=0.999999332:
        m1=171
        m2=81
        mass1=170.9364294
        mass2=81.0635706
if randomnumber >0.999999332 and randomnumber <=0.999999356:
        m1=158
        m2=94
        mass1=157.95198
        mass2=94.04802
if randomnumber >0.999999356 and randomnumber <=0.999999378:
        m1=125
        m2=127
        mass1=125.0
        mass2=127.0
if randomnumber >0.999999378 and randomnumber <=0.9999994:
        m1=145
        m2=107
        mass1=144.9125736
        mass2=107.0874264
if randomnumber >0.9999994 and randomnumber <=0.999999421:
        m1=150
        m2=102
        mass1=149.9172755
        mass2=102.0827245
if randomnumber >0.999999421 and randomnumber <=0.999999442:
        m1=167
        m2=85
        mass1=166.9320482
        mass2=85.0679518
if randomnumber >0.999999442 and randomnumber <=0.999999462:
        m1=167
        m2=85
        mass1=166.95321
        mass2=85.04679
if randomnumber >0.999999462 and randomnumber <=0.999999481:
        m1=72
        m2=180
        mass1=71.94209268
        mass2=180.05790732
if randomnumber >0.999999481 and randomnumber <=0.999999499:
```

```
            m1=171
            m2=81
            mass1=170.9533
            mass2=81.0467
if randomnumber >0.999999499 and randomnumber <=0.999999516:
            m1=142
            m2=110
            mass1=141.94908
            mass2=110.05092
if randomnumber >0.999999516 and randomnumber <=0.999999533:
            m1=73
            m2=179
            mass1=72.94647
            mass2=179.05353
if randomnumber >0.999999533 and randomnumber <=0.999999549:
            m1=111
            m2=141
            mass1=110.9041781
            mass2=141.0958219
if randomnumber >0.999999549 and randomnumber <=0.999999564:
            m1=97
            m2=155
            mass1=96.90602147
            mass2=155.09397853
if randomnumber >0.999999564 and randomnumber <=0.999999579:
            m1=165
            m2=87
            mass1=164.95298
            mass2=87.04702
if randomnumber >0.999999579 and randomnumber <=0.999999594:
            m1=156
            m2=96
            mass1=155.95126
            mass2=96.04874
if randomnumber >0.999999594 and randomnumber <=0.999999608:
            m1=123
            m2=129
            mass1=122.9057208
            mass2=129.0942792
if randomnumber >0.999999608 and randomnumber <=0.999999623:
            m1=71
            m2=181
            mass1=70.94073628
            mass2=181.05926372
if randomnumber >0.999999623 and randomnumber <=0.999999637:
            m1=169
            m2=83
            mass1=168.95287
            mass2=83.04713
if randomnumber >0.999999637 and randomnumber <=0.999999651:
            m1=85
            m2=167
            mass1=84.957
            mass2=167.043
if randomnumber >0.999999651 and randomnumber <=0.999999665:
            m1=155
            m2=97
            mass1=154.922622
            mass2=97.077378
if randomnumber >0.999999665 and randomnumber <=0.999999677:
            m1=71
            m2=181
            mass1=70.93267683
            mass2=181.06732317
if randomnumber >0.999999677 and randomnumber <=0.99999969:
            m1=137
            m2=115
            mass1=136.94599
            mass2=115.05401
if randomnumber >0.99999969 and randomnumber <=0.999999701:
            m1=79
            m2=173
```

```
        mass1=78.9184991
        mass2=173.0815009
if randomnumber >0.999999701 and randomnumber <=0.999999712:
        m1=72
        m2=180
        mass1=71.92685795
        mass2=180.07314205
if randomnumber >0.999999712 and randomnumber <=0.999999722:
        m1=104
        m2=148
        mass1=103.9066555
        mass2=148.0933445
if randomnumber >0.999999722 and randomnumber <=0.999999733:
        m1=74
        m2=178
        mass1=73.94807
        mass2=178.05193
if randomnumber >0.999999733 and randomnumber <=0.999999743:
        m1=135
        m2=117
        mass1=134.9056886
        mass2=117.0943114
if randomnumber >0.999999743 and randomnumber <=0.999999752:
        m1=96
        m2=156
        mass1=95.95853
        mass2=156.04147
if randomnumber >0.999999752 and randomnumber <=0.999999761:
        m1=119
        m2=133
        mass1=118.9033076
        mass2=133.0966924
if randomnumber >0.999999761 and randomnumber <=0.99999977:
        m1=123
        m2=129
        mass1=122.93493
        mass2=129.06507
if randomnumber >0.99999977 and randomnumber <=0.999999779:
        m1=92
        m2=160
        mass1=91.90504085
        mass2=160.09495915
if randomnumber >0.999999779 and randomnumber <=0.999999788:
        m1=82
        m2=170
        mass1=81.95442
        mass2=170.04558
if randomnumber >0.999999788 and randomnumber <=0.999999796:
        m1=88
        m2=164
        mass1=87.95691
        mass2=164.04309
if randomnumber >0.999999796 and randomnumber <=0.999999803:
        m1=83
        m2=169
        mass1=82.9141361
        mass2=169.0858639
if randomnumber >0.999999803 and randomnumber <=0.999999811:
        m1=113
        m2=139
        mass1=112.9040578
        mass2=139.0959422
if randomnumber >0.999999811 and randomnumber <=0.999999818:
        m1=70
        m2=182
        mass1=69.9365
        mass2=182.0635
if randomnumber >0.999999818 and randomnumber <=0.999999826:
        m1=124
        m2=128
        mass1=124.0
        mass2=128.0
```

```
if randomnumber >0.999999826 and randomnumber <=0.999999833:
     m1=163
     m2=89
     mass1=162.95368
     mass2=89.04632
if randomnumber >0.999999833 and randomnumber <=0.99999984:
     m1=77
     m2=175
     mass1=76.92064729
     mass2=175.07935271
if randomnumber >0.99999984 and randomnumber <=0.999999847:
     m1=170
     m2=82
     mass1=169.9358014
     mass2=82.0641986
if randomnumber >0.999999847 and randomnumber <=0.999999853:
     m1=81
     m2=171
     mass1=80.91629056
     mass2=171.08370944
if randomnumber >0.999999853 and randomnumber <=0.999999859:
     m1=91
     m2=161
     mass1=90.96043
     mass2=161.03957
if randomnumber >0.999999859 and randomnumber <=0.999999864:
     m1=118
     m2=134
     mass1=117.9016032
     mass2=134.0983968
if randomnumber >0.999999864 and randomnumber <=0.99999987:
     m1=133
     m2=119
     mass1=132.9054519
     mass2=119.0945481
if randomnumber >0.99999987 and randomnumber <=0.999999876:
     m1=75
     m2=177
     mass1=74.92285895
     mass2=177.07714105
if randomnumber >0.999999876 and randomnumber <=0.999999881:
     m1=160
     m2=92
     mass1=159.9251975
     mass2=92.0748025
if randomnumber >0.999999881 and randomnumber <=0.999999887:
     m1=104
     m2=148
     mass1=103.95233
     mass2=148.04767
if randomnumber >0.999999887 and randomnumber <=0.999999892:
     m1=85
     m2=167
     mass1=84.91178974
     mass2=167.08821026
if randomnumber >0.999999892 and randomnumber <=0.999999897:
     m1=124
     m2=128
     mass1=123.9028179
     mass2=128.0971821
if randomnumber >0.999999897 and randomnumber <=0.999999902:
     m1=79
     m2=173
     mass1=78.95456
     mass2=173.04544
if randomnumber >0.999999902 and randomnumber <=0.999999907:
     m1=152
     m2=100
     mass1=151.9217445
     mass2=100.0782555
if randomnumber >0.999999907 and randomnumber <=0.999999911:
     m1=129
```

```
        m2=123
        mass1=128.93215
        mass2=123.06785
if randomnumber >0.999999911 and randomnumber <=0.999999915:
        m1=163
        m2=89
        mass1=162.9287339
        mass2=89.0712661
if randomnumber >0.999999915 and randomnumber <=0.999999919:
        m1=75
        m2=177
        mass1=74.95287
        mass2=177.04713
if randomnumber >0.999999919 and randomnumber <=0.999999923:
        m1=121
        m2=131
        mass1=120.92887
        mass2=131.07113
if randomnumber >0.999999923 and randomnumber <=0.999999927:
        m1=115
        m2=137
        mass1=114.93869
        mass2=137.06131
if randomnumber >0.999999927 and randomnumber <=0.999999931:
        m1=142
        m2=110
        mass1=141.9100448
        mass2=110.0899552
if randomnumber >0.999999931 and randomnumber <=0.999999935:
        m1=147
        m2=105
        mass1=146.9151385
        mass2=105.0848615
if randomnumber >0.999999935 and randomnumber <=0.999999938:
        m1=166
        m2=86
        mass1=165.9302931
        mass2=86.0697069
if randomnumber >0.999999938 and randomnumber <=0.999999942:
        m1=161
        m2=91
        mass1=160.95388
        mass2=91.04612
if randomnumber >0.999999942 and randomnumber <=0.999999945:
        m1=99
        m2=153
        mass1=98.90625475
        mass2=153.09374525
if randomnumber >0.999999945 and randomnumber <=0.999999949:
        m1=131
        m2=121
        mass1=130.94067
        mass2=121.05933
if randomnumber >0.999999949 and randomnumber <=0.999999952:
        m1=125
        m2=127
        mass1=124.9046302
        mass2=127.0953698
if randomnumber >0.999999952 and randomnumber <=0.999999955:
        m1=106
        m2=146
        mass1=105.9034857
        mass2=146.0965143
if randomnumber >0.999999955 and randomnumber <=0.999999958:
        m1=154
        m2=98
        mass1=153.9545
        mass2=98.0455
if randomnumber >0.999999958 and randomnumber <=0.999999961:
        m1=73
        m2=179
        mass1=72.92517468
```

```
        mass2=179.07482532
if randomnumber >0.999999961 and randomnumber <=0.999999964:
        m1=137
        m2=115
        mass1=136.9064936
        mass2=115.0935064
if randomnumber >0.999999964 and randomnumber <=0.999999967:
        m1=69
        m2=183
        mass1=68.93561027
        mass2=183.06438973
if randomnumber >0.999999967 and randomnumber <=0.99999997:
        m1=70
        m2=182
        mass1=69.93239234
        mass2=182.06760766
if randomnumber >0.99999997 and randomnumber <=0.999999972:
        m1=87
        m2=165
        mass1=86.90887712
        mass2=165.09112288
if randomnumber >0.999999972 and randomnumber <=0.999999974:
        m1=94
        m2=158
        mass1=93.90728389
        mass2=158.09271611
if randomnumber >0.999999974 and randomnumber <=0.999999976:
        m1=157
        m2=95
        mass1=156.9240246
        mass2=95.0759754
if randomnumber >0.999999976 and randomnumber <=0.999999978:
        m1=152
        m2=100
        mass1=151.95427
        mass2=100.04573
if randomnumber >0.999999978 and randomnumber <=0.99999998:
        m1=117
        m2=135
        mass1=116.93558
        mass2=135.06442
if randomnumber >0.99999998 and randomnumber <=0.999999982:
        m1=113
        m2=139
        mass1=112.94188
        mass2=139.05812
if randomnumber >0.999999982 and randomnumber <=0.999999983:
        m1=70
        m2=182
        mass1=69.951
        mass2=182.049
if randomnumber >0.999999983 and randomnumber <=0.999999985:
        m1=69
        m2=183
        mass1=68.94632
        mass2=183.05368
if randomnumber >0.999999985 and randomnumber <=0.999999986:
        m1=71
        m2=181
        mass1=70.9277216
        mass2=181.0722784
if randomnumber >0.999999986 and randomnumber <=0.999999988:
        m1=71
        m2=181
        mass1=70.9529
        mass2=181.0471
if randomnumber >0.999999988 and randomnumber <=0.999999989:
        m1=83
        m2=169
        mass1=82.96103
        mass2=169.03897
if randomnumber >0.999999989 and randomnumber <=0.99999999:
```

```
        m1=170
        m2=82
        mass1=170.0
        mass2=82.0
if randomnumber >0.99999999 and randomnumber <=0.999999991:
        m1=76
        m2=176
        mass1=75.95533
        mass2=176.04467
if randomnumber >0.999999991 and randomnumber <=0.999999993:
        m1=94
        m2=158
        mass1=93.96049
        mass2=158.03951
if randomnumber >0.999999993 and randomnumber <=0.999999994:
        m1=172
        m2=80
        mass1=172.0
        mass2=80.0
if randomnumber >0.999999994 and randomnumber <=0.999999995:
        m1=131
        m2=121
        mass1=130.9050824
        mass2=121.0949176
if randomnumber >0.999999995 and randomnumber <=0.999999996:
        m1=120
        m2=132
        mass1=119.9021947
        mass2=132.0978053
if randomnumber >0.999999996 and randomnumber <=0.999999997:
        m1=111
        m2=141
        mass1=110.94565
        mass2=141.05435
if randomnumber >0.999999997 and randomnumber <=0.999999998:
        m1=126
        m2=126
        mass1=125.9345
        mass2=126.0655
if randomnumber >0.999999998 and randomnumber <=0.999999999:
        m1=159
        m2=93
        mass1=158.9555
        mass2=93.0445
if randomnumber >0.999999999 and randomnumber <=1.0:
        m1=68
        m2=184
        mass1=67.94487306
        mass2=184.05512694
if randomnumber >1.0 and randomnumber <=1.000000001:
        m1=108
        m2=144
        mass1=107.9059556
        mass2=144.0940444
if randomnumber >1.000000001 and randomnumber <=1.000000002:
        m1=101
        m2=151
        mass1=100.9055821
        mass2=151.0944179
if randomnumber >1.000000002 and randomnumber <=1.000000003:
        m1=135
        m2=117
        mass1=134.94933
        mass2=117.05067
if randomnumber >1.000000003 and randomnumber <=1.000000004:
        m1=168
        m2=84
        mass1=168.0
        mass2=84.0
if randomnumber >1.000000004 and randomnumber <=1.000000004:
        m1=109
        m2=143
```

```
        mass1=108.94924
        mass2=143.05076
if randomnumber >1.000000004 and randomnumber <=1.000000005:
        m1=89
        m2=163
        mass1=88.9058483
        mass2=163.0941517
if randomnumber >1.000000005 and randomnumber <=1.000000006:
        m1=145
        m2=107
        mass1=145.0
        mass2=107.0
if randomnumber >1.000000006 and randomnumber <=1.000000007:
        m1=169
        m2=83
        mass1=168.9342133
        mass2=83.0657867
if randomnumber >1.000000007 and randomnumber <=1.000000008:
        m1=128
        m2=124
        mass1=127.9044631
        mass2=124.0955369
if randomnumber >1.000000008 and randomnumber <=1.000000008:
        m1=68
        m2=184
        mass1=67.93186879
        mass2=184.06813121
if randomnumber >1.000000008 and randomnumber <=1.000000009:
        m1=139
        m2=113
        mass1=138.9066527
        mass2=113.0933473
if randomnumber >1.000000009 and randomnumber <=1.00000001:
        m1=72
        m2=180
        mass1=71.95781
        mass2=180.04219
if randomnumber >1.00000001 and randomnumber <=1.000000011:
        m1=154
        m2=98
        mass1=153.9208656
        mass2=98.0791344
if randomnumber >1.000000011 and randomnumber <=1.000000011:
        m1=86
        m2=166
        mass1=85.96312
        mass2=166.03688
if randomnumber >1.000000011 and randomnumber <=1.000000012:
        m1=166
        m2=86
        mass1=166.0
        mass2=86.0
if randomnumber >1.000000012 and randomnumber <=1.000000012:
        m1=144
        m2=108
        mass1=143.9100873
        mass2=108.0899127
if randomnumber >1.000000012 and randomnumber <=1.000000013:
        m1=78
        m2=174
        mass1=77.91730909
        mass2=174.08269091
if randomnumber >1.000000013 and randomnumber <=1.000000014:
        m1=149
        m2=103
        mass1=148.9171847
        mass2=103.0828153
if randomnumber >1.000000014 and randomnumber <=1.000000014:
        m1=150
        m2=102
        mass1=149.95817
        mass2=102.04183
```

```
if randomnumber >1.000000014 and randomnumber <=1.000000015:
    m1=140
    m2=112
    mass1=140.0
    mass2=112.0
if randomnumber >1.000000015 and randomnumber <=1.000000015:
    m1=96
    m2=156
    mass1=95.90467948
    mass2=156.09532052
if randomnumber >1.000000015 and randomnumber <=1.000000016:
    m1=80
    m2=172
    mass1=79.96087
    mass2=172.03913
if randomnumber >1.000000016 and randomnumber <=1.000000016:
    m1=172
    m2=80
    mass1=171.9363815
    mass2=80.0636185
if randomnumber >1.000000016 and randomnumber <=1.000000017:
    m1=69
    m2=183
    mass1=68.92942927
    mass2=183.07057073
if randomnumber >1.000000017 and randomnumber <=1.000000017:
    m1=117
    m2=135
    mass1=116.9029517
    mass2=135.0970483
if randomnumber >1.000000017 and randomnumber <=1.000000017:
    m1=67
    m2=185
    mass1=66.94088953
    mass2=185.05911047
if randomnumber >1.000000017 and randomnumber <=1.000000018:
    m1=76
    m2=176
    mass1=75.92239402
    mass2=176.07760598
if randomnumber >1.000000018 and randomnumber <=1.000000018:
    m1=74
    m2=178
    mass1=73.92117777
    mass2=178.07882223
if randomnumber >1.000000018 and randomnumber <=1.000000019:
    m1=132
    m2=120
    mass1=131.94555
    mass2=120.05445
if randomnumber >1.000000019 and randomnumber <=1.000000019:
    m1=138
    m2=114
    mass1=138.0
    mass2=114.0
if randomnumber >1.000000019 and randomnumber <=1.000000019:
    m1=162
    m2=90
    mass1=161.9290955
    mass2=90.0709045
if randomnumber >1.000000019 and randomnumber <=1.00000002:
    m1=165
    m2=87
    mass1=164.930726
    mass2=87.069274
if randomnumber >1.00000002 and randomnumber <=1.00000002:
    m1=157
    m2=95
    mass1=156.95634
    mass2=95.04366
if randomnumber >1.00000002 and randomnumber <=1.00000002:
    m1=102
```

```
        m2=150
        mass1=101.95887
        mass2=150.04113
if randomnumber >1.00000002 and randomnumber <=1.00000002:
        m1=91
        m2=161
        mass1=90.90564577
        mass2=161.09435423
if randomnumber >1.00000002 and randomnumber <=1.000000021:
        m1=73
        m2=179
        mass1=72.96024
        mass2=179.03976
if randomnumber >1.000000021 and randomnumber <=1.000000021:
        m1=80
        m2=172
        mass1=79.9185293
        mass2=172.0814707
if randomnumber >1.000000021 and randomnumber <=1.000000021:
        m1=164
        m2=88
        mass1=164.0
        mass2=88.0
if randomnumber >1.000000021 and randomnumber <=1.000000021:
        m1=72
        m2=180
        mass1=71.92636627
        mass2=180.07363373
if randomnumber >1.000000021 and randomnumber <=1.000000022:
        m1=159
        m2=93
        mass1=158.9257392
        mass2=93.0742608
if randomnumber >1.000000022 and randomnumber <=1.000000022:
        m1=110
        m2=142
        mass1=109.9030021
        mass2=142.0969979
if randomnumber >1.000000022 and randomnumber <=1.000000022:
        m1=148
        m2=104
        mass1=148.0
        mass2=104.0
if randomnumber >1.000000022 and randomnumber <=1.000000022:
        m1=77
        m2=175
        mass1=76.96055
        mass2=175.03945
if randomnumber >1.000000022 and randomnumber <=1.000000022:
        m1=107
        m2=145
        mass1=106.95414
        mass2=145.04586
if randomnumber >1.000000022 and randomnumber <=1.000000023:
        m1=67
        m2=185
        mass1=66.95094724
        mass2=185.04905276
if randomnumber >1.000000023 and randomnumber <=1.000000023:
        m1=68
        m2=184
        mass1=67.9537
        mass2=184.0463
if randomnumber >1.000000023 and randomnumber <=1.000000023:
        m1=168
        m2=84
        mass1=167.9341728
        mass2=84.0658272
if randomnumber >1.000000023 and randomnumber <=1.000000023:
        m1=82
        m2=170
        mass1=81.9134836
```

```
        mass2=170.0865164
if randomnumber >1.000000023 and randomnumber <=1.000000023:
        m1=97
        m2=155
        mass1=96.9628
        mass2=155.0372
if randomnumber >1.000000023 and randomnumber <=1.000000023:
        m1=134
        m2=118
        mass1=133.9045084
        mass2=118.0954916
if randomnumber >1.000000023 and randomnumber <=1.000000023:
        m1=67
        m2=185
        mass1=66.93156941
        mass2=185.06843059
if randomnumber >1.000000023 and randomnumber <=1.000000024:
        m1=125
        m2=127
        mass1=125.0
        mass2=127.0
if randomnumber >1.000000024 and randomnumber <=1.000000024:
        m1=100
        m2=152
        mass1=99.96114
        mass2=152.03886
if randomnumber >1.000000024 and randomnumber <=1.000000024:
        m1=70
        m2=182
        mass1=69.92531927
        mass2=182.07468073
if randomnumber >1.000000024 and randomnumber <=1.000000024:
        m1=66
        m2=186
        mass1=65.939762
        mass2=186.060238
if randomnumber >1.000000024 and randomnumber <=1.000000024:
        m1=89
        m2=163
        mass1=88.96383
        mass2=163.03617
if randomnumber >1.000000024 and randomnumber <=1.000000024:
        m1=66
        m2=186
        mass1=65.94678064
        mass2=186.05321936
if randomnumber >1.000000024 and randomnumber <=1.000000024:
        m1=118
        m2=134
        mass1=117.93782
        mass2=134.06218
if randomnumber >1.000000024 and randomnumber <=1.000000024:
        m1=69
        m2=183
        mass1=68.95878
        mass2=183.04122
if randomnumber >1.000000024 and randomnumber <=1.000000025:
        m1=116
        m2=136
        mass1=115.9017405
        mass2=136.0982595
if randomnumber >1.000000025 and randomnumber <=1.000000025:
        m1=151
        m2=101
        mass1=150.9198502
        mass2=101.0801498
if randomnumber >1.000000025 and randomnumber <=1.000000025:
        m1=162
        m2=90
        mass1=162.0
        mass2=90.0
if randomnumber >1.000000025 and randomnumber <=1.000000025:
```

```
        m1=112
        m2=140
        mass1=111.9055323
        mass2=140.0944677
if randomnumber >1.000000025 and randomnumber <=1.000000025:
        m1=143
        m2=109
        mass1=143.0
        mass2=109.0
if randomnumber >1.000000025 and randomnumber <=1.000000025:
        m1=133
        m2=119
        mass1=133.0
        mass2=119.0
if randomnumber >1.000000025 and randomnumber <=1.000000025:
        m1=141
        m2=111
        mass1=140.9076528
        mass2=111.0923472
if randomnumber >1.000000025 and randomnumber <=1.000000025:
        m1=84
        m2=168
        mass1=83.91438482
        mass2=168.08561518
if randomnumber >1.000000025 and randomnumber <=1.000000025:
        m1=105
        m2=147
        mass1=104.95858
        mass2=147.04142
if randomnumber >1.000000025 and randomnumber <=1.000000025:
        m1=98
        m2=154
        mass1=97.90721597
        mass2=154.09278403
if randomnumber >1.000000025 and randomnumber <=1.000000025:
        m1=146
        m2=106
        mass1=145.9146963
        mass2=106.0853037
if randomnumber >1.000000025 and randomnumber <=1.000000025:
        m1=171
        m2=81
        mass1=170.9363258
        mass2=81.0636742
if randomnumber >1.000000025 and randomnumber <=1.000000026:
        m1=136
        m2=116
        mass1=136.0
        mass2=116.0
if randomnumber >1.000000026 and randomnumber <=1.000000026:
        m1=115
        m2=137
        mass1=114.9033424
        mass2=137.0966576
if randomnumber >1.000000026 and randomnumber <=1.000000026:
        m1=156
        m2=96
        mass1=155.9247472
        mass2=96.0752528
if randomnumber >1.000000026 and randomnumber <=1.000000026:
        m1=84
        m2=168
        mass1=84.0
        mass2=168.0
if randomnumber >1.000000026 and randomnumber <=1.000000026:
        m1=141
        m2=111
        mass1=141.0
        mass2=111.0
if randomnumber >1.000000026 and randomnumber <=1.000000026:
        m1=74
        m2=178
```

```
        mass1=73.96538
        mass2=178.03462
if randomnumber >1.000000026 and randomnumber <=1.000000026:
        m1=103
        m2=149
        mass1=102.9055043
        mass2=149.0944957
if randomnumber >1.000000026 and randomnumber <=1.000000026:
        m1=105
        m2=147
        mass1=104.9050849
        mass2=147.0949151
if randomnumber >1.000000026 and randomnumber <=1.000000026:
        m1=93
        m2=159
        mass1=92.90637806
        mass2=159.09362194
if randomnumber >1.000000026 and randomnumber <=1.000000026:
        m1=127
        m2=125
        mass1=126.9264439
        mass2=125.0735561
if randomnumber >1.000000026 and randomnumber <=1.000000026:
        m1=68
        m2=184
        mass1=67.92961089
        mass2=184.07038911
if randomnumber >1.000000026 and randomnumber <=1.000000026:
        m1=81
        m2=171
        mass1=81.0
        mass2=171.0
if randomnumber >1.000000026 and randomnumber <=1.000000026:
        m1=171
        m2=81
        mass1=171.0
        mass2=81.0
if randomnumber >1.000000026 and randomnumber <=1.000000026:
        m1=70
        m2=182
        mass1=69.96146
        mass2=182.03854
if randomnumber >1.000000026 and randomnumber <=1.000000026:
        m1=78
        m2=174
        mass1=77.96318
        mass2=174.03682
if randomnumber >1.000000026 and randomnumber <=1.000000026:
        m1=86
        m2=166
        mass1=85.9092602
        mass2=166.0907398
if randomnumber >1.000000026 and randomnumber <=1.000000026:
        m1=146
        m2=106
        mass1=146.0
        mass2=106.0
if randomnumber >1.000000026 and randomnumber <=1.000000026:
        m1=155
        m2=97
        mass1=154.95835
        mass2=97.04165
if randomnumber >1.000000026 and randomnumber <=1.000000026:
        m1=103
        m2=149
        mass1=103.0
        mass2=149.0
if randomnumber >1.000000026 and randomnumber <=1.000000027:
        m1=92
        m2=160
        mass1=91.9668
        mass2=160.0332
```

```
if randomnumber >1.000000027 and randomnumber <=1.000000027:
     m1=112
     m2=140
     mass1=111.95083
     mass2=140.04917
if randomnumber >1.000000027 and randomnumber <=1.000000027:
     m1=114
     m2=138
     mass1=113.94492
     mass2=138.05508
if randomnumber >1.000000027 and randomnumber <=1.000000027:
     m1=110
     m2=142
     mass1=109.95287
     mass2=142.04713
if randomnumber >1.000000027 and randomnumber <=1.000000027:
     m1=153
     m2=99
     mass1=152.95961
     mass2=99.04039
if randomnumber >1.000000027 and randomnumber <=1.000000027:
     m1=144
     m2=108
     mass1=144.0
     mass2=108.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
     m1=114
     m2=138
     mass1=113.9027789
     mass2=138.0972211
if randomnumber >1.000000027 and randomnumber <=1.000000027:
     m1=95
     m2=157
     mass1=95.0
     mass2=157.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
     m1=160
     m2=92
     mass1=160.0
     mass2=92.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
     m1=129
     m2=123
     mass1=128.9049877
     mass2=123.0950123
if randomnumber >1.000000027 and randomnumber <=1.000000027:
     m1=120
     m2=132
     mass1=119.93641
     mass2=132.06359
if randomnumber >1.000000027 and randomnumber <=1.000000027:
     m1=134
     m2=118
     mass1=134.0
     mass2=118.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
     m1=100
     m2=152
     mass1=99.90421948
     mass2=152.09578052
if randomnumber >1.000000027 and randomnumber <=1.000000027:
     m1=88
     m2=164
     mass1=87.90950115
     mass2=164.09049885
if randomnumber >1.000000027 and randomnumber <=1.000000027:
     m1=124
     m2=128
     mass1=124.0
     mass2=128.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
     m1=164
```

```
        m2=88
        mass1=163.9292002
        mass2=88.0707998
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=66
        m2=186
        mass1=65.92913933
        mass2=186.07086067
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=128
        m2=124
        mass1=127.9277623
        mass2=124.0722377
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=161
        m2=91
        mass1=160.9278548
        mass2=91.0721452
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=73
        m2=179
        mass1=72.92345895
        mass2=179.07654105
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=169
        m2=83
        mass1=169.0
        mass2=83.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=167
        m2=85
        mass1=167.0
        mass2=85.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=87
        m2=165
        mass1=87.0
        mass2=165.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=71
        m2=181
        mass1=70.96672
        mass2=181.03328
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=75
        m2=177
        mass1=74.92159648
        mass2=177.07840352
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=148
        m2=104
        mass1=147.9148227
        mass2=104.0851773
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=147
        m2=105
        mass1=147.0
        mass2=105.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=158
        m2=94
        mass1=157.9244095
        mass2=94.0755905
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=151
        m2=101
        mass1=150.96219
        mass2=101.03781
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=106
        m2=146
        mass1=106.0
```

```
        mass2=146.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=107
        m2=145
        mass1=106.9050968
        mass2=145.0949032
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=143
        m2=109
        mass1=142.9098143
        mass2=109.0901857
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=101
        m2=151
        mass1=101.0
        mass2=151.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=167
        m2=85
        mass1=166.9328516
        mass2=85.0671484
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=71
        m2=181
        mass1=70.92470135
        mass2=181.07529865
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=153
        m2=99
        mass1=152.9217495
        mass2=99.0782505
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=77
        m2=175
        mass1=76.91991404
        mass2=175.08008596
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=139
        m2=113
        mass1=139.0
        mass2=113.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=127
        m2=125
        mass1=126.9052263
        mass2=125.0947737
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=98
        m2=154
        mass1=98.0
        mass2=154.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=138
        m2=114
        mass1=137.9059913
        mass2=114.0940087
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=125
        m2=127
        mass1=124.9063955
        mass2=127.0936045
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=130
        m2=122
        mass1=129.903508
        mass2=122.096492
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=66
        m2=186
        mass1=65.96108
        mass2=186.03892
if randomnumber >1.000000027 and randomnumber <=1.000000027:
```

```
        m1=90
        m2=162
        mass1=90.0
        mass2=162.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=95
        m2=157
        mass1=94.90584213
        mass2=157.09415787
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=149
        m2=103
        mass1=149.0
        mass2=103.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=108
        m2=144
        mass1=107.95948
        mass2=144.04052
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=75
        m2=177
        mass1=74.96833
        mass2=177.03167
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=126
        m2=126
        mass1=125.9056242
        mass2=126.0943758
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=79
        m2=173
        mass1=78.91833709
        mass2=173.08166291
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=69
        m2=183
        mass1=68.92655028
        mass2=183.07344972
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=170
        m2=82
        mass1=169.9347618
        mass2=82.0652382
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=99
        m2=153
        mass1=99.0
        mass2=153.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=93
        m2=159
        mass1=93.0
        mass2=159.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=90
        m2=162
        mass1=89.90470442
        mass2=162.09529558
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=67
        m2=185
        mass1=66.96414
        mass2=185.03586
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=165
        m2=87
        mass1=165.0
        mass2=87.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=158
        m2=94
```

```
        mass1=158.0
        mass2=94.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=67
        m2=185
        mass1=66.92773031
        mass2=185.07226969
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=132
        m2=120
        mass1=131.9064343
        mass2=120.0935657
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=85
        m2=167
        mass1=85.0
        mass2=167.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=109
        m2=143
        mass1=108.9049823
        mass2=143.0950177
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=81
        m2=171
        mass1=80.91659202
        mass2=171.08340798
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=82
        m2=170
        mass1=82.0
        mass2=170.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=102
        m2=150
        mass1=101.9068432
        mass2=150.0931568
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=72
        m2=180
        mass1=71.96962
        mass2=180.03038
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=116
        m2=136
        mass1=115.94337
        mass2=136.05663
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=142
        m2=110
        mass1=142.0
        mass2=110.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=68
        m2=184
        mass1=67.9693
        mass2=184.0307
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=156
        m2=96
        mass1=156.0
        mass2=96.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=137
        m2=115
        mass1=137.0
        mass2=115.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=83
        m2=169
        mass1=82.9151097
        mass2=169.0848903
```

```
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=122
    m2=130
    mass1=121.93055
    mass2=130.06945
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=163
    m2=89
    mass1=163.0
    mass2=89.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=140
    m2=112
    mass1=139.9090759
    mass2=112.0909241
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=91
    m2=161
    mass1=91.0
    mass2=161.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=155
    m2=97
    mass1=154.9235052
    mass2=97.0764948
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=145
    m2=107
    mass1=144.912749
    mass2=107.087251
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=97
    m2=155
    mass1=96.90636536
    mass2=155.09363464
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=172
    m2=80
    mass1=172.0
    mass2=80.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=121
    m2=131
    mass1=120.9042355
    mass2=131.0957645
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=79
    m2=173
    mass1=79.0
    mass2=173.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=88
    m2=164
    mass1=88.0
    mass2=164.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=76
    m2=176
    mass1=76.0
    mass2=176.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=85
    m2=167
    mass1=84.9129328
    mass2=167.0870672
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=111
    m2=141
    mass1=110.9051033
    mass2=141.0948967
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=166
```

```
        m2=86
        mass1=165.9335541
        mass2=86.0664459
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=96
        m2=156
        mass1=96.0
        mass2=156.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=92
        m2=160
        mass1=91.90719389
        mass2=160.09280611
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=163
        m2=89
        mass1=162.9300327
        mass2=89.0699673
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=130
        m2=122
        mass1=129.950448
        mass2=122.049552
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=104
        m2=148
        mass1=103.9040358
        mass2=148.0959642
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=161
        m2=91
        mass1=161.0
        mass2=91.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=69
        m2=183
        mass1=68.97284
        mass2=183.02716
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=170
        m2=82
        mass1=170.0
        mass2=82.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=72
        m2=180
        mass1=71.92207582
        mass2=180.07792418
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=135
        m2=117
        mass1=134.9069768
        mass2=117.0930232
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=113
        m2=139
        mass1=112.9051706
        mass2=139.0948294
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=70
        m2=182
        mass1=69.92602197
        mass2=182.07397803
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=73
        m2=179
        mass1=73.0
        mass2=179.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=68
        m2=184
        mass1=67.92484415
```

```
        mass2=184.07515585
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=74
        m2=178
        mass1=73.92392869
        mass2=178.07607131
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=169
        m2=83
        mass1=168.9351898
        mass2=83.0648102
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=152
        m2=100
        mass1=151.919791
        mass2=100.080209
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=168
        m2=84
        mass1=168.0
        mass2=84.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=119
        m2=133
        mass1=118.94284
        mass2=133.05716
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=76
        m2=176
        mass1=75.9192136
        mass2=176.0807864
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=172
        m2=80
        mass1=171.9390857
        mass2=80.0609143
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=154
        m2=98
        mass1=154.0
        mass2=98.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=159
        m2=93
        mass1=159.0
        mass2=93.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=83
        m2=169
        mass1=83.0
        mass2=169.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=87
        m2=165
        mass1=86.91087573
        mass2=165.08912427
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=133
        m2=119
        mass1=132.9060075
        mass2=119.0939925
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=99
        m2=153
        mass1=98.9059393
        mass2=153.0940607
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=66
        m2=186
        mass1=65.92886881
        mass2=186.07113119
if randomnumber >1.000000027 and randomnumber <=1.000000027:
```

```
        m1=147
        m2=105
        mass1=146.9148979
        mass2=105.0851021
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=115
        m2=137
        mass1=114.95029
        mass2=137.04971
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=78
        m2=174
        mass1=77.92114571
        mass2=174.07885429
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=142
        m2=110
        mass1=141.9077233
        mass2=110.0922767
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=157
        m2=95
        mass1=156.9254661
        mass2=95.0745339
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=94
        m2=158
        mass1=93.90508827
        mass2=158.09491173
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=137
        m2=115
        mass1=136.9078056
        mass2=115.0921944
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=80
        m2=172
        mass1=80.0
        mass2=172.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=106
        m2=146
        mass1=105.9066689
        mass2=146.0933311
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=166
        m2=86
        mass1=166.0
        mass2=86.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=66
        m2=186
        mass1=65.97338
        mass2=186.02662
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=70
        m2=182
        mass1=70.0
        mass2=182.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=86
        m2=166
        mass1=86.0
        mass2=166.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=89
        m2=163
        mass1=88.9088895
        mass2=163.0911105
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=80
        m2=172
```

```
        mass1=79.91637897
        mass2=172.08362103
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=119
        m2=133
        mass1=118.903942
        mass2=133.096058
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=126
        m2=126
        mass1=126.0
        mass2=126.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=74
        m2=178
        mass1=74.0
        mass2=178.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=77
        m2=175
        mass1=77.0
        mass2=175.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=118
        m2=134
        mass1=117.9055287
        mass2=134.0944713
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=108
        m2=144
        mass1=107.9041837
        mass2=144.0958163
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=165
        m2=87
        mass1=164.9324355
        mass2=87.0675645
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=168
        m2=84
        mass1=167.9338969
        mass2=84.0661031
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=162
        m2=90
        mass1=161.9287783
        mass2=90.0712217
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=164
        m2=88
        mass1=164.0
        mass2=88.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=101
        m2=151
        mass1=100.9061636
        mass2=151.0938364
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=150
        m2=102
        mass1=150.0
        mass2=102.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=123
        m2=129
        mass1=122.904214
        mass2=129.095786
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=67
        m2=185
        mass1=66.97955
        mass2=185.02045
```

```
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=139
    m2=113
    mass1=138.9089384
    mass2=113.0910616
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=149
    m2=103
    mass1=148.9179312
    mass2=103.0820688
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=171
    m2=81
    mass1=170.9379131
    mass2=81.0620869
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=144
    m2=108
    mass1=143.9125908
    mass2=108.0874092
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=131
    m2=121
    mass1=131.0
    mass2=121.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=81
    m2=171
    mass1=81.0
    mass2=171.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=67
    m2=185
    mass1=66.92712735
    mass2=185.07287265
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=71
    m2=181
    mass1=71.0
    mass2=181.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=69
    m2=183
    mass1=68.92557359
    mass2=183.07442641
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=91
    m2=161
    mass1=90.90699624
    mass2=161.09300376
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=123
    m2=129
    mass1=123.0
    mass2=129.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=159
    m2=93
    mass1=158.927712
    mass2=93.072288
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=171
    m2=81
    mass1=171.0
    mass2=81.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=73
    m2=179
    mass1=72.92382484
    mass2=179.07617516
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=78
```

```
        m2=174
        mass1=78.0
        mass2=174.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=169
        m2=83
        mass1=169.0
        mass2=83.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=129
        m2=123
        mass1=128.94369
        mass2=123.05631
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=117
        m2=135
        mass1=116.94648
        mass2=135.05352
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=132
        m2=120
        mass1=132.0
        mass2=120.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=167
        m2=85
        mass1=167.0
        mass2=85.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=75
        m2=177
        mass1=75.0
        mass2=177.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=72
        m2=180
        mass1=72.0
        mass2=180.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=118
        m2=134
        mass1=117.95148
        mass2=134.04852
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=172
        m2=80
        mass1=172.0
        mass2=80.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=69
        m2=183
        mass1=69.0
        mass2=183.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=73
        m2=179
        mass1=73.0
        mass2=179.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=66
        m2=186
        mass1=66.0
        mass2=186.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=67
        m2=185
        mass1=67.0
        mass2=185.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=71
        m2=181
        mass1=71.0
```

```
        mass2=181.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=119
        m2=133
        mass1=119.0
        mass2=133.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=68
        m2=184
        mass1=68.0
        mass2=184.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=70
        m2=182
        mass1=70.0
        mass2=182.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=76
        m2=176
        mass1=76.0
        mass2=176.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=82
        m2=170
        mass1=82.0
        mass2=170.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=66
        m2=186
        mass1=65.92603342
        mass2=186.07396658
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=66
        m2=186
        mass1=65.93158901
        mass2=186.06841099
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=67
        m2=185
        mass1=66.9282017
        mass2=185.0717983
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=68
        m2=184
        mass1=67.92798008
        mass2=184.07201992
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=66
        m2=186
        mass1=65.93384345
        mass2=186.06615655
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=67
        m2=185
        mass1=66.93273407
        mass2=185.06726593
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=68
        m2=184
        mass1=67.92809424
        mass2=184.07190576
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=69
        m2=183
        mass1=68.92796453
        mass2=183.07203547
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=70
        m2=182
        mass1=69.92424738
        mass2=182.07575262
if randomnumber >1.000000027 and randomnumber <=1.000000027:
```

```
            m1=71
            m2=181
            mass1=70.92495095
            mass2=181.07504905
if randomnumber >1.000000027 and randomnumber <=1.000000027:
            m1=69
            m2=183
            mass1=68.93227368
            mass2=183.06772632
if randomnumber >1.000000027 and randomnumber <=1.000000027:
            m1=71
            m2=181
            mass1=70.92711243
            mass2=181.07288757
if randomnumber >1.000000027 and randomnumber <=1.000000027:
            m1=72
            m2=180
            mass1=71.92675228
            mass2=180.07324772
if randomnumber >1.000000027 and randomnumber <=1.000000027:
            m1=72
            m2=180
            mass1=71.92711235
            mass2=180.07288765
if randomnumber >1.000000027 and randomnumber <=1.000000027:
            m1=73
            m2=179
            mass1=72.92676535
            mass2=179.07323465
if randomnumber >1.000000027 and randomnumber <=1.000000027:
            m1=74
            m2=178
            mass1=73.92247644
            mass2=178.07752356
if randomnumber >1.000000027 and randomnumber <=1.000000027:
            m1=75
            m2=177
            mass1=74.92252337
            mass2=177.07747663
if randomnumber >1.000000027 and randomnumber <=1.000000027:
            m1=75
            m2=177
            mass1=74.92577621
            mass2=177.07422379
if randomnumber >1.000000027 and randomnumber <=1.000000027:
            m1=77
            m2=175
            mass1=76.92137908
            mass2=175.07862092
if randomnumber >1.000000027 and randomnumber <=1.000000027:
            m1=77
            m2=175
            mass1=76.92467
            mass2=175.07533
if randomnumber >1.000000027 and randomnumber <=1.000000027:
            m1=78
            m2=174
            mass1=77.92036478
            mass2=174.07963522
if randomnumber >1.000000027 and randomnumber <=1.000000027:
            m1=79
            m2=173
            mass1=78.92008243
            mass2=173.07991757
if randomnumber >1.000000027 and randomnumber <=1.000000027:
            m1=79
            m2=173
            mass1=78.92398946
            mass2=173.07601054
if randomnumber >1.000000027 and randomnumber <=1.000000027:
            m1=81
            m2=171
```

```
        mass1=80.91899591
        mass2=171.08100409
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=83
        m2=169
        mass1=82.9175567
        mass2=169.0824433
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=84
        m2=168
        mass1=83.91342528
        mass2=168.08657472
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=85
        m2=167
        mass1=84.91643304
        mass2=167.08356696
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=87
        m2=165
        mass1=86.91481625
        mass2=165.08518375
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=88
        m2=164
        mass1=87.9102269
        mass2=164.0897731
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=89
        m2=163
        mass1=88.91341825
        mass2=163.08658175
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=90
        m2=162
        mass1=89.91126485
        mass2=162.08873515
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=90
        m2=162
        mass1=89.9139369
        mass2=162.0860631
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=91
        m2=161
        mass1=90.91175019
        mass2=161.08824981
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=92
        m2=160
        mass1=91.90681099
        mass2=160.09318901
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=93
        m2=159
        mass1=92.90681261
        mass2=159.09318739
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=116
        m2=136
        mass1=116.0
        mass2=136.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=93
        m2=159
        mass1=92.91024898
        mass2=159.08975102
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=95
        m2=157
        mass1=94.90765708
        mass2=157.09234292
```

```
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=95
    m2=157
    mass1=94.91041293
    mass2=157.08958707
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=96
    m2=156
    mass1=95.90759784
    mass2=156.09240216
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=97
    m2=155
    mass1=96.9075547
    mass2=155.0924453
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=98
    m2=154
    mass1=97.90528713
    mass2=154.09471287
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=120
    m2=132
    mass1=119.94531
    mass2=132.05469
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=122
    m2=130
    mass1=122.0
    mass2=130.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=123
    m2=129
    mass1=123.0
    mass2=129.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=99
    m2=153
    mass1=98.9081321
    mass2=153.0918679
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=121
    m2=131
    mass1=120.93872
    mass2=131.06128
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=122
    m2=130
    mass1=121.94321
    mass2=130.05679
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=99
    m2=153
    mass1=98.91176783
    mass2=153.08823217
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=101
    m2=151
    mass1=100.9082892
    mass2=151.0917108
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=102
    m2=150
    mass1=101.9056085
    mass2=150.0943915
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=103
    m2=149
    mass1=102.9060873
    mass2=149.0939127
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=128
```

```
        m2=124
        mass1=128.0
        mass2=124.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=129
        m2=123
        mass1=129.0
        mass2=123.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=130
        m2=122
        mass1=130.0
        mass2=122.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=103
        m2=149
        mass1=102.9089727
        mass2=149.0910273
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=105
        m2=147
        mass1=104.9065287
        mass2=147.0934713
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=127
        m2=125
        mass1=126.93677
        mass2=125.06323
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=128
        m2=124
        mass1=127.94117
        mass2=124.05883
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=105
        m2=147
        mass1=104.9094679
        mass2=147.0905321
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=106
        m2=146
        mass1=105.9064594
        mass2=146.0935406
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=107
        m2=145
        mass1=106.9066179
        mass2=145.0933821
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=136
        m2=116
        mass1=136.0
        mass2=116.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=107
        m2=145
        mass1=106.9102951
        mass2=145.0897049
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=109
        m2=143
        mass1=108.9071505
        mass2=143.0928495
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=111
        m2=141
        mass1=110.9077345
        mass2=141.0922655
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=112
        m2=140
        mass1=111.9048182
```

```
        mass2=140.0951818
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=122
        m2=130
        mass1=121.903439
        mass2=130.096561
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=113
        m2=139
        mass1=112.9093717
        mass2=139.0906283
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=115
        m2=137
        mass1=114.906598
        mass2=137.093402
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=117
        m2=135
        mass1=116.9048359
        mass2=135.0951641
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=120
        m2=132
        mass1=119.9050724
        mass2=132.0949276
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=121
        m2=131
        mass1=120.9038157
        mass2=131.0961843
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=122
        m2=130
        mass1=121.9051737
        mass2=130.0948263
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=115
        m2=137
        mass1=114.911902
        mass2=137.088098
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=117
        m2=135
        mass1=116.9086447
        mass2=135.0913553
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=118
        m2=134
        mass1=117.9058276
        mass2=134.0941724
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=119
        m2=133
        mass1=118.9064036
        mass2=133.0935964
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=120
        m2=132
        mass1=119.9040202
        mass2=132.0959798
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=121
        m2=131
        mass1=120.9049364
        mass2=131.0950636
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=122
        m2=130
        mass1=121.9030439
        mass2=130.0969561
if randomnumber >1.000000027 and randomnumber <=1.000000027:
```

```
        m1=123
        m2=129
        mass1=122.90427
        mass2=129.09573
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=121
        m2=131
        mass1=120.9073668
        mass2=131.0926332
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=123
        m2=129
        mass1=122.905589
        mass2=129.094411
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=127
        m2=125
        mass1=126.9044727
        mass2=125.0955273
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=128
        m2=124
        mass1=127.9058094
        mass2=124.0941906
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=124
        m2=128
        mass1=123.905893
        mass2=128.094107
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=126
        m2=126
        mass1=125.9042736
        mass2=126.0957264
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=127
        m2=125
        mass1=126.9051837
        mass2=125.0948163
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=128
        m2=124
        mass1=127.9035313
        mass2=124.0964687
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=129
        m2=123
        mass1=128.9047794
        mass2=123.0952206
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=127
        m2=125
        mass1=126.9074175
        mass2=125.0925825
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=129
        m2=123
        mass1=128.9060644
        mass2=123.0939356
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=131
        m2=121
        mass1=130.9054639
        mass2=121.0945361
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=129
        m2=123
        mass1=128.9086794
        mass2=123.0913206
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=131
        m2=121
```

```
        mass1=130.9069411
        mass2=121.0930589
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=132
        m2=120
        mass1=131.9050613
        mass2=120.0949387
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=133
        m2=119
        mass1=132.908218
        mass2=119.091782
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=135
        m2=117
        mass1=134.9091514
        mass2=117.0908486
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=160
        m2=92
        mass1=160.0
        mass2=92.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=140
        m2=112
        mass1=139.909552
        mass2=112.090448
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=141
        m2=111
        mass1=140.9096099
        mass2=111.0903901
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=141
        m2=111
        mass1=140.9135551
        mass2=111.0864449
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=143
        m2=109
        mass1=142.9109326
        mass2=109.0890674
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=143
        m2=109
        mass1=142.9146283
        mass2=109.0853717
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=144
        m2=108
        mass1=143.9119995
        mass2=108.0880005
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=145
        m2=107
        mass1=144.9134104
        mass2=107.0865896
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=146
        m2=106
        mass1=145.9130409
        mass2=106.0869591
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=170
        m2=82
        mass1=170.0
        mass2=82.0
if randomnumber >1.000000027 and randomnumber <=1.000000027:
        m1=147
        m2=105
        mass1=146.9167461
        mass2=105.0832539
```

```python
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=147
    m2=105
    mass1=146.9190944
    mass2=105.0809056
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=149
    m2=103
    mass1=148.9193409
    mass2=103.0806591
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=151
    m2=101
    mass1=150.9203485
    mass2=101.0796515
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=151
    m2=101
    mass1=150.9231025
    mass2=101.0768975
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=153
    m2=99
    mass1=152.9234346
    mass2=99.0765654
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=155
    m2=97
    mass1=154.9257538
    mass2=97.0742462
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=156
    m2=96
    mass1=155.9242831
    mass2=96.0757169
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=161
    m2=91
    mass1=160.9299953
    mass2=91.0700047
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=166
    m2=86
    mass1=165.933882
    mass2=86.066118
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=167
    m2=85
    mass1=166.9349496
    mass2=85.0650504
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=169
    m2=83
    mass1=168.9376514
    mass2=83.0623486
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=171
    m2=81
    mass1=170.940492
    mass2=81.059508
if randomnumber >1.000000027 and randomnumber <=1.000000027:
    m1=172
    m2=80
    mass1=171.9394483
    mass2=80.0605517
def trange7376(x):
    return (((147.1-143.6)/(76.8-73.2))*x)+(147.1-(((147.1-143.6)/(76.8-73.2))*76.8))
def trange7680(x):
    return (((156.4-147.1)/(80.4-76.8))*x)+(156.4-(((156.4-147.1)/(80.4-76.8))*80.4))
def trange80107(x):
    return (((183.6-156.4)/(107.1-80.4))*x)+(183.6-(((183.6-156.4)/(107.1-80.4))*107.1))
def trange107114(x):
```

```
        return (((190-183.6)/(114.3-107.1))*x)+(190-(((190-183.6)/(114.3-107.1))*114.3))
    def trange114121(x):
        return (((193.9-190)/(121.4-114.3))*x)+(193.9-(((193.9-190)/(121.4-114.3))*121.4))
    def trange121125(x):
        return (((187.9-193.9)/(125-121.4))*x)+(187.9-(((187.9-193.9)/(125-121.4))*125))
    def trange125134(x):
        return (((193.9-187.9)/(133.9-125))*x)+(193.9-(((193.9-187.9)/(133.9-125))*133.9))
    def trange134140(x):
        return (((191.1-193.9)/(139.3-133.9))*x)+(191.1-(((191.1-193.9)/(139.3-133.9))*139.3))
    def trange140148(x):
        return (((185-191.1)/(148.2-139.3))*x)+(185-(((185-191.1)/(148.2-139.3))*148.2))
    def trange148173(x):
        return (((157.1-185)/(173.1-148.2))*x)+(157.1-(((157.1-185)/(173.1-148.2))*173.1))
    def trange173177(x):
        return (((147.1-157.1)/(176.8-173.1))*x)+(147.1-(((147.1-157.1)/(176.8-173.1))*176.8))
    def trange177179(x):
        return (((143.6-147.1)/(178.6-176.8))*x)+(143.6-(((143.6-147.1)/(178.6-176.8))*178.6))
    def trange179190(x):
        return (((146.3-143.6)/(190.2-178.6))*x)+(146.3-(((146.3-143.6)/(190.2-178.6))*190.2))
    def urange6875(x):
        return (((11.3-10.1)/(75-67.9))*x)+(11.3-(((11.3-10.1)/(75-67.9))*75))
    def urange75121(x):
        return (0.0036956171*(x**2))+(-0.7107330003*x)+43.81712859
    def urange121127(x):
        return (((11.3-12)/(126.8-121.4))*x)+(11.3-(((11.3-12)/(126.8-121.4))*126.8))
    def urange127131(x):
        return (((12-11.3)/(131.3-126.8))*x)+(12-(((12-11.3)/(131.3-126.8))*131.3))
    def urange131134(x):
        return (((11.6-12)/(133.9-131.25))*x)+(11.6-(((11.6-12)/(133.9-131.25))*133.9))
    def urange134177(x):
        return (0.0044526553*(x**2))+(-1.389733708*x)+117.8827515
    def urange177184(x):
        return (((8.4-11.4)/(183.9-176.8))*x)+(8.4-(((8.4-11.4)/(183.9-176.8))*183.9))
# How much kinetic energy does each fragment have? (m equals A, not mass)
# Which interpolation to use? for m1
    if m1 >= 70 and m1 < 77:
        Av1=trange7376(m1)
    if m1 >= 77 and m1 < 81:
        Av1=trange7680(m1)
    if m1 >= 81 and m1 < 107:
        Av1=trange80107(m1)
    if m1 >= 107 and m1 < 114:
        Av1=trange107114(m1)
    if m1 >= 114 and m1 < 121:
        Av1=trange114121(m1)
    if m1 >= 121 and m1 < 125:
        Av1=trange121125(m1)
    if m1 >= 125 and m1 < 134:
        Av1=trange125134(m1)
    if m1 >= 134 and m1 < 140:
        Av1=trange134140(m1)
    if m1 >= 140 and m1 < 148:
        Av1=trange140148(m1)
    if m1 >= 148 and m1 < 173:
        Av1=trange148173(m1)
    if m1 >= 173 and m1 < 177:
        Av1=trange173177(m1)
    if m1 >= 177 and m1 < 179:
        Av1=trange177179(m1)
    if m1 >= 179 and m1 < 190:
        Av1=trange179190(m1)
    if m1 >= 190 and m1 < 190:
        Av1=trange179190(m1)
    if m1 >=68 and m1 <75:
        Sd1=urange6875(m1)
    if m1 >=75 and m1 <121:
        Sd1=urange75121(m1)
    if m1 >=121 and m1 <127:
        Sd1=urange121127(m1)
    if m1 >=127 and m1 <131:
        Sd1=urange127131(m1)
    if m1 >=131 and m1 <134:
```

```python
                Sd1=urange131134(m1)
        if m1 >=134 and m1 <177:
                Sd1=urange134177(m1)
        if m1 >=177 and m1 <184:
                Sd1=urange177184(m1)
# end linear interpolation definitions for m1
# Which interpolation to use? m2
        if m2 >= 70 and m2 < 77:
                Av2=trange7376(m2)
        if m2 >= 77 and m2 < 81:
                Av2=trange7680(m2)
        if m2 >= 81 and m2 < 107:
                Av2=trange80107(m2)
        if m2 >= 107 and m2 < 114:
                Av2=trange107114(m2)
        if m2 >= 114 and m2 < 121:
                Av2=trange114121(m2)
        if m2 >= 121 and m2 < 125:
                Av2=trange121125(m2)
        if m2 >= 125 and m2 < 134:
                Av2=trange125134(m2)
        if m2 >= 134 and m2 < 140:
                Av2=trange134140(m2)
        if m2 >= 140 and m2 < 148:
                Av2=trange140148(m2)
        if m2 >= 148 and m2 < 173:
                Av2=trange148173(m2)
        if m2 >= 173 and m2 < 177:
                Av2=trange173177(m2)
        if m2 >= 177 and m2 < 179:
                Av2=trange177179(m2)
        if m2 >= 179 and m2 < 190:
                Av2=trange179190(m2)
        if m2 >= 190 and m2 < 190:
                Av2=trange179190(m2)
        if m2 >=68 and m2 <75:
                Sd2=urange6875(m2)
        if m2 >=75 and m2 <121:
                Sd2=urange75121(m2)
        if m2 >=121 and m2 <127:
                Sd2=urange121127(m2)
        if m2 >=127 and m2 <131:
                Sd2=urange127131(m2)
        if m2 >=131 and m2 <134:
                Sd2=urange131134(m2)
        if m2 >=134 and m2 <177:
                Sd2=urange134177(m2)
        if m2 >=177 and m2 <184:
                Sd2=urange177184(m2)
# end linear interpolation definitions for m2
        Em1=random.gauss(Av1,Sd1)
        Em2=random.gauss(Av2,Sd2)
# How much velocity does each fragment have?
# Energy in MeV, mass in amu
        vf1=((2*Em1*1.60217646*(10**-13))/(mass1*1.66053886*(10**-27)))**.5
        vf2=((2*Em2*1.60217646*(10**-13))/(mass2*1.66053886*(10**-27)))**.5
# How many neutrons are released off of each fragment?
# Use a Gaussian distribution with mean=vaverage and sigma=sqrt of mean
        def numnrange7382(x):
                return (((0.1-1.4)/(82-73))*x)+(0.1-(((0.1-1.4)/(82-73))*82))
        def numnrange82122(x):
                return (((3.4-0.1)/(122-82))*x)+(3.4-(((3.4-0.1)/(122-82))*122))
        def numnrange122130(x):
                return (((0.4-3.4)/(130-122))*x)+(0.4-(((0.4-3.4)/(130-122))*130))
        def numnrange130140(x):
                return (((1.4-0.4)/(140-130))*x)+(1.4-(((1.4-0.4)/(140-130))*140))
        def numnrange140168(x):
                return (((3.2-1.4)/(168-140))*x)+(3.2-(((3.2-1.4)/(168-140))*168))
        if m1 <= 82:
                numn1=numnrange7382(m1)
        if m1 > 82 and m1 <= 122:
                numn1=numnrange82122(m1)
```

```
            if m1 > 122 and m1 <= 130:
                numn1=numnrange122130(m1)
            if m1 > 130 and m1 <= 140:
                numn1=numnrange130140(m1)
            if m1 > 140 and m1 <= 168:
                numn1=numnrange140168(m1)
            if m2 <= 82:
                numn2=numnrange7382(m2)
            if m2 > 82 and m2 <= 122:
                numn2=numnrange82122(m2)
            if m2 > 122 and m2 <= 130:
                numn2=numnrange122130(m2)
            if m2 > 130 and m2 <= 140:
                numn2=numnrange130140(m2)
            if m2 > 140 and m2 <= 168:
                numn2=numnrange140168(m2)
            nm1=int(round(numn1))
            nm2=int(round(numn2))
#   *What are the velocities of the neutrons that are emitted? Watt spectrum?
            nvelfrag1=[]
            for n1count in range(0,nm1):
                nvelfrag1.append(0)
            pos1=0
            for i in range(0,nm1):
                r=random.random()
                pount=1
                for n in range(1,len(Wattcumuprob)):
                    if r < 0.000324276:
                        Wsample1=0.01
                        break;
                    if r > Wattcumuprob[pount] and r < Wattcumuprob[pount+1]:
                        Wsample1=(2*Wattenergy[pount+1]*1.602*(10**(-13))/(1.6749273*(10**(-27))))**.5
                        break;
                    pount=pount+1
                nvelfrag1.pop(pos1)
                nvelfrag1.insert(pos1,Wsample1)
                pos1=pos1+1
            nvelfrag2=[]
            for n2count in range(0,nm2):
                nvelfrag2.append(0)
            pos2=0
            for i in range(0,nm2):
                r=random.random()
                pount=1
                for n in range(1,len(Wattcumuprob)):
                    if r < 0.000324276:
                        Wsample2=0.01
                        break;
                    if r > Wattcumuprob[pount] and r < Wattcumuprob[pount+1]:
                        Wsample2=(2*Wattenergy[pount+1]*1.602*(10**(-13))/(1.6749273*(10**(-27))))**.5
                        break;
                    pount=pount+1
                nvelfrag2.pop(pos2)
                nvelfrag2.insert(pos2,Wsample2)
                pos2=pos2+1
# What direction cosine does the neutron go? (relative to direction of travel of fragment), assume isotropic
            ndirfrag1=[]
            for n1count in range(0,nm1):
                dir1=random.uniform(0, 360)
                pos1=0
                ndirfrag1.insert(pos1,dir1)
                pos1=pos1+1
            ndirfrag2=[]
            for n2count in range(0,nm2):
                dir2=random.uniform(0, 360)
                pos2=0
                ndirfrag2.insert(pos2,dir2)
                pos2=pos2+1
# NEW: What are angles of the neutrons detected in lab frame of refrence rel to frag direction of travel?
# What are the velocities of the neutrons detected in the lab frame of reference relative to the frag direction of travel?
            countn1=0
            i=0
```

```python
        j=0
        nvellength1=len(nvelfrag1)
        vn1labarray=[]
        vn2labarray=[]
        vn1labdetectprob=[]
        vn2labdetectprob=[]
        for i in range(0,nvellength1):
                Vn1lab=((vf1**2)+(2*vf1*nvelfrag1[countn1]*math.cos(math.radians(ndirfrag1[countn1])))+(nvelfrag1[countn1]**2))**.5
                vn1labarray.append(Vn1lab)
# find E that corresponds to vn1lab then find corresponding efficiency for E
                En1lab=(Vn1lab**2)*(1.6749273*(10**-27))/(2*1.602*(10**-13))
                for x in range (0, len(energyE)):
                        if En1lab < 1:
                                probdetect=0
                                break;
                        if En1lab > energyE[x] and En1lab < energyE[x+1]:
                                probdetect=efficiencyE[x]
                                break;
                        if En1lab >= 25:
                                probdetect=0
                                break;
                vn1labdetectprob.append(probdetect)
                countn1=countn1+1
        countn2=0
        nvellength2=len(nvelfrag2)
        for j in range(0,nvellength2):
                Vn2lab=((vf2**2)+(2*vf2*nvelfrag2[countn2]*math.cos(math.radians(ndirfrag2[countn2])))+(nvelfrag2[countn2]**2))**.5
                vn2labarray.append(Vn2lab)
                En2lab=(Vn2lab**2)*(1.6749273*(10**-27))/(2*1.602*(10**-13))
                for y in range (0, len(energyE)):
                        if En2lab < 1:
                                probdetect=0
                                break;
                        if En2lab > energyE[y] and En2lab < energyE[y+1]:
                                probdetect=efficiencyE[y]
                                break;
                        if En2lab >= 25:
                                probdetect=0
                                break;
                vn2labdetectprob.append(probdetect)
                countn2=countn2+1
# What are the angles, in the lab frame of reference between neutrons and fragment direction of travel?
        i=0
        nlabanglearrayf1=[]
        for varn1 in range(0,nm1):
                num1=nvelfrag1[i]*(math.sin(math.radians(ndirfrag1[i])))
                den1=vf1+(nvelfrag1[i]*(math.cos(math.radians(ndirfrag1[i]))))
                if den1==0:
                        break; break;
                nlabangle1=math.degrees(math.atan(num1/den1))
                nlabanglearrayf1.append(nlabangle1)
                i=i+1
        j=0
        nvellength2=len(vn2labarray)
        nlabanglearrayf2=[]
        for varn2 in range(0,nvellength2):
                dont=0
                num2=nvelfrag2[j]*(math.sin(math.radians(ndirfrag2[j])))
                den2=vf2+(nvelfrag2[j]*(math.cos(math.radians(ndirfrag2[j]))))
                if den2==0:
                        break; break;
                nlabangle2=math.degrees(math.atan(num2/den2))
                nlabanglearrayf2.append(nlabangle2)
                j=j+1
# What are the angles, in the lab frame of reference between neutrons?
# same fragment
# * vn1labdetectprob=[] vn2labdetectprob=[]
        probdet=[]
        diffsamearray=[]
        i=0
        diffsamearrayf1=[]
        for uy in range(0,nm1):
```

```
            j=i+1
            for uyy in range(j,nm1):
                diffsamef1 = math.fabs(nlabanglearrayf1[i]-nlabanglearrayf1[j])
                probf1=(vn1labdetectprob[uy]*vn1labdetectprob[uyy])
#               probdet.append(probf1)
                diffsamearrayf1.append(diffsamef1)
#               diffsamearray.append(diffsamef1)
                j=j+1
            i=i+1
        i=0
        nvellength2=len(vn2labarray)
        diffsamearrayf2=[]
        for varn2 in range(0,nm2):
            j=i+1
            for varn22 in range(j,nm2):
                diffsamef2 = math.fabs(nlabanglearrayf2[i]-nlabanglearrayf2[j])
                probf2=(vn2labdetectprob[varn2]*vn2labdetectprob[varn22])
#               probdet.append(probf2)
                diffsamearrayf2.append(diffsamef2)
#               diffsamearray.append(diffsamef2)
                j=j+1
            i=i+1
# opposite fragments
        i=0
        diffsamearrayf12=[]
        for varn12 in range(0,nvellength1):
            j=0
            for varn1212 in range(j,nvellength2):
                df2n2 =(nlabanglearrayf2[j])-180
                diffsamef12 = math.fabs(df2n2+nlabanglearrayf1[i])
                if diffsamef12 > 180:
                    diffsamef12=360-diffsamef12

                probf12=(vn1labdetectprob[varn12]*vn2labdetectprob[varn1212])
                probdet.append(probf12)
                diffsamearrayf12.append(diffsamef12)
                diffsamearray.append(diffsamef12)
                j=j+1
            i=i+1
# Tally frequencies for each of angles and dump into output file
        i=0
        anglearraylength=len(diffsamearray)
        for i in range(0,anglearraylength):
            if diffsamearray[i] < 1:
                bin0=bin0+(probdet[i])
            if diffsamearray[i] >=1 and diffsamearray[i] <2 :
                bin1=bin1+(probdet[i])
            if diffsamearray[i] >=2 and diffsamearray[i] <3 :
                bin2=bin2+(probdet[i])
            if diffsamearray[i] >=3 and diffsamearray[i] <4 :
                bin3=bin3+(probdet[i])
            if diffsamearray[i] >=4 and diffsamearray[i] <5 :
                bin4=bin4+(probdet[i])
            if diffsamearray[i] >=5 and diffsamearray[i] <6 :
                bin5=bin5+(probdet[i])
            if diffsamearray[i] >=6 and diffsamearray[i] <7 :
                bin6=bin6+(probdet[i])
            if diffsamearray[i] >=7 and diffsamearray[i] <8 :
                bin7=bin7+(probdet[i])
            if diffsamearray[i] >=8 and diffsamearray[i] <9 :
                bin8=bin8+(probdet[i])
            if diffsamearray[i] >=9 and diffsamearray[i] <10 :
                bin9=bin9+(probdet[i])
            if diffsamearray[i] >=10 and diffsamearray[i] <11 :
                bin10=bin10+(probdet[i])
            if diffsamearray[i] >=11 and diffsamearray[i] <12 :
                bin11=bin11+(probdet[i])
            if diffsamearray[i] >=12 and diffsamearray[i] <13 :
                bin12=bin12+(probdet[i])
            if diffsamearray[i] >=13 and diffsamearray[i] <14 :
                bin13=bin13+(probdet[i])
            if diffsamearray[i] >=14 and diffsamearray[i] <15 :
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        bin14=bin14+(probdet[i])
if diffsamearray[i] >=15 and diffsamearray[i] <16 :
        bin15=bin15+(probdet[i])
if diffsamearray[i] >=16 and diffsamearray[i] <17 :
        bin16=bin16+(probdet[i])
if diffsamearray[i] >=17 and diffsamearray[i] <18 :
        bin17=bin17+(probdet[i])
if diffsamearray[i] >=18 and diffsamearray[i] <19 :
        bin18=bin18+(probdet[i])
if diffsamearray[i] >=19 and diffsamearray[i] <20 :
        bin19=bin19+(probdet[i])
if diffsamearray[i] >=20 and diffsamearray[i] <21 :
        bin20=bin20+(probdet[i])
if diffsamearray[i] >=21 and diffsamearray[i] <22 :
        bin21=bin21+(probdet[i])
if diffsamearray[i] >=22 and diffsamearray[i] <23 :
        bin22=bin22+(probdet[i])
if diffsamearray[i] >=23 and diffsamearray[i] <24 :
        bin23=bin23+(probdet[i])
if diffsamearray[i] >=24 and diffsamearray[i] <25 :
        bin24=bin24+(probdet[i])
if diffsamearray[i] >=25 and diffsamearray[i] <26 :
        bin25=bin25+(probdet[i])
if diffsamearray[i] >=26 and diffsamearray[i] <27 :
        bin26=bin26+(probdet[i])
if diffsamearray[i] >=27 and diffsamearray[i] <28 :
        bin27=bin27+(probdet[i])
if diffsamearray[i] >=28 and diffsamearray[i] <29 :
        bin28=bin28+(probdet[i])
if diffsamearray[i] >=29 and diffsamearray[i] <30 :
        bin29=bin29+(probdet[i])
if diffsamearray[i] >=30 and diffsamearray[i] <31 :
        bin30=bin30+(probdet[i])
if diffsamearray[i] >=31 and diffsamearray[i] <32 :
        bin31=bin31+(probdet[i])
if diffsamearray[i] >=32 and diffsamearray[i] <33 :
        bin32=bin32+(probdet[i])
if diffsamearray[i] >=33 and diffsamearray[i] <34 :
        bin33=bin33+(probdet[i])
if diffsamearray[i] >=34 and diffsamearray[i] <35 :
        bin34=bin34+(probdet[i])
if diffsamearray[i] >=35 and diffsamearray[i] <36 :
        bin35=bin35+(probdet[i])
if diffsamearray[i] >=36 and diffsamearray[i] <37 :
        bin36=bin36+(probdet[i])
if diffsamearray[i] >=37 and diffsamearray[i] <38 :
        bin37=bin37+(probdet[i])
if diffsamearray[i] >=38 and diffsamearray[i] <39 :
        bin38=bin38+(probdet[i])
if diffsamearray[i] >=39 and diffsamearray[i] <40 :
        bin39=bin39+(probdet[i])
if diffsamearray[i] >=40 and diffsamearray[i] <41 :
        bin40=bin40+(probdet[i])
if diffsamearray[i] >=41 and diffsamearray[i] <42 :
        bin41=bin41+(probdet[i])
if diffsamearray[i] >=42 and diffsamearray[i] <43 :
        bin42=bin42+(probdet[i])
if diffsamearray[i] >=43 and diffsamearray[i] <44 :
        bin43=bin43+(probdet[i])
if diffsamearray[i] >=44 and diffsamearray[i] <45 :
        bin44=bin44+(probdet[i])
if diffsamearray[i] >=45 and diffsamearray[i] <46 :
        bin45=bin45+(probdet[i])
if diffsamearray[i] >=46 and diffsamearray[i] <47 :
        bin46=bin46+(probdet[i])
if diffsamearray[i] >=47 and diffsamearray[i] <48 :
        bin47=bin47+(probdet[i])
if diffsamearray[i] >=48 and diffsamearray[i] <49 :
        bin48=bin48+(probdet[i])
if diffsamearray[i] >=49 and diffsamearray[i] <50 :
        bin49=bin49+(probdet[i])
if diffsamearray[i] >=50 and diffsamearray[i] <51 :
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        bin50=bin50+(probdet[i])
if diffsamearray[i] >=51 and diffsamearray[i] <52 :
        bin51=bin51+(probdet[i])
if diffsamearray[i] >=52 and diffsamearray[i] <53 :
        bin52=bin52+(probdet[i])
if diffsamearray[i] >=53 and diffsamearray[i] <54 :
        bin53=bin53+(probdet[i])
if diffsamearray[i] >=54 and diffsamearray[i] <55 :
        bin54=bin54+(probdet[i])
if diffsamearray[i] >=55 and diffsamearray[i] <56 :
        bin55=bin55+(probdet[i])
if diffsamearray[i] >=56 and diffsamearray[i] <57 :
        bin56=bin56+(probdet[i])
if diffsamearray[i] >=57 and diffsamearray[i] <58 :
        bin57=bin57+(probdet[i])
if diffsamearray[i] >=58 and diffsamearray[i] <59 :
        bin58=bin58+(probdet[i])
if diffsamearray[i] >=59 and diffsamearray[i] <60 :
        bin59=bin59+(probdet[i])
if diffsamearray[i] >=60 and diffsamearray[i] <61 :
        bin60=bin60+(probdet[i])
if diffsamearray[i] >=61 and diffsamearray[i] <62 :
        bin61=bin61+(probdet[i])
if diffsamearray[i] >=62 and diffsamearray[i] <63 :
        bin62=bin62+(probdet[i])
if diffsamearray[i] >=63 and diffsamearray[i] <64 :
        bin63=bin63+(probdet[i])
if diffsamearray[i] >=64 and diffsamearray[i] <65 :
        bin64=bin64+(probdet[i])
if diffsamearray[i] >=65 and diffsamearray[i] <66 :
        bin65=bin65+(probdet[i])
if diffsamearray[i] >=66 and diffsamearray[i] <67 :
        bin66=bin66+(probdet[i])
if diffsamearray[i] >=67 and diffsamearray[i] <68 :
        bin67=bin67+(probdet[i])
if diffsamearray[i] >=68 and diffsamearray[i] <69 :
        bin68=bin68+(probdet[i])
if diffsamearray[i] >=69 and diffsamearray[i] <70 :
        bin69=bin69+(probdet[i])
if diffsamearray[i] >=70 and diffsamearray[i] <71 :
        bin70=bin70+(probdet[i])
if diffsamearray[i] >=71 and diffsamearray[i] <72 :
        bin71=bin71+(probdet[i])
if diffsamearray[i] >=72 and diffsamearray[i] <73 :
        bin72=bin72+(probdet[i])
if diffsamearray[i] >=73 and diffsamearray[i] <74 :
        bin73=bin73+(probdet[i])
if diffsamearray[i] >=74 and diffsamearray[i] <75 :
        bin74=bin74+(probdet[i])
if diffsamearray[i] >=75 and diffsamearray[i] <76 :
        bin75=bin75+(probdet[i])
if diffsamearray[i] >=76 and diffsamearray[i] <77 :
        bin76=bin76+(probdet[i])
if diffsamearray[i] >=77 and diffsamearray[i] <78 :
        bin77=bin77+(probdet[i])
if diffsamearray[i] >=78 and diffsamearray[i] <79 :
        bin78=bin78+(probdet[i])
if diffsamearray[i] >=79 and diffsamearray[i] <80 :
        bin79=bin79+(probdet[i])
if diffsamearray[i] >=80 and diffsamearray[i] <81 :
        bin80=bin80+(probdet[i])
if diffsamearray[i] >=81 and diffsamearray[i] <82 :
        bin81=bin81+(probdet[i])
if diffsamearray[i] >=82 and diffsamearray[i] <83 :
        bin82=bin82+(probdet[i])
if diffsamearray[i] >=83 and diffsamearray[i] <84 :
        bin83=bin83+(probdet[i])
if diffsamearray[i] >=84 and diffsamearray[i] <85 :
        bin84=bin84+(probdet[i])
if diffsamearray[i] >=85 and diffsamearray[i] <86 :
        bin85=bin85+(probdet[i])
if diffsamearray[i] >=86 and diffsamearray[i] <87 :
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        bin86=bin86+(probdet[i])
if diffsamearray[i] >=87 and diffsamearray[i] <88 :
        bin87=bin87+(probdet[i])
if diffsamearray[i] >=88 and diffsamearray[i] <89 :
        bin88=bin88+(probdet[i])
if diffsamearray[i] >=89 and diffsamearray[i] <90 :
        bin89=bin89+(probdet[i])
if diffsamearray[i] >=90 and diffsamearray[i] <91 :
        bin90=bin90+(probdet[i])
if diffsamearray[i] >=91 and diffsamearray[i] <92 :
        bin91=bin91+(probdet[i])
if diffsamearray[i] >=92 and diffsamearray[i] <93 :
        bin92=bin92+(probdet[i])
if diffsamearray[i] >=93 and diffsamearray[i] <94 :
        bin93=bin93+(probdet[i])
if diffsamearray[i] >=94 and diffsamearray[i] <95 :
        bin94=bin94+(probdet[i])
if diffsamearray[i] >=95 and diffsamearray[i] <96 :
        bin95=bin95+(probdet[i])
if diffsamearray[i] >=96 and diffsamearray[i] <97 :
        bin96=bin96+(probdet[i])
if diffsamearray[i] >=97 and diffsamearray[i] <98 :
        bin97=bin97+(probdet[i])
if diffsamearray[i] >=98 and diffsamearray[i] <99 :
        bin98=bin98+(probdet[i])
if diffsamearray[i] >=99 and diffsamearray[i] <100 :
        bin99=bin99+(probdet[i])
if diffsamearray[i] >=100 and diffsamearray[i] <101 :
        bin100=bin100+(probdet[i])
if diffsamearray[i] >=101 and diffsamearray[i] <102 :
        bin101=bin101+(probdet[i])
if diffsamearray[i] >=102 and diffsamearray[i] <103 :
        bin102=bin102+(probdet[i])
if diffsamearray[i] >=103 and diffsamearray[i] <104 :
        bin103=bin103+(probdet[i])
if diffsamearray[i] >=104 and diffsamearray[i] <105 :
        bin104=bin104+(probdet[i])
if diffsamearray[i] >=105 and diffsamearray[i] <106 :
        bin105=bin105+(probdet[i])
if diffsamearray[i] >=106 and diffsamearray[i] <107 :
        bin106=bin106+(probdet[i])
if diffsamearray[i] >=107 and diffsamearray[i] <108 :
        bin107=bin107+(probdet[i])
if diffsamearray[i] >=108 and diffsamearray[i] <109 :
        bin108=bin108+(probdet[i])
if diffsamearray[i] >=109 and diffsamearray[i] <110 :
        bin109=bin109+(probdet[i])
if diffsamearray[i] >=110 and diffsamearray[i] <111 :
        bin110=bin110+(probdet[i])
if diffsamearray[i] >=111 and diffsamearray[i] <112 :
        bin111=bin111+(probdet[i])
if diffsamearray[i] >=112 and diffsamearray[i] <113 :
        bin112=bin112+(probdet[i])
if diffsamearray[i] >=113 and diffsamearray[i] <114 :
        bin113=bin113+(probdet[i])
if diffsamearray[i] >=114 and diffsamearray[i] <115 :
        bin114=bin114+(probdet[i])
if diffsamearray[i] >=115 and diffsamearray[i] <116 :
        bin115=bin115+(probdet[i])
if diffsamearray[i] >=116 and diffsamearray[i] <117 :
        bin116=bin116+(probdet[i])
if diffsamearray[i] >=117 and diffsamearray[i] <118 :
        bin117=bin117+(probdet[i])
if diffsamearray[i] >=118 and diffsamearray[i] <119 :
        bin118=bin118+(probdet[i])
if diffsamearray[i] >=119 and diffsamearray[i] <120 :
        bin119=bin119+(probdet[i])
if diffsamearray[i] >=120 and diffsamearray[i] <121 :
        bin120=bin120+(probdet[i])
if diffsamearray[i] >=121 and diffsamearray[i] <122 :
        bin121=bin121+(probdet[i])
if diffsamearray[i] >=122 and diffsamearray[i] <123 :
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        bin122=bin122+(probdet[i])
if diffsamearray[i] >=123 and diffsamearray[i] <124 :
        bin123=bin123+(probdet[i])
if diffsamearray[i] >=124 and diffsamearray[i] <125 :
        bin124=bin124+(probdet[i])
if diffsamearray[i] >=125 and diffsamearray[i] <126 :
        bin125=bin125+(probdet[i])
if diffsamearray[i] >=126 and diffsamearray[i] <127 :
        bin126=bin126+(probdet[i])
if diffsamearray[i] >=127 and diffsamearray[i] <128 :
        bin127=bin127+(probdet[i])
if diffsamearray[i] >=128 and diffsamearray[i] <129 :
        bin128=bin128+(probdet[i])
if diffsamearray[i] >=129 and diffsamearray[i] <130 :
        bin129=bin129+(probdet[i])
if diffsamearray[i] >=130 and diffsamearray[i] <131 :
        bin130=bin130+(probdet[i])
if diffsamearray[i] >=131 and diffsamearray[i] <132 :
        bin131=bin131+(probdet[i])
if diffsamearray[i] >=132 and diffsamearray[i] <133 :
        bin132=bin132+(probdet[i])
if diffsamearray[i] >=133 and diffsamearray[i] <134 :
        bin133=bin133+(probdet[i])
if diffsamearray[i] >=134 and diffsamearray[i] <135 :
        bin134=bin134+(probdet[i])
if diffsamearray[i] >=135 and diffsamearray[i] <136 :
        bin135=bin135+(probdet[i])
if diffsamearray[i] >=136 and diffsamearray[i] <137 :
        bin136=bin136+(probdet[i])
if diffsamearray[i] >=137 and diffsamearray[i] <138 :
        bin137=bin137+(probdet[i])
if diffsamearray[i] >=138 and diffsamearray[i] <139 :
        bin138=bin138+(probdet[i])
if diffsamearray[i] >=139 and diffsamearray[i] <140 :
        bin139=bin139+(probdet[i])
if diffsamearray[i] >=140 and diffsamearray[i] <141 :
        bin140=bin140+(probdet[i])
if diffsamearray[i] >=141 and diffsamearray[i] <142 :
        bin141=bin141+(probdet[i])
if diffsamearray[i] >=142 and diffsamearray[i] <143 :
        bin142=bin142+(probdet[i])
if diffsamearray[i] >=143 and diffsamearray[i] <144 :
        bin143=bin143+(probdet[i])
if diffsamearray[i] >=144 and diffsamearray[i] <145 :
        bin144=bin144+(probdet[i])
if diffsamearray[i] >=145 and diffsamearray[i] <146 :
        bin145=bin145+(probdet[i])
if diffsamearray[i] >=146 and diffsamearray[i] <147 :
        bin146=bin146+(probdet[i])
if diffsamearray[i] >=147 and diffsamearray[i] <148 :
        bin147=bin147+(probdet[i])
if diffsamearray[i] >=148 and diffsamearray[i] <149 :
        bin148=bin148+(probdet[i])
if diffsamearray[i] >=149 and diffsamearray[i] <150 :
        bin149=bin149+(probdet[i])
if diffsamearray[i] >=150 and diffsamearray[i] <151 :
        bin150=bin150+(probdet[i])
if diffsamearray[i] >=151 and diffsamearray[i] <152 :
        bin151=bin151+(probdet[i])
if diffsamearray[i] >=152 and diffsamearray[i] <153 :
        bin152=bin152+(probdet[i])
if diffsamearray[i] >=153 and diffsamearray[i] <154 :
        bin153=bin153+(probdet[i])
if diffsamearray[i] >=154 and diffsamearray[i] <155 :
        bin154=bin154+(probdet[i])
if diffsamearray[i] >=155 and diffsamearray[i] <156 :
        bin155=bin155+(probdet[i])
if diffsamearray[i] >=156 and diffsamearray[i] <157 :
        bin156=bin156+(probdet[i])
if diffsamearray[i] >=157 and diffsamearray[i] <158 :
        bin157=bin157+(probdet[i])
if diffsamearray[i] >=158 and diffsamearray[i] <159 :
```

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        bin158=bin158+(probdet[i])
if diffsamearray[i] >=159 and diffsamearray[i] <160 :
        bin159=bin159+(probdet[i])
if diffsamearray[i] >=160 and diffsamearray[i] <161 :
        bin160=bin160+(probdet[i])
if diffsamearray[i] >=161 and diffsamearray[i] <162 :
        bin161=bin161+(probdet[i])
if diffsamearray[i] >=162 and diffsamearray[i] <163 :
        bin162=bin162+(probdet[i])
if diffsamearray[i] >=163 and diffsamearray[i] <164 :
        bin163=bin163+(probdet[i])
if diffsamearray[i] >=164 and diffsamearray[i] <165 :
        bin164=bin164+(probdet[i])
if diffsamearray[i] >=165 and diffsamearray[i] <166 :
        bin165=bin165+(probdet[i])
if diffsamearray[i] >=166 and diffsamearray[i] <167 :
        bin166=bin166+(probdet[i])
if diffsamearray[i] >=167 and diffsamearray[i] <168 :
        bin167=bin167+(probdet[i])
if diffsamearray[i] >=168 and diffsamearray[i] <169 :
        bin168=bin168+(probdet[i])
if diffsamearray[i] >=169 and diffsamearray[i] <170 :
        bin169=bin169+(probdet[i])
if diffsamearray[i] >=170 and diffsamearray[i] <171 :
        bin170=bin170+(probdet[i])
if diffsamearray[i] >=171 and diffsamearray[i] <172 :
        bin171=bin171+(probdet[i])
if diffsamearray[i] >=172 and diffsamearray[i] <173 :
        bin172=bin172+(probdet[i])
if diffsamearray[i] >=173 and diffsamearray[i] <174 :
        bin173=bin173+(probdet[i])
if diffsamearray[i] >=174 and diffsamearray[i] <175 :
        bin174=bin174+(probdet[i])
if diffsamearray[i] >=175 and diffsamearray[i] <176 :
        bin175=bin175+(probdet[i])
if diffsamearray[i] >=176 and diffsamearray[i] <177 :
        bin176=bin176+(probdet[i])
if diffsamearray[i] >=177 and diffsamearray[i] <178 :
        bin177=bin177+(probdet[i])
if diffsamearray[i] >=178 and diffsamearray[i] <179 :
        bin178=bin178+(probdet[i])
if diffsamearray[i] >=179 and diffsamearray[i] <180 :
        bin179=bin179+(probdet[i])
if diffsamearray[i] >=180 and diffsamearray[i] <181 :
        bin180=bin180+(probdet[i])
if diffsamearray[i] >=181 and diffsamearray[i] <182 :
        bin181=bin181+(probdet[i])
if diffsamearray[i] >=182 and diffsamearray[i] <183 :
        bin182=bin182+(probdet[i])
if diffsamearray[i] >=183 and diffsamearray[i] <184 :
        bin183=bin183+(probdet[i])
if diffsamearray[i] >=184 and diffsamearray[i] <185 :
        bin184=bin184+(probdet[i])
if diffsamearray[i] >=185 and diffsamearray[i] <186 :
        bin185=bin185+(probdet[i])
if diffsamearray[i] >=186 and diffsamearray[i] <187 :
        bin186=bin186+(probdet[i])
if diffsamearray[i] >=187 and diffsamearray[i] <188 :
        bin187=bin187+(probdet[i])
if diffsamearray[i] >=188 and diffsamearray[i] <189 :
        bin188=bin188+(probdet[i])
if diffsamearray[i] >=189 and diffsamearray[i] <180 :
        bin189=bin189+(probdet[i])
if diffsamearray[i] >=190 and diffsamearray[i] <191 :
        bin190=bin190+(probdet[i])
if diffsamearray[i] >=191 and diffsamearray[i] <192 :
        bin191=bin191+(probdet[i])
if diffsamearray[i] >=192 and diffsamearray[i] <193 :
        bin192=bin192+(probdet[i])
if diffsamearray[i] >=193 and diffsamearray[i] <194 :
        bin193=bin193+(probdet[i])
if diffsamearray[i] >=194 and diffsamearray[i] <195 :
```

```
        bin194=bin194+(probdet[i])
if diffsamearray[i] >=195 and diffsamearray[i] <196 :
        bin195=bin195+(probdet[i])
if diffsamearray[i] >=196 and diffsamearray[i] <197 :
        bin196=bin196+(probdet[i])
if diffsamearray[i] >=197 and diffsamearray[i] <198 :
        bin197=bin197+(probdet[i])
if diffsamearray[i] >=198 and diffsamearray[i] <199 :
        bin198=bin198+(probdet[i])
if diffsamearray[i] >=199 and diffsamearray[i] <200 :
        bin199=bin199+(probdet[i])
if diffsamearray[i] >=200 and diffsamearray[i] <201 :
        bin200=bin200+(probdet[i])
if diffsamearray[i] >=201 and diffsamearray[i] <202 :
        bin201=bin201+(probdet[i])
if diffsamearray[i] >=202 and diffsamearray[i] <203 :
        bin202=bin202+(probdet[i])
if diffsamearray[i] >=203 and diffsamearray[i] <204 :
        bin203=bin203+(probdet[i])
if diffsamearray[i] >=204 and diffsamearray[i] <205 :
        bin204=bin204+(probdet[i])
if diffsamearray[i] >=205 and diffsamearray[i] <206 :
        bin205=bin205+(probdet[i])
if diffsamearray[i] >=206 and diffsamearray[i] <207 :
        bin206=bin206+(probdet[i])
if diffsamearray[i] >=207 and diffsamearray[i] <208 :
        bin207=bin207+(probdet[i])
if diffsamearray[i] >=208 and diffsamearray[i] <209 :
        bin208=bin208+(probdet[i])
if diffsamearray[i] >=209 and diffsamearray[i] <210 :
        bin209=bin209+(probdet[i])
if diffsamearray[i] >=210 and diffsamearray[i] <211 :
        bin210=bin210+(probdet[i])
if diffsamearray[i] >=211 and diffsamearray[i] <212 :
        bin211=bin211+(probdet[i])
if diffsamearray[i] >=212 and diffsamearray[i] <213 :
        bin212=bin212+(probdet[i])
if diffsamearray[i] >=213 and diffsamearray[i] <214 :
        bin213=bin213+(probdet[i])
if diffsamearray[i] >=214 and diffsamearray[i] <215 :
        bin214=bin214+(probdet[i])
if diffsamearray[i] >=215 and diffsamearray[i] <216 :
        bin215=bin215+(probdet[i])
if diffsamearray[i] >=216 and diffsamearray[i] <217 :
        bin216=bin216+(probdet[i])
if diffsamearray[i] >=217 and diffsamearray[i] <218 :
        bin217=bin217+(probdet[i])
if diffsamearray[i] >=218 and diffsamearray[i] <219 :
        bin218=bin218+(probdet[i])
if diffsamearray[i] >=219 and diffsamearray[i] <220 :
        bin219=bin219+(probdet[i])
if diffsamearray[i] >=220 and diffsamearray[i] <221 :
        bin220=bin220+(probdet[i])
if diffsamearray[i] >=221 and diffsamearray[i] <222 :
        bin221=bin221+(probdet[i])
if diffsamearray[i] >=222 and diffsamearray[i] <223 :
        bin222=bin222+(probdet[i])
if diffsamearray[i] >=223 and diffsamearray[i] <224 :
        bin223=bin223+(probdet[i])
if diffsamearray[i] >=224 and diffsamearray[i] <225 :
        bin224=bin224+(probdet[i])
if diffsamearray[i] >=225 and diffsamearray[i] <226 :
        bin225=bin225+(probdet[i])
if diffsamearray[i] >=226 and diffsamearray[i] <227 :
        bin226=bin226+(probdet[i])
if diffsamearray[i] >=227 and diffsamearray[i] <228 :
        bin227=bin227+(probdet[i])
if diffsamearray[i] >=228 and diffsamearray[i] <229 :
        bin228=bin228+(probdet[i])
if diffsamearray[i] >=229 and diffsamearray[i] <230 :
        bin229=bin229+(probdet[i])
if diffsamearray[i] >=230 and diffsamearray[i] <231 :
```

```
        bin230=bin230+(probdet[i])
if diffsamearray[i] >=231 and diffsamearray[i] <232 :
        bin231=bin231+(probdet[i])
if diffsamearray[i] >=232 and diffsamearray[i] <233 :
        bin232=bin232+(probdet[i])
if diffsamearray[i] >=233 and diffsamearray[i] <234 :
        bin233=bin233+(probdet[i])
if diffsamearray[i] >=234 and diffsamearray[i] <235 :
        bin234=bin234+(probdet[i])
if diffsamearray[i] >=235 and diffsamearray[i] <236 :
        bin235=bin235+(probdet[i])
if diffsamearray[i] >=236 and diffsamearray[i] <237 :
        bin236=bin236+(probdet[i])
if diffsamearray[i] >=237 and diffsamearray[i] <238 :
        bin237=bin237+(probdet[i])
if diffsamearray[i] >=238 and diffsamearray[i] <239 :
        bin238=bin238+(probdet[i])
if diffsamearray[i] >=239 and diffsamearray[i] <240 :
        bin239=bin239+(probdet[i])
if diffsamearray[i] >=240 and diffsamearray[i] <241 :
        bin240=bin240+(probdet[i])
if diffsamearray[i] >=241 and diffsamearray[i] <242 :
        bin241=bin241+(probdet[i])
if diffsamearray[i] >=242 and diffsamearray[i] <243 :
        bin242=bin242+(probdet[i])
if diffsamearray[i] >=243 and diffsamearray[i] <244 :
        bin243=bin243+(probdet[i])
if diffsamearray[i] >=244 and diffsamearray[i] <245 :
        bin244=bin244+(probdet[i])
if diffsamearray[i] >=245 and diffsamearray[i] <246 :
        bin245=bin245+(probdet[i])
if diffsamearray[i] >=246 and diffsamearray[i] <247 :
        bin246=bin246+(probdet[i])
if diffsamearray[i] >=247 and diffsamearray[i] <248 :
        bin247=bin247+(probdet[i])
if diffsamearray[i] >=248 and diffsamearray[i] <249 :
        bin248=bin248+(probdet[i])
if diffsamearray[i] >=249 and diffsamearray[i] <250 :
        bin249=bin249+(probdet[i])
if diffsamearray[i] >=250 and diffsamearray[i] <251 :
        bin250=bin250+(probdet[i])
if diffsamearray[i] >=251 and diffsamearray[i] <252 :
        bin251=bin251+(probdet[i])
if diffsamearray[i] >=252 and diffsamearray[i] <253 :
        bin252=bin252+(probdet[i])
if diffsamearray[i] >=253 and diffsamearray[i] <254 :
        bin253=bin253+(probdet[i])
if diffsamearray[i] >=254 and diffsamearray[i] <255 :
        bin254=bin254+(probdet[i])
if diffsamearray[i] >=255 and diffsamearray[i] <256 :
        bin255=bin255+(probdet[i])
if diffsamearray[i] >=256 and diffsamearray[i] <257 :
        bin256=bin256+(probdet[i])
if diffsamearray[i] >=257 and diffsamearray[i] <258 :
        bin257=bin257+(probdet[i])
if diffsamearray[i] >=258 and diffsamearray[i] <259 :
        bin258=bin258+(probdet[i])
if diffsamearray[i] >=259 and diffsamearray[i] <260 :
        bin259=bin259+(probdet[i])
if diffsamearray[i] >=260 and diffsamearray[i] <261 :
        bin260=bin260+(probdet[i])
if diffsamearray[i] >=261 and diffsamearray[i] <262 :
        bin261=bin261+(probdet[i])
if diffsamearray[i] >=262 and diffsamearray[i] <263 :
        bin262=bin262+(probdet[i])
if diffsamearray[i] >=263 and diffsamearray[i] <264 :
        bin263=bin263+(probdet[i])
if diffsamearray[i] >=264 and diffsamearray[i] <265 :
        bin264=bin264+(probdet[i])
if diffsamearray[i] >=265 and diffsamearray[i] <266 :
        bin265=bin265+(probdet[i])
if diffsamearray[i] >=266 and diffsamearray[i] <267 :
```

```
        bin266=bin266+(probdet[i])
if diffsamearray[i] >=267 and diffsamearray[i] <268 :
        bin267=bin267+(probdet[i])
if diffsamearray[i] >=268 and diffsamearray[i] <269 :
        bin268=bin268+(probdet[i])
if diffsamearray[i] >=269 and diffsamearray[i] <270 :
        bin269=bin269+(probdet[i])
if diffsamearray[i] >=270 and diffsamearray[i] <271 :
        bin270=bin270+(probdet[i])
if diffsamearray[i] >=271 and diffsamearray[i] <272 :
        bin271=bin271+(probdet[i])
if diffsamearray[i] >=272 and diffsamearray[i] <273 :
        bin272=bin272+(probdet[i])
if diffsamearray[i] >=273 and diffsamearray[i] <274 :
        bin273=bin273+(probdet[i])
if diffsamearray[i] >=274 and diffsamearray[i] <275 :
        bin274=bin274+(probdet[i])
if diffsamearray[i] >=275 and diffsamearray[i] <276 :
        bin275=bin275+(probdet[i])
if diffsamearray[i] >=276 and diffsamearray[i] <277 :
        bin276=bin276+(probdet[i])
if diffsamearray[i] >=277 and diffsamearray[i] <278 :
        bin277=bin277+(probdet[i])
if diffsamearray[i] >=278 and diffsamearray[i] <279 :
        bin278=bin278+(probdet[i])
if diffsamearray[i] >=279 and diffsamearray[i] <280 :
        bin279=bin279+(probdet[i])
if diffsamearray[i] >=280 and diffsamearray[i] <281 :
        bin280=bin280+(probdet[i])
if diffsamearray[i] >=281 and diffsamearray[i] <282 :
        bin281=bin281+(probdet[i])
if diffsamearray[i] >=282 and diffsamearray[i] <283 :
        bin282=bin282+(probdet[i])
if diffsamearray[i] >=283 and diffsamearray[i] <284 :
        bin283=bin283+(probdet[i])
if diffsamearray[i] >=284 and diffsamearray[i] <285 :
        bin284=bin284+(probdet[i])
if diffsamearray[i] >=285 and diffsamearray[i] <286 :
        bin285=bin285+(probdet[i])
if diffsamearray[i] >=286 and diffsamearray[i] <287 :
        bin286=bin286+(probdet[i])
if diffsamearray[i] >=287 and diffsamearray[i] <288 :
        bin287=bin287+(probdet[i])
if diffsamearray[i] >=288 and diffsamearray[i] <289 :
        bin288=bin288+(probdet[i])
if diffsamearray[i] >=289 and diffsamearray[i] <280 :
        bin289=bin289+(probdet[i])
if diffsamearray[i] >=290 and diffsamearray[i] <291 :
        bin290=bin290+(probdet[i])
if diffsamearray[i] >=291 and diffsamearray[i] <292 :
        bin291=bin291+(probdet[i])
if diffsamearray[i] >=292 and diffsamearray[i] <293 :
        bin292=bin292+(probdet[i])
if diffsamearray[i] >=293 and diffsamearray[i] <294 :
        bin293=bin293+(probdet[i])
if diffsamearray[i] >=294 and diffsamearray[i] <295 :
        bin294=bin294+(probdet[i])
if diffsamearray[i] >=295 and diffsamearray[i] <296 :
        bin295=bin295+(probdet[i])
if diffsamearray[i] >=296 and diffsamearray[i] <297 :
        bin296=bin296+(probdet[i])
if diffsamearray[i] >=297 and diffsamearray[i] <298 :
        bin297=bin297+(probdet[i])
if diffsamearray[i] >=298 and diffsamearray[i] <299 :
        bin298=bin298+(probdet[i])
if diffsamearray[i] >=299 and diffsamearray[i] <300 :
        bin299=bin299+(probdet[i])
if diffsamearray[i] >=300 and diffsamearray[i] <301 :
        bin300=bin300+(probdet[i])
if diffsamearray[i] >=301 and diffsamearray[i] <302 :
        bin301=bin301+(probdet[i])
if diffsamearray[i] >=302 and diffsamearray[i] <303 :
```

```
            bin302=bin302+(probdet[i])
if diffsamearray[i] >=303 and diffsamearray[i] <304 :
            bin303=bin303+(probdet[i])
if diffsamearray[i] >=304 and diffsamearray[i] <305 :
            bin304=bin304+(probdet[i])
if diffsamearray[i] >=305 and diffsamearray[i] <306 :
            bin305=bin305+(probdet[i])
if diffsamearray[i] >=306 and diffsamearray[i] <307 :
            bin306=bin306+(probdet[i])
if diffsamearray[i] >=307 and diffsamearray[i] <308 :
            bin307=bin307+(probdet[i])
if diffsamearray[i] >=308 and diffsamearray[i] <309 :
            bin308=bin308+(probdet[i])
if diffsamearray[i] >=309 and diffsamearray[i] <310 :
            bin309=bin309+(probdet[i])
if diffsamearray[i] >=310 and diffsamearray[i] <311 :
            bin310=bin310+(probdet[i])
if diffsamearray[i] >=311 and diffsamearray[i] <312 :
            bin311=bin311+(probdet[i])
if diffsamearray[i] >=312 and diffsamearray[i] <313 :
            bin312=bin312+(probdet[i])
if diffsamearray[i] >=313 and diffsamearray[i] <314 :
            bin313=bin313+(probdet[i])
if diffsamearray[i] >=314 and diffsamearray[i] <315 :
            bin314=bin314+(probdet[i])
if diffsamearray[i] >=315 and diffsamearray[i] <316 :
            bin315=bin315+(probdet[i])
if diffsamearray[i] >=316 and diffsamearray[i] <317 :
            bin316=bin316+(probdet[i])
if diffsamearray[i] >=317 and diffsamearray[i] <318 :
            bin317=bin317+(probdet[i])
if diffsamearray[i] >=318 and diffsamearray[i] <319 :
            bin318=bin318+(probdet[i])
if diffsamearray[i] >=319 and diffsamearray[i] <320 :
            bin319=bin319+(probdet[i])
if diffsamearray[i] >=320 and diffsamearray[i] <321 :
            bin320=bin320+(probdet[i])
if diffsamearray[i] >=321 and diffsamearray[i] <322 :
            bin321=bin321+(probdet[i])
if diffsamearray[i] >=322 and diffsamearray[i] <323 :
            bin322=bin322+(probdet[i])
if diffsamearray[i] >=323 and diffsamearray[i] <324 :
            bin323=bin323+(probdet[i])
if diffsamearray[i] >=324 and diffsamearray[i] <325 :
            bin324=bin324+(probdet[i])
if diffsamearray[i] >=325 and diffsamearray[i] <326 :
            bin325=bin325+(probdet[i])
if diffsamearray[i] >=326 and diffsamearray[i] <327 :
            bin326=bin326+(probdet[i])
if diffsamearray[i] >=327 and diffsamearray[i] <328 :
            bin327=bin327+(probdet[i])
if diffsamearray[i] >=328 and diffsamearray[i] <329 :
            bin328=bin328+(probdet[i])
if diffsamearray[i] >=329 and diffsamearray[i] <330 :
            bin329=bin329+(probdet[i])
if diffsamearray[i] >=330 and diffsamearray[i] <331 :
            bin330=bin330+(probdet[i])
if diffsamearray[i] >=331 and diffsamearray[i] <332 :
            bin331=bin331+(probdet[i])
if diffsamearray[i] >=332 and diffsamearray[i] <333 :
            bin332=bin332+(probdet[i])
if diffsamearray[i] >=333 and diffsamearray[i] <334 :
            bin333=bin333+(probdet[i])
if diffsamearray[i] >=334 and diffsamearray[i] <335 :
            bin334=bin334+(probdet[i])
if diffsamearray[i] >=335 and diffsamearray[i] <336 :
            bin335=bin335+(probdet[i])
if diffsamearray[i] >=336 and diffsamearray[i] <337 :
            bin336=bin336+(probdet[i])
if diffsamearray[i] >=337 and diffsamearray[i] <338 :
            bin337=bin337+(probdet[i])
if diffsamearray[i] >=338 and diffsamearray[i] <339 :
```

```
            bin338=bin338+(probdet[i])
        if diffsamearray[i] >=339 and diffsamearray[i] <340 :
            bin339=bin339+(probdet[i])
        if diffsamearray[i] >=340 and diffsamearray[i] <341 :
            bin340=bin340+(probdet[i])
        if diffsamearray[i] >=341 and diffsamearray[i] <342 :
            bin341=bin341+(probdet[i])
        if diffsamearray[i] >=342 and diffsamearray[i] <343 :
            bin342=bin342+(probdet[i])
        if diffsamearray[i] >=343 and diffsamearray[i] <344 :
            bin343=bin343+(probdet[i])
        if diffsamearray[i] >=344 and diffsamearray[i] <345 :
            bin344=bin344+(probdet[i])
        if diffsamearray[i] >=345 and diffsamearray[i] <346 :
            bin345=bin345+(probdet[i])
        if diffsamearray[i] >=346 and diffsamearray[i] <347 :
            bin346=bin346+(probdet[i])
        if diffsamearray[i] >=347 and diffsamearray[i] <348 :
            bin347=bin347+(probdet[i])
        if diffsamearray[i] >=348 and diffsamearray[i] <349 :
            bin348=bin348+(probdet[i])
        if diffsamearray[i] >=349 and diffsamearray[i] <350 :
            bin349=bin349+(probdet[i])
        if diffsamearray[i] >=350 and diffsamearray[i] <351 :
            bin350=bin350+(probdet[i])
        if diffsamearray[i] >=351 and diffsamearray[i] <352 :
            bin351=bin351+(probdet[i])
        if diffsamearray[i] >=352 and diffsamearray[i] <353 :
            bin352=bin352+(probdet[i])
        if diffsamearray[i] >=353 and diffsamearray[i] <354 :
            bin353=bin353+(probdet[i])
        if diffsamearray[i] >=354 and diffsamearray[i] <355 :
            bin354=bin354+(probdet[i])
        if diffsamearray[i] >=355 and diffsamearray[i] <356 :
            bin355=bin355+(probdet[i])
        if diffsamearray[i] >=356 and diffsamearray[i] <357 :
            bin356=bin356+(probdet[i])
        if diffsamearray[i] >=357 and diffsamearray[i] <358 :
            bin357=bin357+(probdet[i])
        if diffsamearray[i] >=358 and diffsamearray[i] <359 :
            bin358=bin358+(probdet[i])
        if diffsamearray[i] >=359 and diffsamearray[i] <360 :
            bin359=bin359+(probdet[i])
        if diffsamearray[i] >=360 and diffsamearray[i] <361 :
            bin360=bin360+(probdet[i])
count=count+1
angbins=open("angbins.txt","a")
angbins.write('\n'+str(bin0))
angbins.write('\n'+str(bin1))
angbins.write('\n'+str(bin2))
angbins.write('\n'+str(bin3))
angbins.write('\n'+str(bin4))
angbins.write('\n'+str(bin5))
angbins.write('\n'+str(bin6))
angbins.write('\n'+str(bin7))
angbins.write('\n'+str(bin8))
angbins.write('\n'+str(bin9))
angbins.write('\n'+str(bin10))
angbins.write('\n'+str(bin11))
angbins.write('\n'+str(bin12))
angbins.write('\n'+str(bin13))
angbins.write('\n'+str(bin14))
angbins.write('\n'+str(bin15))
angbins.write('\n'+str(bin16))
angbins.write('\n'+str(bin17))
angbins.write('\n'+str(bin18))
angbins.write('\n'+str(bin19))
angbins.write('\n'+str(bin20))
angbins.write('\n'+str(bin21))
angbins.write('\n'+str(bin22))
angbins.write('\n'+str(bin23))
angbins.write('\n'+str(bin24))
```

```
angbins.write('\n'+str(bin25))
angbins.write('\n'+str(bin26))
angbins.write('\n'+str(bin27))
angbins.write('\n'+str(bin28))
angbins.write('\n'+str(bin29))
angbins.write('\n'+str(bin30))
angbins.write('\n'+str(bin79))
angbins.write('\n'+str(bin80))
angbins.write('\n'+str(bin81))
angbins.write('\n'+str(bin82))
angbins.write('\n'+str(bin83))
angbins.write('\n'+str(bin84))
angbins.write('\n'+str(bin85))
angbins.write('\n'+str(bin86))
angbins.write('\n'+str(bin87))
angbins.write('\n'+str(bin88))
angbins.write('\n'+str(bin89))
angbins.write('\n'+str(bin90))
angbins.write('\n'+str(bin91))
angbins.write('\n'+str(bin92))
angbins.write('\n'+str(bin93))
angbins.write('\n'+str(bin94))
angbins.write('\n'+str(bin95))
angbins.write('\n'+str(bin96))
angbins.write('\n'+str(bin97))
angbins.write('\n'+str(bin98))
angbins.write('\n'+str(bin99))
angbins.write('\n'+str(bin100))
angbins.write('\n'+str(bin101))
angbins.write('\n'+str(bin102))
angbins.write('\n'+str(bin103))
angbins.write('\n'+str(bin104))
angbins.write('\n'+str(bin105))
angbins.write('\n'+str(bin106))
angbins.write('\n'+str(bin107))
angbins.write('\n'+str(bin108))
angbins.write('\n'+str(bin109))
angbins.write('\n'+str(bin110))
angbins.write('\n'+str(bin111))
angbins.write('\n'+str(bin112))
angbins.write('\n'+str(bin113))
angbins.write('\n'+str(bin114))
angbins.write('\n'+str(bin115))
angbins.write('\n'+str(bin116))
angbins.write('\n'+str(bin117))
angbins.write('\n'+str(bin118))
angbins.write('\n'+str(bin119))
angbins.write('\n'+str(bin120))
angbins.write('\n'+str(bin121))
angbins.write('\n'+str(bin122))
angbins.write('\n'+str(bin123))
angbins.write('\n'+str(bin124))
angbins.write('\n'+str(bin125))
angbins.write('\n'+str(bin126))
angbins.write('\n'+str(bin127))
angbins.write('\n'+str(bin128))
angbins.write('\n'+str(bin129))
angbins.write('\n'+str(bin130))
angbins.write('\n'+str(bin131))
angbins.write('\n'+str(bin132))
angbins.write('\n'+str(bin133))
angbins.write('\n'+str(bin134))
angbins.write('\n'+str(bin135))
angbins.write('\n'+str(bin136))
angbins.write('\n'+str(bin137))
angbins.write('\n'+str(bin138))
angbins.write('\n'+str(bin139))
angbins.write('\n'+str(bin140))
angbins.write('\n'+str(bin141))
angbins.write('\n'+str(bin142))
angbins.write('\n'+str(bin143))
angbins.write('\n'+str(bin144))
```

```
angbins.write('\n'+str(bin145))
angbins.write('\n'+str(bin146))
angbins.write('\n'+str(bin147))
angbins.write('\n'+str(bin148))
angbins.write('\n'+str(bin149))
angbins.write('\n'+str(bin150))
angbins.write('\n'+str(bin151))
angbins.write('\n'+str(bin152))
angbins.write('\n'+str(bin153))
angbins.write('\n'+str(bin154))
angbins.write('\n'+str(bin155))
angbins.write('\n'+str(bin156))
angbins.write('\n'+str(bin157))
angbins.write('\n'+str(bin158))
angbins.write('\n'+str(bin159))
angbins.write('\n'+str(bin160))
angbins.write('\n'+str(bin161))
angbins.write('\n'+str(bin162))
angbins.write('\n'+str(bin163))
angbins.write('\n'+str(bin164))
angbins.write('\n'+str(bin165))
angbins.write('\n'+str(bin166))
angbins.write('\n'+str(bin167))
angbins.write('\n'+str(bin168))
angbins.write('\n'+str(bin169))
angbins.write('\n'+str(bin170))
angbins.write('\n'+str(bin171))
angbins.write('\n'+str(bin172))
angbins.write('\n'+str(bin173))
angbins.write('\n'+str(bin174))
angbins.write('\n'+str(bin175))
angbins.write('\n'+str(bin176))
angbins.write('\n'+str(bin177))
angbins.write('\n'+str(bin178))
angbins.write('\n'+str(bin179))
angbins.write('\n'+str(bin180))
angbins.write('\n'+str(bin181))
angbins.write('\n'+str(bin182))
angbins.write('\n'+str(bin183))
angbins.write('\n'+str(bin184))
angbins.write('\n'+str(bin185))
angbins.write('\n'+str(bin186))
angbins.write('\n'+str(bin187))
angbins.write('\n'+str(bin188))
angbins.write('\n'+str(bin189))
angbins.write('\n'+str(bin190))
angbins.write('\n'+str(bin191))
angbins.write('\n'+str(bin192))
angbins.write('\n'+str(bin193))
angbins.write('\n'+str(bin194))
angbins.write('\n'+str(bin195))
angbins.write('\n'+str(bin196))
angbins.write('\n'+str(bin197))
angbins.write('\n'+str(bin198))
angbins.write('\n'+str(bin199))
angbins.write('\n'+str(bin200))
angbins.write('\n'+str(bin201))
angbins.write('\n'+str(bin202))
angbins.write('\n'+str(bin203))
angbins.write('\n'+str(bin204))
angbins.write('\n'+str(bin205))
angbins.write('\n'+str(bin206))
angbins.write('\n'+str(bin207))
angbins.write('\n'+str(bin208))
angbins.write('\n'+str(bin209))
angbins.write('\n'+str(bin210))
angbins.write('\n'+str(bin211))
angbins.write('\n'+str(bin212))
angbins.write('\n'+str(bin213))
angbins.write('\n'+str(bin214))
angbins.write('\n'+str(bin215))
angbins.write('\n'+str(bin216))
```

```
angbins.write('\n'+str(bin217))
angbins.write('\n'+str(bin218))
angbins.write('\n'+str(bin219))
angbins.write('\n'+str(bin220))
angbins.write('\n'+str(bin221))
angbins.write('\n'+str(bin222))
angbins.write('\n'+str(bin223))
angbins.write('\n'+str(bin224))
angbins.write('\n'+str(bin225))
angbins.write('\n'+str(bin226))
angbins.write('\n'+str(bin227))
angbins.write('\n'+str(bin228))
angbins.write('\n'+str(bin229))
angbins.write('\n'+str(bin230))
angbins.write('\n'+str(bin231))
angbins.write('\n'+str(bin222))
angbins.write('\n'+str(bin233))
angbins.write('\n'+str(bin234))
angbins.write('\n'+str(bin235))
angbins.write('\n'+str(bin236))
angbins.write('\n'+str(bin237))
angbins.write('\n'+str(bin238))
angbins.write('\n'+str(bin239))
angbins.write('\n'+str(bin240))
angbins.write('\n'+str(bin241))
angbins.write('\n'+str(bin242))
angbins.write('\n'+str(bin243))
angbins.write('\n'+str(bin244))
angbins.write('\n'+str(bin245))
angbins.write('\n'+str(bin246))
angbins.write('\n'+str(bin247))
angbins.write('\n'+str(bin248))
angbins.write('\n'+str(bin249))
angbins.write('\n'+str(bin250))
angbins.write('\n'+str(bin251))
angbins.write('\n'+str(bin252))
angbins.write('\n'+str(bin253))
angbins.write('\n'+str(bin254))
angbins.write('\n'+str(bin255))
angbins.write('\n'+str(bin256))
angbins.write('\n'+str(bin257))
angbins.write('\n'+str(bin258))
angbins.write('\n'+str(bin259))
angbins.write('\n'+str(bin260))
angbins.write('\n'+str(bin261))
angbins.write('\n'+str(bin262))
angbins.write('\n'+str(bin263))
angbins.write('\n'+str(bin264))
angbins.write('\n'+str(bin265))
angbins.write('\n'+str(bin266))
angbins.write('\n'+str(bin267))
angbins.write('\n'+str(bin268))
angbins.write('\n'+str(bin269))
angbins.write('\n'+str(bin270))
angbins.write('\n'+str(bin271))
angbins.write('\n'+str(bin272))
angbins.write('\n'+str(bin273))
angbins.write('\n'+str(bin274))
angbins.write('\n'+str(bin275))
angbins.write('\n'+str(bin276))
angbins.write('\n'+str(bin277))
angbins.write('\n'+str(bin278))
angbins.write('\n'+str(bin279))
angbins.write('\n'+str(bin280))
angbins.write('\n'+str(bin281))
angbins.write('\n'+str(bin282))
angbins.write('\n'+str(bin283))
angbins.write('\n'+str(bin284))
angbins.write('\n'+str(bin285))
angbins.write('\n'+str(bin286))
angbins.write('\n'+str(bin287))
angbins.write('\n'+str(bin288))
```

```
angbins.write('\n'+str(bin289))
angbins.write('\n'+str(bin290))
angbins.write('\n'+str(bin291))
angbins.write('\n'+str(bin292))
angbins.write('\n'+str(bin293))
angbins.write('\n'+str(bin294))
angbins.write('\n'+str(bin295))
angbins.write('\n'+str(bin296))
angbins.write('\n'+str(bin297))
angbins.write('\n'+str(bin298))
angbins.write('\n'+str(bin299))
angbins.write('\n'+str(bin300))
angbins.write('\n'+str(bin301))
angbins.write('\n'+str(bin302))
angbins.write('\n'+str(bin303))
angbins.write('\n'+str(bin304))
angbins.write('\n'+str(bin305))
angbins.write('\n'+str(bin306))
angbins.write('\n'+str(bin307))
angbins.write('\n'+str(bin308))
angbins.write('\n'+str(bin309))
angbins.write('\n'+str(bin310))
angbins.write('\n'+str(bin311))
angbins.write('\n'+str(bin312))
angbins.write('\n'+str(bin313))
angbins.write('\n'+str(bin314))
angbins.write('\n'+str(bin315))
angbins.write('\n'+str(bin316))
angbins.write('\n'+str(bin317))
angbins.write('\n'+str(bin318))
angbins.write('\n'+str(bin319))
angbins.write('\n'+str(bin320))
angbins.write('\n'+str(bin321))
angbins.write('\n'+str(bin322))
angbins.write('\n'+str(bin323))
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angbins.write('\n'+str(bin326))
angbins.write('\n'+str(bin327))
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angbins.write('\n'+str(bin331))
angbins.write('\n'+str(bin332))
angbins.write('\n'+str(bin333))
angbins.write('\n'+str(bin334))
angbins.write('\n'+str(bin335))
angbins.write('\n'+str(bin336))
angbins.write('\n'+str(bin337))
angbins.write('\n'+str(bin338))
angbins.write('\n'+str(bin339))
angbins.write('\n'+str(bin340))
angbins.write('\n'+str(bin341))
angbins.write('\n'+str(bin342))
angbins.write('\n'+str(bin343))
angbins.write('\n'+str(bin344))
angbins.write('\n'+str(bin345))
angbins.write('\n'+str(bin346))
angbins.write('\n'+str(bin347))
angbins.write('\n'+str(bin348))
angbins.write('\n'+str(bin349))
angbins.write('\n'+str(bin350))
angbins.write('\n'+str(bin351))
angbins.write('\n'+str(bin352))
angbins.write('\n'+str(bin353))
angbins.write('\n'+str(bin354))
angbins.write('\n'+str(bin355))
angbins.write('\n'+str(bin356))
angbins.write('\n'+str(bin357))
angbins.write('\n'+str(bin358))
angbins.write('\n'+str(bin359))
angbins.write('\n'+str(bin360))
```

angbins.close()

APPENDIX B

Fission Fragment Distribution from a ^{239}Pu Source Undergoing Induced Fission (Used to Approximate ^{240}Pu Spontaneous Fission Distribution)

This data is size 7 font to conserve space. If you wish to use this data, please copy and paste it from the electronic version of this thesis.

This data is of the form:

    if randomnumber >a and randomnumber <=b:
        m1=mass number of first fragment
        m2=mass number of second fragment
        mass1=mass corresponding to mass number of first fragment
        mass2=mass corresponding to mass number of second fragment

The variable randomnumber is a number between 0 and 1. The interval a and b is specific to the particular fragments that are predicted to come out. The intervals were chosen to reflect the relative probabilities of the fission fragment combinations. This data was originally taken from Ref. 12 and then formatted for code implementation.

```
if randomnumber <=1.07396695716e-18:
    m1=70
    m2=182
    mass1=70.0
    mass2=182.0
if randomnumber >1.07396695716e-18 and randomnumber <=2.08418300926e-12:
    m1=66
    m2=186
    mass1=66.0
    mass2=186.0
if randomnumber >2.08418300926e-12 and randomnumber <=2.51231649327e-12:
    m1=67
    m2=185
    mass1=67.0
    mass2=185.0
if randomnumber >2.51231649327e-12 and randomnumber <=2.60155796739e-12:
    m1=68
    m2=184
    mass1=68.0
    mass2=184.0
if randomnumber >2.60155796739e-12 and randomnumber <=2.61663759515e-12:
    m1=69
    m2=183
    mass1=69.0
    mass2=183.0
if randomnumber >2.61663759515e-12 and randomnumber <=2.61663759515e-12:
    m1=70
```

```
    m2=182
    mass1=70.0
    mass2=182.0
if randomnumber >2.61663759515e-12 and randomnumber <=2.61663759515e-12:
    m1=71
    m2=181
    mass1=71.0
    mass2=181.0
if randomnumber >2.61663759515e-12 and randomnumber <=2.61664272341e-12:
    m1=72
    m2=180
    mass1=72.0
    mass2=180.0
if randomnumber >2.61664272341e-12 and randomnumber <=2.07646441443e-10:
    m1=66
    m2=186
    mass1=66.0
    mass2=186.0
if randomnumber >2.07646441443e-10 and randomnumber <=3.10443754105e-10:
    m1=67
    m2=185
    mass1=67.0
    mass2=185.0
if randomnumber >3.10443754105e-10 and randomnumber <=3.8669421628e-10:
    m1=68
    m2=184
    mass1=68.0
    mass2=184.0
if randomnumber >3.8669421628e-10 and randomnumber <=4.19849142681e-10:
    m1=69
    m2=183
    mass1=69.0
    mass2=183.0
if randomnumber >4.19849142681e-10 and randomnumber <=4.30241839269e-10:
    m1=70
    m2=182
    mass1=70.0
    mass2=182.0
if randomnumber >4.30241839269e-10 and randomnumber <=4.31275460661e-10:
    m1=71
    m2=181
    mass1=71.0
    mass2=181.0
if randomnumber >4.31275460661e-10 and randomnumber <=4.3140423435e-10:
    m1=72
    m2=180
    mass1=72.0
    mass2=180.0
if randomnumber >4.3140423435e-10 and randomnumber <=4.3140423435e-10:
    m1=73
    m2=179
    mass1=73.0
    mass2=179.0
if randomnumber >4.3140423435e-10 and randomnumber <=4.3140423435e-10:
    m1=74
    m2=178
    mass1=74.0
    mass2=178.0
```

```
if randomnumber >4.3140423435e-10 and randomnumber <=4.3140423435e-10:
    m1=76
    m2=176
    mass1=76.0
    mass2=176.0
if randomnumber >4.3140423435e-10 and randomnumber <=1.08094918313e-09:
    m1=66
    m2=186
    mass1=66.0
    mass2=186.0
if randomnumber >1.08094918313e-09 and randomnumber <=2.13151537401e-09:
    m1=67
    m2=185
    mass1=67.0
    mass2=185.0
if randomnumber >2.13151537401e-09 and randomnumber <=3.87115872783e-09:
    m1=68
    m2=184
    mass1=68.0
    mass2=184.0
if randomnumber >3.87115872783e-09 and randomnumber <=6.5032168228e-09:
    m1=69
    m2=183
    mass1=69.0
    mass2=183.0
if randomnumber >6.5032168228e-09 and randomnumber <=8.54221827787e-09:
    m1=70
    m2=182
    mass1=70.0
    mass2=182.0
if randomnumber >8.54221827787e-09 and randomnumber <=9.27083330325e-09:
    m1=71
    m2=181
    mass1=71.0
    mass2=181.0
if randomnumber >9.27083330325e-09 and randomnumber <=9.50410386745e-09:
    m1=72
    m2=180
    mass1=72.0
    mass2=180.0
if randomnumber >9.50410386745e-09 and randomnumber <=9.54251162481e-09:
    m1=73
    m2=179
    mass1=73.0
    mass2=179.0
if randomnumber >9.54251162481e-09 and randomnumber <=9.54661221513e-09:
    m1=74
    m2=178
    mass1=74.0
    mass2=178.0
if randomnumber >9.54661221513e-09 and randomnumber <=9.54692286581e-09:
    m1=75
    m2=177
    mass1=75.0
    mass2=177.0
if randomnumber >9.54692286581e-09 and randomnumber <=9.54693500941e-09:
    m1=76
    m2=176
```

```
        mass1=76.0
        mass2=176.0
if randomnumber >9.54693500941e-09 and randomnumber <=9.54693594594e-09:
        m1=77
        m2=175
        mass1=77.0
        mass2=175.0
if randomnumber >9.54693594594e-09 and randomnumber <=9.92988386628e-09:
        m1=66
        m2=186
        mass1=66.0
        mass2=186.0
if randomnumber >9.92988386628e-09 and randomnumber <=1.12233198495e-08:
        m1=67
        m2=185
        mass1=67.0
        mass2=185.0
if randomnumber >1.12233198495e-08 and randomnumber <=1.76058040161e-08:
        m1=68
        m2=184
        mass1=68.0
        mass2=184.0
if randomnumber >1.76058040161e-08 and randomnumber <=3.83346580479e-08:
        m1=69
        m2=183
        mass1=69.0
        mass2=183.0
if randomnumber >3.83346580479e-08 and randomnumber <=9.0693463127e-08:
        m1=70
        m2=182
        mass1=70.0
        mass2=182.0
if randomnumber >9.0693463127e-08 and randomnumber <=1.32998467582e-07:
        m1=71
        m2=181
        mass1=71.0
        mass2=181.0
if randomnumber >1.32998467582e-07 and randomnumber <=1.81008164277e-07:
        m1=72
        m2=180
        mass1=72.0
        mass2=180.0
if randomnumber >1.81008164277e-07 and randomnumber <=2.007203869e-07:
        m1=73
        m2=179
        mass1=73.0
        mass2=179.0
if randomnumber >2.007203869e-07 and randomnumber <=2.08345433118e-07:
        m1=74
        m2=178
        mass1=74.0
        mass2=178.0
if randomnumber >2.08345433118e-07 and randomnumber <=2.09836558413e-07:
        m1=75
        m2=177
        mass1=75.0
        mass2=177.0
if randomnumber >2.09836558413e-07 and randomnumber <=2.10059097272e-07:
```

```
    m1=76
    m2=176
    mass1=76.0
    mass2=176.0
if randomnumber >2.10059097272e-07 and randomnumber <=2.10078582603e-07:
    m1=77
    m2=175
    mass1=77.0
    mass2=175.0
if randomnumber >2.10078582603e-07 and randomnumber <=2.10079926874e-07:
    m1=78
    m2=174
    mass1=78.0
    mass2=174.0
if randomnumber >2.10079926874e-07 and randomnumber <=2.10079972326e-07:
    m1=79
    m2=173
    mass1=79.0
    mass2=173.0
if randomnumber >2.10079972326e-07 and randomnumber <=2.10079972326e-07:
    m1=80
    m2=172
    mass1=80.0
    mass2=172.0
if randomnumber >2.10079972326e-07 and randomnumber <=2.10079972326e-07:
    m1=82
    m2=170
    mass1=82.0
    mass2=170.0
if randomnumber >2.10079972326e-07 and randomnumber <=2.10087766821e-07:
    m1=66
    m2=186
    mass1=66.0
    mass2=186.0
if randomnumber >2.10087766821e-07 and randomnumber <=2.10175878641e-07:
    m1=67
    m2=185
    mass1=67.0
    mass2=185.0
if randomnumber >2.10175878641e-07 and randomnumber <=2.11111787291e-07:
    m1=68
    m2=184
    mass1=68.0
    mass2=184.0
if randomnumber >2.11111787291e-07 and randomnumber <=2.11766980505e-07:
    m1=69
    m2=183
    mass1=69.0
    mass2=183.0
if randomnumber >2.11766980505e-07 and randomnumber <=2.61301652554e-07:
    m1=70
    m2=182
    mass1=70.0
    mass2=182.0
if randomnumber >2.61301652554e-07 and randomnumber <=2.98466791376e-07:
    m1=71
    m2=181
    mass1=71.0
```

```
        mass2=181.0
if randomnumber >2.98466791376e-07 and randomnumber <=5.93867717423e-07:
    m1=72
    m2=180
    mass1=72.0
    mass2=180.0
if randomnumber >5.93867717423e-07 and randomnumber <=9.95454350943e-07:
    m1=73
    m2=179
    mass1=73.0
    mass2=179.0
if randomnumber >9.95454350943e-07 and randomnumber <=1.35129059419e-06:
    m1=74
    m2=178
    mass1=74.0
    mass2=178.0
if randomnumber >1.35129059419e-06 and randomnumber <=1.60094112997e-06:
    m1=75
    m2=177
    mass1=75.0
    mass2=177.0
if randomnumber >1.60094112997e-06 and randomnumber <=1.69470121693e-06:
    m1=76
    m2=176
    mass1=76.0
    mass2=176.0
if randomnumber >1.69470121693e-06 and randomnumber <=1.72537090627e-06:
    m1=77
    m2=175
    mass1=77.0
    mass2=175.0
if randomnumber >1.72537090627e-06 and randomnumber <=1.73090049096e-06:
    m1=78
    m2=174
    mass1=78.0
    mass2=174.0
if randomnumber >1.73090049096e-06 and randomnumber <=1.73153869419e-06:
    m1=79
    m2=173
    mass1=79.0
    mass2=173.0
if randomnumber >1.73153869419e-06 and randomnumber <=1.73157953065e-06:
    m1=80
    m2=172
    mass1=80.0
    mass2=172.0
if randomnumber >1.73157953065e-06 and randomnumber <=1.73158111215e-06:
    m1=81
    m2=171
    mass1=81.0
    mass2=171.0
if randomnumber >1.73158111215e-06 and randomnumber <=1.73158113113e-06:
    m1=82
    m2=170
    mass1=82.0
    mass2=170.0
if randomnumber >1.73158113113e-06 and randomnumber <=1.73158115089e-06:
    m1=66
```

```
        m2=186
        mass1=66.0
        mass2=186.0
if randomnumber >1.73158115089e-06 and randomnumber <=1.73158171232e-06:
        m1=67
        m2=185
        mass1=67.0
        mass2=185.0
if randomnumber >1.73158171232e-06 and randomnumber <=1.73160232827e-06:
        m1=68
        m2=184
        mass1=68.0
        mass2=184.0
if randomnumber >1.73160232827e-06 and randomnumber <=1.73209089707e-06:
        m1=69
        m2=183
        mass1=69.0
        mass2=183.0
if randomnumber >1.73209089707e-06 and randomnumber <=1.73248683544e-06:
        m1=70
        m2=182
        mass1=70.0
        mass2=182.0
if randomnumber >1.73248683544e-06 and randomnumber <=1.77597791928e-06:
        m1=71
        m2=181
        mass1=71.0
        mass2=181.0
if randomnumber >1.77597791928e-06 and randomnumber <=1.81122264765e-06:
        m1=72
        m2=180
        mass1=72.0
        mass2=180.0
if randomnumber >1.81122264765e-06 and randomnumber <=2.74317525123e-06:
        m1=73
        m2=179
        mass1=73.0
        mass2=179.0
if randomnumber >2.74317525123e-06 and randomnumber <=5.239680609e-06:
        m1=74
        m2=178
        mass1=74.0
        mass2=178.0
if randomnumber >5.239680609e-06 and randomnumber <=9.10304940881e-06:
        m1=75
        m2=177
        mass1=75.0
        mass2=177.0
if randomnumber >9.10304940881e-06 and randomnumber <=1.39717926227e-05:
        m1=76
        m2=176
        mass1=76.0
        mass2=176.0
if randomnumber >1.39717926227e-05 and randomnumber <=1.77899752941e-05:
        m1=77
        m2=175
        mass1=77.0
        mass2=175.0
```

```
if randomnumber >1.77899752941e-05 and randomnumber <=2.02751841197e-05:
    m1=78
    m2=174
    mass1=78.0
    mass2=174.0
if randomnumber >2.02751841197e-05 and randomnumber <=2.10037991451e-05:
    m1=79
    m2=173
    mass1=79.0
    mass2=173.0
if randomnumber >2.10037991451e-05 and randomnumber <=2.11901896658e-05:
    m1=80
    m2=172
    mass1=80.0
    mass2=172.0
if randomnumber >2.11901896658e-05 and randomnumber <=2.12102407844e-05:
    m1=81
    m2=171
    mass1=81.0
    mass2=171.0
if randomnumber >2.12102407844e-05 and randomnumber <=2.12112292197e-05:
    m1=82
    m2=170
    mass1=82.0
    mass2=170.0
if randomnumber >2.12112292197e-05 and randomnumber <=2.12112569523e-05:
    m1=83
    m2=169
    mass1=83.0
    mass2=169.0
if randomnumber >2.12112569523e-05 and randomnumber <=2.12112575341e-05:
    m1=84
    m2=168
    mass1=84.0
    mass2=168.0
if randomnumber >2.12112575341e-05 and randomnumber <=2.12112575456e-05:
    m1=85
    m2=167
    mass1=85.0
    mass2=167.0
if randomnumber >2.12112575456e-05 and randomnumber <=2.12112575456e-05:
    m1=86
    m2=166
    mass1=86.0
    mass2=166.0
if randomnumber >2.12112575456e-05 and randomnumber <=2.12112575456e-05:
    m1=66
    m2=186
    mass1=66.0
    mass2=186.0
if randomnumber >2.12112575456e-05 and randomnumber <=2.12112575456e-05:
    m1=67
    m2=185
    mass1=67.0
    mass2=185.0
if randomnumber >2.12112575456e-05 and randomnumber <=2.1211257557e-05:
    m1=68
    m2=184
```

```
        mass1=68.0
        mass2=184.0
if randomnumber >2.1211257557e-05 and randomnumber <=2.12112585681e-05:
        m1=69
        m2=183
        mass1=69.0
        mass2=183.0
if randomnumber >2.12112585681e-05 and randomnumber <=2.12113024545e-05:
        m1=70
        m2=182
        mass1=70.0
        mass2=182.0
if randomnumber >2.12113024545e-05 and randomnumber <=2.12120706074e-05:
        m1=71
        m2=181
        mass1=71.0
        mass2=181.0
if randomnumber >2.12120706074e-05 and randomnumber <=2.12255698503e-05:
        m1=72
        m2=180
        mass1=72.0
        mass2=180.0
if randomnumber >2.12255698503e-05 and randomnumber <=2.12323194718e-05:
        m1=73
        m2=179
        mass1=73.0
        mass2=179.0
if randomnumber >2.12323194718e-05 and randomnumber <=2.19326954262e-05:
        m1=74
        m2=178
        mass1=74.0
        mass2=178.0
if randomnumber >2.19326954262e-05 and randomnumber <=2.22828834034e-05:
        m1=75
        m2=177
        mass1=75.0
        mass2=177.0
if randomnumber >2.22828834034e-05 and randomnumber <=3.09811001725e-05:
        m1=76
        m2=176
        mass1=76.0
        mass2=176.0
if randomnumber >3.09811001725e-05 and randomnumber <=5.23595048012e-05:
        m1=77
        m2=175
        mass1=77.0
        mass2=175.0
if randomnumber >5.23595048012e-05 and randomnumber <=8.34923519526e-05:
        m1=78
        m2=174
        mass1=78.0
        mass2=174.0
if randomnumber >8.34923519526e-05 and randomnumber <=0.000114517882049:
        m1=79
        m2=173
        mass1=79.0
        mass2=173.0
if randomnumber >0.000114517882049 and randomnumber <=0.000134998268856:
```

```
        m1=80
        m2=172
        mass1=80.0
        mass2=172.0
if randomnumber >0.000134998268856 and randomnumber <=0.00014353268591:
        m1=81
        m2=171
        mass1=81.0
        mass2=171.0
if randomnumber >0.00014353268591 and randomnumber <=0.000144673624358:
        m1=82
        m2=170
        mass1=82.0
        mass2=170.0
if randomnumber >0.000144673624358 and randomnumber <=0.000144802967956:
        m1=83
        m2=169
        mass1=83.0
        mass2=169.0
if randomnumber >0.000144802967956 and randomnumber <=0.000144810593002:
        m1=84
        m2=168
        mass1=84.0
        mass2=168.0
if randomnumber >0.000144810593002 and randomnumber <=0.000144810754529:
        m1=85
        m2=167
        mass1=85.0
        mass2=167.0
if randomnumber >0.000144810754529 and randomnumber <=0.000144810761194:
        m1=86
        m2=166
        mass1=86.0
        mass2=166.0
if randomnumber >0.000144810761194 and randomnumber <=0.000144810761447:
        m1=87
        m2=165
        mass1=87.0
        mass2=165.0
if randomnumber >0.000144810761447 and randomnumber <=0.000144810761447:
        m1=66
        m2=186
        mass1=66.0
        mass2=186.0
if randomnumber >0.000144810761447 and randomnumber <=0.000144810761447:
        m1=67
        m2=185
        mass1=67.0
        mass2=185.0
if randomnumber >0.000144810761447 and randomnumber <=0.000144810761447:
        m1=68
        m2=184
        mass1=68.0
        mass2=184.0
if randomnumber >0.000144810761447 and randomnumber <=0.000144810761447:
        m1=69
        m2=183
        mass1=69.0
```

```
        mass2=183.0
if randomnumber >0.000144810761447 and randomnumber <=0.000144810761473:
        m1=70
        m2=182
        mass1=70.0
        mass2=182.0
if randomnumber >0.000144810761473 and randomnumber <=0.000144810762603:
        m1=71
        m2=181
        mass1=71.0
        mass2=181.0
if randomnumber >0.000144810762603 and randomnumber <=0.000144810763168:
        m1=72
        m2=180
        mass1=72.0
        mass2=180.0
if randomnumber >0.000144810763168 and randomnumber <=0.000144812436163:
        m1=73
        m2=179
        mass1=73.0
        mass2=179.0
if randomnumber >0.000144812436163 and randomnumber <=0.000144812753592:
        m1=74
        m2=178
        mass1=74.0
        mass2=178.0
if randomnumber >0.000144812753592 and randomnumber <=0.000145154921596:
        m1=75
        m2=177
        mass1=75.0
        mass2=177.0
if randomnumber >0.000145154921596 and randomnumber <=0.000145452581828:
        m1=76
        m2=176
        mass1=76.0
        mass2=176.0
if randomnumber >0.000145452581828 and randomnumber <=0.000160527611905:
        m1=77
        m2=175
        mass1=77.0
        mass2=175.0
if randomnumber >0.000160527611905 and randomnumber <=0.000162487537635:
        m1=78
        m2=174
        mass1=78.0
        mass2=174.0
if randomnumber >0.000162487537635 and randomnumber <=0.00033058332458:
        m1=79
        m2=173
        mass1=79.0
        mass2=173.0
if randomnumber >0.00033058332458 and randomnumber <=0.000414631218052:
        m1=80
        m2=172
        mass1=80.0
        mass2=172.0
if randomnumber >0.000414631218052 and randomnumber <=0.000725942744767:
        m1=81
```

```
        m2=171
        mass1=81.0
        mass2=171.0
if randomnumber >0.000725942744767 and randomnumber <=0.000879020357081:
        m1=82
        m2=170
        mass1=82.0
        mass2=170.0
if randomnumber >0.000879020357081 and randomnumber <=0.000924426203121:
        m1=83
        m2=169
        mass1=83.0
        mass2=169.0
if randomnumber >0.000924426203121 and randomnumber <=0.0009349036237:
        m1=84
        m2=168
        mass1=84.0
        mass2=168.0
if randomnumber >0.0009349036237 and randomnumber <=0.000935513630786:
        m1=85
        m2=167
        mass1=85.0
        mass2=167.0
if randomnumber >0.000935513630786 and randomnumber <=0.000935612474312:
        m1=86
        m2=166
        mass1=86.0
        mass2=166.0
if randomnumber >0.000935612474312 and randomnumber <=0.000935617749477:
        m1=87
        m2=165
        mass1=87.0
        mass2=165.0
if randomnumber >0.000935617749477 and randomnumber <=0.000935617903108:
        m1=88
        m2=164
        mass1=88.0
        mass2=164.0
if randomnumber >0.000935617903108 and randomnumber <=0.000935617904938:
        m1=89
        m2=163
        mass1=89.0
        mass2=163.0
if randomnumber >0.000935617904938 and randomnumber <=0.000935617905416:
        m1=90
        m2=162
        mass1=90.0
        mass2=162.0
if randomnumber >0.000935617905416 and randomnumber <=0.000935617905416:
        m1=69
        m2=183
        mass1=69.0
        mass2=183.0
if randomnumber >0.000935617905416 and randomnumber <=0.000935617905416:
        m1=71
        m2=181
        mass1=71.0
        mass2=181.0
```

```
if randomnumber >0.000935617905416 and randomnumber <=0.000935617905425:
    m1=72
    m2=180
    mass1=72.0
    mass2=180.0
if randomnumber >0.000935617905425 and randomnumber <=0.000935617906233:
    m1=73
    m2=179
    mass1=73.0
    mass2=179.0
if randomnumber >0.000935617906233 and randomnumber <=0.000935617944415:
    m1=74
    m2=178
    mass1=74.0
    mass2=178.0
if randomnumber >0.000935617944415 and randomnumber <=0.000935617971131:
    m1=75
    m2=177
    mass1=75.0
    mass2=177.0
if randomnumber >0.000935617971131 and randomnumber <=0.000935649205647:
    m1=76
    m2=176
    mass1=76.0
    mass2=176.0
if randomnumber >0.000935649205647 and randomnumber <=0.000936207812326:
    m1=77
    m2=175
    mass1=77.0
    mass2=175.0
if randomnumber >0.000936207812326 and randomnumber <=0.000941788231415:
    m1=78
    m2=174
    mass1=78.0
    mass2=174.0
if randomnumber >0.000941788231415 and randomnumber <=0.00098705851907:
    m1=79
    m2=173
    mass1=79.0
    mass2=173.0
if randomnumber >0.00098705851907 and randomnumber <=0.00116749011909:
    m1=80
    m2=172
    mass1=80.0
    mass2=172.0
if randomnumber >0.00116749011909 and randomnumber <=0.0017468836034:
    m1=81
    m2=171
    mass1=81.0
    mass2=171.0
if randomnumber >0.0017468836034 and randomnumber <=0.00238803296951:
    m1=82
    m2=170
    mass1=82.0
    mass2=170.0
if randomnumber >0.00238803296951 and randomnumber <=0.00270860765256:
    m1=83
    m2=169
```

```
    mass1=83.0
    mass2=169.0
if randomnumber >0.00270860765256 and randomnumber <=0.00307959254539:
    m1=84
    m2=168
    mass1=84.0
    mass2=168.0
if randomnumber >0.00307959254539 and randomnumber <=0.0032650849918:
    m1=85
    m2=167
    mass1=85.0
    mass2=167.0
if randomnumber >0.0032650849918 and randomnumber <=0.00329899113759:
    m1=86
    m2=166
    mass1=86.0
    mass2=166.0
if randomnumber >0.00329899113759 and randomnumber <=0.00330614737772:
    m1=87
    m2=165
    mass1=87.0
    mass2=165.0
if randomnumber >0.00330614737772 and randomnumber <=0.00330672349521:
    m1=88
    m2=164
    mass1=88.0
    mass2=164.0
if randomnumber >0.00330672349521 and randomnumber <=0.00330674919268:
    m1=89
    m2=163
    mass1=89.0
    mass2=163.0
if randomnumber >0.00330674919268 and randomnumber <=0.00330675475701:
    m1=90
    m2=162
    mass1=90.0
    mass2=162.0
if randomnumber >0.00330675475701 and randomnumber <=0.00330675475751:
    m1=92
    m2=160
    mass1=92.0
    mass2=160.0
if randomnumber >0.00330675475751 and randomnumber <=0.00330675475751:
    m1=72
    m2=180
    mass1=72.0
    mass2=180.0
if randomnumber >0.00330675475751 and randomnumber <=0.00330675475751:
    m1=73
    m2=179
    mass1=73.0
    mass2=179.0
if randomnumber >0.00330675475751 and randomnumber <=0.00330675475751:
    m1=74
    m2=178
    mass1=74.0
    mass2=178.0
if randomnumber >0.00330675475751 and randomnumber <=0.00330675475803:
```

```
        m1=75
        m2=177
        mass1=75.0
        mass2=177.0
if randomnumber >0.00330675475803 and randomnumber <=0.0033067547979:
        m1=76
        m2=176
        mass1=76.0
        mass2=176.0
if randomnumber >0.0033067547979 and randomnumber <=0.00330675648558:
        m1=77
        m2=175
        mass1=77.0
        mass2=175.0
if randomnumber >0.00330675648558 and randomnumber <=0.00330675795412:
        m1=78
        m2=174
        mass1=78.0
        mass2=174.0
if randomnumber >0.00330675795412 and randomnumber <=0.00330804969901:
        m1=79
        m2=173
        mass1=79.0
        mass2=173.0
if randomnumber >0.00330804969901 and randomnumber <=0.00330821745025:
        m1=80
        m2=172
        mass1=80.0
        mass2=172.0
if randomnumber >0.00330821745025 and randomnumber <=0.0034454740434:
        m1=81
        m2=171
        mass1=81.0
        mass2=171.0
if randomnumber >0.0034454740434 and randomnumber <=0.00356488798999:
        m1=82
        m2=170
        mass1=82.0
        mass2=170.0
if randomnumber >0.00356488798999 and randomnumber <=0.00444638180871:
        m1=83
        m2=169
        mass1=83.0
        mass2=169.0
if randomnumber >0.00444638180871 and randomnumber <=0.00465581104187:
        m1=84
        m2=168
        mass1=84.0
        mass2=168.0
if randomnumber >0.00465581104187 and randomnumber <=0.00694812028499:
        m1=85
        m2=167
        mass1=85.0
        mass2=167.0
if randomnumber >0.00694812028499 and randomnumber <=0.00808178941442:
        m1=86
        m2=166
        mass1=86.0
```

```
        mass2=166.0
if randomnumber >0.00808178941442 and randomnumber <=0.00885473768011:
    m1=87
    m2=165
    mass1=87.0
    mass2=165.0
if randomnumber >0.00885473768011 and randomnumber <=0.00909212018201:
    m1=88
    m2=164
    mass1=88.0
    mass2=164.0
if randomnumber >0.00909212018201 and randomnumber <=0.00912055886273:
    m1=89
    m2=163
    mass1=89.0
    mass2=163.0
if randomnumber >0.00912055886273 and randomnumber <=0.00912742150599:
    m1=90
    m2=162
    mass1=90.0
    mass2=162.0
if randomnumber >0.00912742150599 and randomnumber <=0.00912742150599:
    m1=91
    m2=161
    mass1=91.0
    mass2=161.0
if randomnumber >0.00912742150599 and randomnumber <=0.0091274342704:
    m1=92
    m2=160
    mass1=92.0
    mass2=160.0
if randomnumber >0.0091274342704 and randomnumber <=0.00912743692112:
    m1=93
    m2=159
    mass1=93.0
    mass2=159.0
if randomnumber >0.00912743692112 and randomnumber <=0.00912743820891:
    m1=94
    m2=158
    mass1=94.0
    mass2=158.0
if randomnumber >0.00912743820891 and randomnumber <=0.00912743820935:
    m1=95
    m2=157
    mass1=95.0
    mass2=157.0
if randomnumber >0.00912743820935 and randomnumber <=0.00912743820937:
    m1=96
    m2=156
    mass1=96.0
    mass2=156.0
if randomnumber >0.00912743820937 and randomnumber <=0.00912743820937:
    m1=75
    m2=177
    mass1=75.0
    mass2=177.0
if randomnumber >0.00912743820937 and randomnumber <=0.00912743820956:
    m1=77
```

```
        m2=175
        mass1=77.0
        mass2=175.0
if randomnumber >0.00912743820956 and randomnumber <=0.0091274382097:
        m1=78
        m2=174
        mass1=78.0
        mass2=174.0
if randomnumber >0.0091274382097 and randomnumber <=0.00912743960989:
        m1=79
        m2=173
        mass1=79.0
        mass2=173.0
if randomnumber >0.00912743960989 and randomnumber <=0.00912744690174:
        m1=80
        m2=172
        mass1=80.0
        mass2=172.0
if randomnumber >0.00912744690174 and randomnumber <=0.00912745311477:
        m1=81
        m2=171
        mass1=81.0
        mass2=171.0
if randomnumber >0.00912745311477 and randomnumber <=0.00913470539802:
        m1=82
        m2=170
        mass1=82.0
        mass2=170.0
if randomnumber >0.00913470539802 and randomnumber <=0.00913687995222:
        m1=83
        m2=169
        mass1=83.0
        mass2=169.0
if randomnumber >0.00913687995222 and randomnumber <=0.00956521112554:
        m1=84
        m2=168
        mass1=84.0
        mass2=168.0
if randomnumber >0.00956521112554 and randomnumber <=0.0098393406816:
        m1=85
        m2=167
        mass1=85.0
        mass2=167.0
if randomnumber >0.0098393406816 and randomnumber <=0.0119754923129:
        m1=86
        m2=166
        mass1=86.0
        mass2=166.0
if randomnumber >0.0119754923129 and randomnumber <=0.0130435681286:
        m1=87
        m2=165
        mass1=87.0
        mass2=165.0
if randomnumber >0.0130435681286 and randomnumber <=0.0156733499723:
        m1=88
        m2=164
        mass1=88.0
        mass2=164.0
```

```
if randomnumber >0.0156733499723 and randomnumber <=0.0176151673616:
    m1=89
    m2=163
    mass1=89.0
    mass2=163.0
if randomnumber >0.0176151673616 and randomnumber <=0.018820654194:
    m1=90
    m2=162
    mass1=90.0
    mass2=162.0
if randomnumber >0.018820654194 and randomnumber <=0.0189326977182:
    m1=91
    m2=161
    mass1=91.0
    mass2=161.0
if randomnumber >0.0189326977182 and randomnumber <=0.0189466148763:
    m1=92
    m2=160
    mass1=92.0
    mass2=160.0
if randomnumber >0.0189466148763 and randomnumber <=0.0189838338431:
    m1=93
    m2=159
    mass1=93.0
    mass2=159.0
if randomnumber >0.0189838338431 and randomnumber <=0.0189991461229:
    m1=94
    m2=158
    mass1=94.0
    mass2=158.0
if randomnumber >0.0189991461229 and randomnumber <=0.0189991522796:
    m1=95
    m2=157
    mass1=95.0
    mass2=157.0
if randomnumber >0.0189991522796 and randomnumber <=0.0189991557815:
    m1=96
    m2=156
    mass1=96.0
    mass2=156.0
if randomnumber >0.0189991557815 and randomnumber <=0.0189991562177:
    m1=97
    m2=155
    mass1=97.0
    mass2=155.0
if randomnumber >0.0189991562177 and randomnumber <=0.0189991562177:
    m1=77
    m2=175
    mass1=77.0
    mass2=175.0
if randomnumber >0.0189991562177 and randomnumber <=0.0189991562177:
    m1=78
    m2=174
    mass1=78.0
    mass2=174.0
if randomnumber >0.0189991562177 and randomnumber <=0.0189991562178:
    m1=79
    m2=173
```

```
        mass1=79.0
        mass2=173.0
if randomnumber >0.0189991562178 and randomnumber <=0.0189991562179:
        m1=80
        m2=172
        mass1=80.0
        mass2=172.0
if randomnumber >0.0189991562179 and randomnumber <=0.0189991575554:
        m1=81
        m2=171
        mass1=81.0
        mass2=171.0
if randomnumber >0.0189991575554 and randomnumber <=0.0189991577293:
        m1=82
        m2=170
        mass1=82.0
        mass2=170.0
if randomnumber >0.0189991577293 and randomnumber <=0.0190000219005:
        m1=83
        m2=169
        mass1=83.0
        mass2=169.0
if randomnumber >0.0190000219005 and randomnumber <=0.0190001856979:
        m1=84
        m2=168
        mass1=84.0
        mass2=168.0
if randomnumber >0.0190001856979 and randomnumber <=0.019070121794:
        m1=85
        m2=167
        mass1=85.0
        mass2=167.0
if randomnumber >0.019070121794 and randomnumber <=0.0190834289394:
        m1=86
        m2=166
        mass1=86.0
        mass2=166.0
if randomnumber >0.0190834289394 and randomnumber <=0.0206885192991:
        m1=87
        m2=165
        mass1=87.0
        mass2=165.0
if randomnumber >0.0206885192991 and randomnumber <=0.0249082485013:
        m1=88
        m2=164
        mass1=88.0
        mass2=164.0
if randomnumber >0.0249082485013 and randomnumber <=0.0311227532352:
        m1=89
        m2=163
        mass1=89.0
        mass2=163.0
if randomnumber >0.0311227532352 and randomnumber <=0.0373183927606:
        m1=90
        m2=162
        mass1=90.0
        mass2=162.0
if randomnumber >0.0373183927606 and randomnumber <=0.0412546919718:
```

```
        m1=91
        m2=161
        mass1=91.0
        mass2=161.0
if randomnumber >0.0412546919718 and randomnumber <=0.0429981761465:
        m1=92
        m2=160
        mass1=92.0
        mass2=160.0
if randomnumber >0.0429981761465 and randomnumber <=0.0433579435829:
        m1=93
        m2=159
        mass1=93.0
        mass2=159.0
if randomnumber >0.0433579435829 and randomnumber <=0.0434795490567:
        m1=94
        m2=158
        mass1=94.0
        mass2=158.0
if randomnumber >0.0434795490567 and randomnumber <=0.0434858406603:
        m1=95
        m2=157
        mass1=95.0
        mass2=157.0
if randomnumber >0.0434858406603 and randomnumber <=0.0435319130017:
        m1=96
        m2=156
        mass1=96.0
        mass2=156.0
if randomnumber >0.0435319130017 and randomnumber <=0.0435409892005:
        m1=97
        m2=155
        mass1=97.0
        mass2=155.0
if randomnumber >0.0435409892005 and randomnumber <=0.0435409904657:
        m1=98
        m2=154
        mass1=98.0
        mass2=154.0
if randomnumber >0.0435409904657 and randomnumber <=0.0435409904804:
        m1=99
        m2=153
        mass1=99.0
        mass2=153.0
if randomnumber >0.0435409904804 and randomnumber <=0.0435409904808:
        m1=100
        m2=152
        mass1=100.0
        mass2=152.0
if randomnumber >0.0435409904808 and randomnumber <=0.0435409904808:
        m1=79
        m2=173
        mass1=79.0
        mass2=173.0
if randomnumber >0.0435409904808 and randomnumber <=0.0435409904808:
        m1=81
        m2=171
        mass1=81.0
```

```
        mass2=171.0
if randomnumber >0.0435409904808 and randomnumber <=0.0435409907638:
    m1=83
    m2=169
    mass1=83.0
    mass2=169.0
if randomnumber >0.0435409907638 and randomnumber <=0.0435409909818:
    m1=84
    m2=168
    mass1=84.0
    mass2=168.0
if randomnumber >0.0435409909818 and randomnumber <=0.0435412304655:
    m1=85
    m2=167
    mass1=85.0
    mass2=167.0
if randomnumber >0.0435412304655 and randomnumber <=0.0435422640857:
    m1=86
    m2=166
    mass1=86.0
    mass2=166.0
if randomnumber >0.0435422640857 and randomnumber <=0.0435427808959:
    m1=87
    m2=165
    mass1=87.0
    mass2=165.0
if randomnumber >0.0435427808959 and randomnumber <=0.0438664847183:
    m1=88
    m2=164
    mass1=88.0
    mass2=164.0
if randomnumber >0.0438664847183 and randomnumber <=0.0453062672752:
    m1=89
    m2=163
    mass1=89.0
    mass2=163.0
if randomnumber >0.0453062672752 and randomnumber <=0.0495137566848:
    m1=90
    m2=162
    mass1=90.0
    mass2=162.0
if randomnumber >0.0495137566848 and randomnumber <=0.0529230783208:
    m1=91
    m2=161
    mass1=91.0
    mass2=161.0
if randomnumber >0.0529230783208 and randomnumber <=0.0620029484276:
    m1=92
    m2=160
    mass1=92.0
    mass2=160.0
if randomnumber >0.0620029484276 and randomnumber <=0.0696590036258:
    m1=93
    m2=159
    mass1=93.0
    mass2=159.0
if randomnumber >0.0696590036258 and randomnumber <=0.0736360776696:
    m1=94
```

```
    m2=158
    mass1=94.0
    mass2=158.0
if randomnumber >0.0736360776696 and randomnumber <=0.0760774785437:
    m1=95
    m2=157
    mass1=95.0
    mass2=157.0
if randomnumber >0.0760774785437 and randomnumber <=0.0762981930125:
    m1=96
    m2=156
    mass1=96.0
    mass2=156.0
if randomnumber >0.0762981930125 and randomnumber <=0.0763284390818:
    m1=97
    m2=155
    mass1=97.0
    mass2=155.0
if randomnumber >0.0763284390818 and randomnumber <=0.0763322685611:
    m1=98
    m2=154
    mass1=98.0
    mass2=154.0
if randomnumber >0.0763322685611 and randomnumber <=0.0763324756632:
    m1=99
    m2=153
    mass1=99.0
    mass2=153.0
if randomnumber >0.0763324756632 and randomnumber <=0.0763324872985:
    m1=100
    m2=152
    mass1=100.0
    mass2=152.0
if randomnumber >0.0763324872985 and randomnumber <=0.0763324873769:
    m1=101
    m2=151
    mass1=101.0
    mass2=151.0
if randomnumber >0.0763324873769 and randomnumber <=0.0763324873787:
    m1=102
    m2=150
    mass1=102.0
    mass2=150.0
if randomnumber >0.0763324873787 and randomnumber <=0.0763324873791:
    m1=103
    m2=149
    mass1=103.0
    mass2=149.0
if randomnumber >0.0763324873791 and randomnumber <=0.0763324873791:
    m1=83
    m2=169
    mass1=83.0
    mass2=169.0
if randomnumber >0.0763324873791 and randomnumber <=0.0763324873804:
    m1=84
    m2=168
    mass1=84.0
    mass2=168.0
```

```
if randomnumber >0.0763324873804 and randomnumber <=0.0763324874442:
    m1=85
    m2=167
    mass1=85.0
    mass2=167.0
if randomnumber >0.0763324874442 and randomnumber <=0.0763324874761:
    m1=86
    m2=166
    mass1=86.0
    mass2=166.0
if randomnumber >0.0763324874761 and randomnumber <=0.0763326590119:
    m1=87
    m2=165
    mass1=87.0
    mass2=165.0
if randomnumber >0.0763326590119 and randomnumber <=0.076332691602:
    m1=88
    m2=164
    mass1=88.0
    mass2=164.0
if randomnumber >0.076332691602 and randomnumber <=0.0764180018829:
    m1=89
    m2=163
    mass1=89.0
    mass2=163.0
if randomnumber >0.0764180018829 and randomnumber <=0.0769653177346:
    m1=90
    m2=162
    mass1=90.0
    mass2=162.0
if randomnumber >0.0769653177346 and randomnumber <=0.0791460341851:
    m1=91
    m2=161
    mass1=91.0
    mass2=161.0
if randomnumber >0.0791460341851 and randomnumber <=0.0849319484904:
    m1=92
    m2=160
    mass1=92.0
    mass2=160.0
if randomnumber >0.0849319484904 and randomnumber <=0.0970425087178:
    m1=93
    m2=159
    mass1=93.0
    mass2=159.0
if randomnumber >0.0970425087178 and randomnumber <=0.113563291568:
    m1=94
    m2=158
    mass1=94.0
    mass2=158.0
if randomnumber >0.113563291568 and randomnumber <=0.128316280107:
    m1=95
    m2=157
    mass1=95.0
    mass2=157.0
if randomnumber >0.128316280107 and randomnumber <=0.13860719494:
    m1=96
    m2=156
```

```
        mass1=96.0
        mass2=156.0
if randomnumber >0.13860719494 and randomnumber <=0.143050731037:
        m1=97
        m2=155
        mass1=97.0
        mass2=155.0
if randomnumber >0.143050731037 and randomnumber <=0.144899481946:
        m1=98
        m2=154
        mass1=98.0
        mass2=154.0
if randomnumber >0.144899481946 and randomnumber <=0.145111121911:
        m1=99
        m2=153
        mass1=99.0
        mass2=153.0
if randomnumber >0.145111121911 and randomnumber <=0.145149303737:
        m1=100
        m2=152
        mass1=100.0
        mass2=152.0
if randomnumber >0.145149303737 and randomnumber <=0.14515093599:
        m1=101
        m2=151
        mass1=101.0
        mass2=151.0
if randomnumber >0.14515093599 and randomnumber <=0.145150981344:
        m1=102
        m2=150
        mass1=102.0
        mass2=150.0
if randomnumber >0.145150981344 and randomnumber <=0.14515098962:
        m1=103
        m2=149
        mass1=103.0
        mass2=149.0
if randomnumber >0.14515098962 and randomnumber <=0.145150989673:
        m1=104
        m2=148
        mass1=104.0
        mass2=148.0
if randomnumber >0.145150989673 and randomnumber <=0.145150989676:
        m1=105
        m2=147
        mass1=105.0
        mass2=147.0
if randomnumber >0.145150989676 and randomnumber <=0.145150989676:
        m1=85
        m2=167
        mass1=85.0
        mass2=167.0
if randomnumber >0.145150989676 and randomnumber <=0.145150989692:
        m1=87
        m2=165
        mass1=87.0
        mass2=165.0
if randomnumber >0.145150989692 and randomnumber <=0.145150990703:
```

```
        m1=88
        m2=164
        mass1=88.0
        mass2=164.0
if randomnumber >0.145150990703 and randomnumber <=0.145151039165:
        m1=89
        m2=163
        mass1=89.0
        mass2=163.0
if randomnumber >0.145151039165 and randomnumber <=0.14515162347:
        m1=90
        m2=162
        mass1=90.0
        mass2=162.0
if randomnumber >0.14515162347 and randomnumber <=0.145159172258:
        m1=91
        m2=161
        mass1=91.0
        mass2=161.0
if randomnumber >0.145159172258 and randomnumber <=0.145166175995:
        m1=92
        m2=160
        mass1=92.0
        mass2=160.0
if randomnumber >0.145166175995 and randomnumber <=0.146149278167:
        m1=93
        m2=159
        mass1=93.0
        mass2=159.0
if randomnumber >0.146149278167 and randomnumber <=0.146640829252:
        m1=94
        m2=158
        mass1=94.0
        mass2=158.0
if randomnumber >0.146640829252 and randomnumber <=0.156117377085:
        m1=95
        m2=157
        mass1=95.0
        mass2=157.0
if randomnumber >0.156117377085 and randomnumber <=0.170160531083:
        m1=96
        m2=156
        mass1=96.0
        mass2=156.0
if randomnumber >0.170160531083 and randomnumber <=0.191147567356:
        m1=97
        m2=155
        mass1=97.0
        mass2=155.0
if randomnumber >0.191147567356 and randomnumber <=0.206201664959:
        m1=98
        m2=154
        mass1=98.0
        mass2=154.0
if randomnumber >0.206201664959 and randomnumber <=0.21290756884:
        m1=99
        m2=153
        mass1=99.0
```

```
        mass2=153.0
if randomnumber >0.21290756884 and randomnumber <=0.214854723841:
    m1=100
    m2=152
    mass1=100.0
    mass2=152.0
if randomnumber >0.214854723841 and randomnumber <=0.215329296803:
    m1=101
    m2=151
    mass1=101.0
    mass2=151.0
if randomnumber >0.215329296803 and randomnumber <=0.21536386374:
    m1=102
    m2=150
    mass1=102.0
    mass2=150.0
if randomnumber >0.21536386374 and randomnumber <=0.215369571426:
    m1=103
    m2=149
    mass1=103.0
    mass2=149.0
if randomnumber >0.215369571426 and randomnumber <=0.215369986003:
    m1=104
    m2=148
    mass1=104.0
    mass2=148.0
if randomnumber >0.215369986003 and randomnumber <=0.215370021386:
    m1=105
    m2=147
    mass1=105.0
    mass2=147.0
if randomnumber >0.215370021386 and randomnumber <=0.215370021427:
    m1=106
    m2=146
    mass1=106.0
    mass2=146.0
if randomnumber >0.215370021427 and randomnumber <=0.215370021431:
    m1=107
    m2=145
    mass1=107.0
    mass2=145.0
if randomnumber >0.215370021431 and randomnumber <=0.215370021431:
    m1=108
    m2=144
    mass1=108.0
    mass2=144.0
if randomnumber >0.215370021431 and randomnumber <=0.215370021431:
    m1=87
    m2=165
    mass1=87.0
    mass2=165.0
if randomnumber >0.215370021431 and randomnumber <=0.215370021431:
    m1=88
    m2=164
    mass1=88.0
    mass2=164.0
if randomnumber >0.215370021431 and randomnumber <=0.215370021435:
    m1=89
```

```
        m2=163
        mass1=89.0
        mass2=163.0
if randomnumber >0.215370021435 and randomnumber <=0.215370021775:
        m1=90
        m2=162
        mass1=90.0
        mass2=162.0
if randomnumber >0.215370021775 and randomnumber <=0.215370021944:
        m1=91
        m2=161
        mass1=91.0
        mass2=161.0
if randomnumber >0.215370021944 and randomnumber <=0.215370555134:
        m1=92
        m2=160
        mass1=92.0
        mass2=160.0
if randomnumber >0.215370555134 and randomnumber <=0.215380077998:
        m1=93
        m2=159
        mass1=93.0
        mass2=159.0
if randomnumber >0.215380077998 and randomnumber <=0.215550325774:
        m1=94
        m2=158
        mass1=94.0
        mass2=158.0
if randomnumber >0.215550325774 and randomnumber <=0.216259098441:
        m1=95
        m2=157
        mass1=95.0
        mass2=157.0
if randomnumber >0.216259098441 and randomnumber <=0.219293956981:
        m1=96
        m2=156
        mass1=96.0
        mass2=156.0
if randomnumber >0.219293956981 and randomnumber <=0.228242504902:
        m1=97
        m2=155
        mass1=97.0
        mass2=155.0
if randomnumber >0.228242504902 and randomnumber <=0.244746794816:
        m1=98
        m2=154
        mass1=98.0
        mass2=154.0
if randomnumber >0.244746794816 and randomnumber <=0.266002123727:
        m1=99
        m2=153
        mass1=99.0
        mass2=153.0
if randomnumber >0.266002123727 and randomnumber <=0.293018571056:
        m1=100
        m2=152
        mass1=100.0
        mass2=152.0
```

```
if randomnumber >0.293018571056 and randomnumber <=0.306171066924:
    m1=101
    m2=151
    mass1=101.0
    mass2=151.0
if randomnumber >0.306171066924 and randomnumber <=0.313049581816:
    m1=102
    m2=150
    mass1=102.0
    mass2=150.0
if randomnumber >0.313049581816 and randomnumber <=0.314311794184:
    m1=103
    m2=149
    mass1=103.0
    mass2=149.0
if randomnumber >0.314311794184 and randomnumber <=0.314656435564:
    m1=104
    m2=148
    mass1=104.0
    mass2=148.0
if randomnumber >0.314656435564 and randomnumber <=0.314692593843:
    m1=105
    m2=147
    mass1=105.0
    mass2=147.0
if randomnumber >0.314692593843 and randomnumber <=0.314693627419:
    m1=106
    m2=146
    mass1=106.0
    mass2=146.0
if randomnumber >0.314693627419 and randomnumber <=0.314693707427:
    m1=107
    m2=145
    mass1=107.0
    mass2=145.0
if randomnumber >0.314693707427 and randomnumber <=0.314693709997:
    m1=108
    m2=144
    mass1=108.0
    mass2=144.0
if randomnumber >0.314693709997 and randomnumber <=0.314693709997:
    m1=109
    m2=143
    mass1=109.0
    mass2=143.0
if randomnumber >0.314693709997 and randomnumber <=0.314693709997:
    m1=110
    m2=142
    mass1=110.0
    mass2=142.0
if randomnumber >0.314693709997 and randomnumber <=0.314693709997:
    m1=111
    m2=141
    mass1=111.0
    mass2=141.0
if randomnumber >0.314693709997 and randomnumber <=0.314693709997:
    m1=112
    m2=140
```

```
        mass1=112.0
        mass2=140.0
if randomnumber >0.314693709997 and randomnumber <=0.314693709997:
        m1=89
        m2=163
        mass1=89.0
        mass2=163.0
if randomnumber >0.314693709997 and randomnumber <=0.314693709997:
        m1=90
        m2=162
        mass1=90.0
        mass2=162.0
if randomnumber >0.314693709997 and randomnumber <=0.314693709997:
        m1=91
        m2=161
        mass1=91.0
        mass2=161.0
if randomnumber >0.314693709997 and randomnumber <=0.314693710038:
        m1=92
        m2=160
        mass1=92.0
        mass2=160.0
if randomnumber >0.314693710038 and randomnumber <=0.31469371298:
        m1=93
        m2=159
        mass1=93.0
        mass2=159.0
if randomnumber >0.31469371298 and randomnumber <=0.314693751099:
        m1=94
        m2=158
        mass1=94.0
        mass2=158.0
if randomnumber >0.314693751099 and randomnumber <=0.31469453422:
        m1=95
        m2=157
        mass1=95.0
        mass2=157.0
if randomnumber >0.31469453422 and randomnumber <=0.314695279779:
        m1=96
        m2=156
        mass1=96.0
        mass2=156.0
if randomnumber >0.314695279779 and randomnumber <=0.315148982399:
        m1=97
        m2=155
        mass1=97.0
        mass2=155.0
if randomnumber >0.315148982399 and randomnumber <=0.315486451046:
        m1=98
        m2=154
        mass1=98.0
        mass2=154.0
if randomnumber >0.315486451046 and randomnumber <=0.320716121285:
        m1=99
        m2=153
        mass1=99.0
        mass2=153.0
if randomnumber >0.320716121285 and randomnumber <=0.329932442204:
```

```
        m1=100
        m2=152
        mass1=100.0
        mass2=152.0
if randomnumber >0.329932442204 and randomnumber <=0.334170358823:
        m1=101
        m2=151
        mass1=101.0
        mass2=151.0
if randomnumber >0.334170358823 and randomnumber <=0.351556738447:
        m1=102
        m2=150
        mass1=102.0
        mass2=150.0
if randomnumber >0.351556738447 and randomnumber <=0.360249928259:
        m1=103
        m2=149
        mass1=103.0
        mass2=149.0
if randomnumber >0.360249928259 and randomnumber <=0.366820872471:
        m1=104
        m2=148
        mass1=104.0
        mass2=148.0
if randomnumber >0.366820872471 and randomnumber <=0.370106344577:
        m1=105
        m2=147
        mass1=105.0
        mass2=147.0
if randomnumber >0.370106344577 and randomnumber <=0.370303223928:
        m1=106
        m2=146
        mass1=106.0
        mass2=146.0
if randomnumber >0.370303223928 and randomnumber <=0.370358400201:
        m1=107
        m2=145
        mass1=107.0
        mass2=145.0
if randomnumber >0.370358400201 and randomnumber <=0.370363664323:
        m1=108
        m2=144
        mass1=108.0
        mass2=144.0
if randomnumber >0.370363664323 and randomnumber <=0.370363664333:
        m1=109
        m2=143
        mass1=109.0
        mass2=143.0
if randomnumber >0.370363664333 and randomnumber <=0.370363664333:
        m1=110
        m2=142
        mass1=110.0
        mass2=142.0
if randomnumber >0.370363664333 and randomnumber <=0.370363664333:
        m1=111
        m2=141
        mass1=111.0
```

```
        mass2=141.0
if randomnumber >0.370363664333 and randomnumber <=0.370363664333:
        m1=112
        m2=140
        mass1=112.0
        mass2=140.0
if randomnumber >0.370363664333 and randomnumber <=0.370363664333:
        m1=113
        m2=139
        mass1=113.0
        mass2=139.0
if randomnumber >0.370363664333 and randomnumber <=0.370363664333:
        m1=114
        m2=138
        mass1=114.0
        mass2=138.0
if randomnumber >0.370363664333 and randomnumber <=0.370363664333:
        m1=90
        m2=162
        mass1=90.0
        mass2=162.0
if randomnumber >0.370363664333 and randomnumber <=0.370363664333:
        m1=91
        m2=161
        mass1=91.0
        mass2=161.0
if randomnumber >0.370363664333 and randomnumber <=0.370363664333:
        m1=92
        m2=160
        mass1=92.0
        mass2=160.0
if randomnumber >0.370363664333 and randomnumber <=0.370363664334:
        m1=93
        m2=159
        mass1=93.0
        mass2=159.0
if randomnumber >0.370363664334 and randomnumber <=0.370363664334:
        m1=94
        m2=158
        mass1=94.0
        mass2=158.0
if randomnumber >0.370363664334 and randomnumber <=0.370363664861:
        m1=95
        m2=157
        mass1=95.0
        mass2=157.0
if randomnumber >0.370363664861 and randomnumber <=0.370363690334:
        m1=96
        m2=156
        mass1=96.0
        mass2=156.0
if randomnumber >0.370363690334 and randomnumber <=0.370364277748:
        m1=97
        m2=155
        mass1=97.0
        mass2=155.0
if randomnumber >0.370364277748 and randomnumber <=0.370375319996:
        m1=98
```

```
    m2=154
    mass1=98.0
    mass2=154.0
if randomnumber >0.370375319996 and randomnumber <=0.370587166687:
    m1=99
    m2=153
    mass1=99.0
    mass2=153.0
if randomnumber >0.370587166687 and randomnumber <=0.371388932406:
    m1=100
    m2=152
    mass1=100.0
    mass2=152.0
if randomnumber >0.371388932406 and randomnumber <=0.372168590812:
    m1=101
    m2=151
    mass1=101.0
    mass2=151.0
if randomnumber >0.372168590812 and randomnumber <=0.382088866426:
    m1=102
    m2=150
    mass1=102.0
    mass2=150.0
if randomnumber >0.382088866426 and randomnumber <=0.403625422504:
    m1=103
    m2=149
    mass1=103.0
    mass2=149.0
if randomnumber >0.403625422504 and randomnumber <=0.427874219463:
    m1=104
    m2=148
    mass1=104.0
    mass2=148.0
if randomnumber >0.427874219463 and randomnumber <=0.447723469021:
    m1=105
    m2=147
    mass1=105.0
    mass2=147.0
if randomnumber >0.447723469021 and randomnumber <=0.459954732694:
    m1=106
    m2=146
    mass1=106.0
    mass2=146.0
if randomnumber >0.459954732694 and randomnumber <=0.463264706978:
    m1=107
    m2=145
    mass1=107.0
    mass2=145.0
if randomnumber >0.463264706978 and randomnumber <=0.464478830009:
    m1=108
    m2=144
    mass1=108.0
    mass2=144.0
if randomnumber >0.464478830009 and randomnumber <=0.464512244756:
    m1=109
    m2=143
    mass1=109.0
    mass2=143.0
```

```
if randomnumber >0.464512244756 and randomnumber <=0.464512291749:
    m1=110
    m2=142
    mass1=110.0
    mass2=142.0
if randomnumber >0.464512291749 and randomnumber <=0.464512293178:
    m1=111
    m2=141
    mass1=111.0
    mass2=141.0
if randomnumber >0.464512293178 and randomnumber <=0.464512293211:
    m1=112
    m2=140
    mass1=112.0
    mass2=140.0
if randomnumber >0.464512293211 and randomnumber <=0.464512293211:
    m1=113
    m2=139
    mass1=113.0
    mass2=139.0
if randomnumber >0.464512293211 and randomnumber <=0.464512296284:
    m1=114
    m2=138
    mass1=114.0
    mass2=138.0
if randomnumber >0.464512296284 and randomnumber <=0.464512296285:
    m1=115
    m2=137
    mass1=115.0
    mass2=137.0
if randomnumber >0.464512296285 and randomnumber <=0.464512296285:
    m1=116
    m2=136
    mass1=116.0
    mass2=136.0
if randomnumber >0.464512296285 and randomnumber <=0.464512296285:
    m1=93
    m2=159
    mass1=93.0
    mass2=159.0
if randomnumber >0.464512296285 and randomnumber <=0.464512296285:
    m1=95
    m2=157
    mass1=95.0
    mass2=157.0
if randomnumber >0.464512296285 and randomnumber <=0.464512296308:
    m1=97
    m2=155
    mass1=97.0
    mass2=155.0
if randomnumber >0.464512296308 and randomnumber <=0.464512296331:
    m1=98
    m2=154
    mass1=98.0
    mass2=154.0
if randomnumber >0.464512296331 and randomnumber <=0.464512379981:
    m1=99
    m2=153
```

```
        mass1=99.0
        mass2=153.0
if randomnumber >0.464512379981 and randomnumber <=0.464512395853:
        m1=100
        m2=152
        mass1=100.0
        mass2=152.0
if randomnumber >0.464512395853 and randomnumber <=0.464582653505:
        m1=101
        m2=151
        mass1=101.0
        mass2=151.0
if randomnumber >0.464582653505 and randomnumber <=0.464962867664:
        m1=102
        m2=150
        mass1=102.0
        mass2=150.0
if randomnumber >0.464962867664 and randomnumber <=0.465152974744:
        m1=103
        m2=149
        mass1=103.0
        mass2=149.0
if randomnumber >0.465152974744 and randomnumber <=0.468215012741:
        m1=104
        m2=148
        mass1=104.0
        mass2=148.0
if randomnumber >0.468215012741 and randomnumber <=0.477219534979:
        m1=105
        m2=147
        mass1=105.0
        mass2=147.0
if randomnumber >0.477219534979 and randomnumber <=0.487530105778:
        m1=106
        m2=146
        mass1=106.0
        mass2=146.0
if randomnumber >0.487530105778 and randomnumber <=0.497813338969:
        m1=107
        m2=145
        mass1=107.0
        mass2=145.0
if randomnumber >0.497813338969 and randomnumber <=0.50134939075:
        m1=108
        m2=144
        mass1=108.0
        mass2=144.0
if randomnumber >0.50134939075 and randomnumber <=0.503629968545:
        m1=109
        m2=143
        mass1=109.0
        mass2=143.0
if randomnumber >0.503629968545 and randomnumber <=0.503856839624:
        m1=110
        m2=142
        mass1=110.0
        mass2=142.0
if randomnumber >0.503856839624 and randomnumber <=0.503894682554:
```

```
        m1=111
        m2=141
        mass1=111.0
        mass2=141.0
if randomnumber >0.503894682554 and randomnumber <=0.503898122303:
        m1=112
        m2=140
        mass1=112.0
        mass2=140.0
if randomnumber >0.503898122303 and randomnumber <=0.503898566816:
        m1=113
        m2=139
        mass1=113.0
        mass2=139.0
if randomnumber >0.503898566816 and randomnumber <=0.50390006359:
        m1=114
        m2=138
        mass1=114.0
        mass2=138.0
if randomnumber >0.50390006359 and randomnumber <=0.503900073545:
        m1=115
        m2=137
        mass1=115.0
        mass2=137.0
if randomnumber >0.503900073545 and randomnumber <=0.50390007437:
        m1=116
        m2=136
        mass1=116.0
        mass2=136.0
if randomnumber >0.50390007437 and randomnumber <=0.503900074372:
        m1=117
        m2=135
        mass1=117.0
        mass2=135.0
if randomnumber >0.503900074372 and randomnumber <=0.503900074372:
        m1=118
        m2=134
        mass1=118.0
        mass2=134.0
if randomnumber >0.503900074372 and randomnumber <=0.503900074372:
        m1=119
        m2=133
        mass1=119.0
        mass2=133.0
if randomnumber >0.503900074372 and randomnumber <=0.503900074372:
        m1=95
        m2=157
        mass1=95.0
        mass2=157.0
if randomnumber >0.503900074372 and randomnumber <=0.503900074372:
        m1=96
        m2=156
        mass1=96.0
        mass2=156.0
if randomnumber >0.503900074372 and randomnumber <=0.503900074372:
        m1=97
        m2=155
        mass1=97.0
```

```
        mass2=155.0
if randomnumber >0.503900074372 and randomnumber <=0.503900074372:
        m1=98
        m2=154
        mass1=98.0
        mass2=154.0
if randomnumber >0.503900074372 and randomnumber <=0.503900074377:
        m1=99
        m2=153
        mass1=99.0
        mass2=153.0
if randomnumber >0.503900074377 and randomnumber <=0.503900074777:
        m1=100
        m2=152
        mass1=100.0
        mass2=152.0
if randomnumber >0.503900074777 and randomnumber <=0.503900088502:
        m1=101
        m2=151
        mass1=101.0
        mass2=151.0
if randomnumber >0.503900088502 and randomnumber <=0.503900520589:
        m1=102
        m2=150
        mass1=102.0
        mass2=150.0
if randomnumber >0.503900520589 and randomnumber <=0.503907665533:
        m1=103
        m2=149
        mass1=103.0
        mass2=149.0
if randomnumber >0.503907665533 and randomnumber <=0.504045521068:
        m1=104
        m2=148
        mass1=104.0
        mass2=148.0
if randomnumber >0.504045521068 and randomnumber <=0.504302208778:
        m1=105
        m2=147
        mass1=105.0
        mass2=147.0
if randomnumber >0.504302208778 and randomnumber <=0.506132687547:
        m1=106
        m2=146
        mass1=106.0
        mass2=146.0
if randomnumber >0.506132687547 and randomnumber <=0.510862833608:
        m1=107
        m2=145
        mass1=107.0
        mass2=145.0
if randomnumber >0.510862833608 and randomnumber <=0.518102159736:
        m1=108
        m2=144
        mass1=108.0
        mass2=144.0
if randomnumber >0.518102159736 and randomnumber <=0.523726962901:
        m1=109
```

```
        m2=143
        mass1=109.0
        mass2=143.0
if randomnumber >0.523726962901 and randomnumber <=0.526539364483:
        m1=110
        m2=142
        mass1=110.0
        mass2=142.0
if randomnumber >0.526539364483 and randomnumber <=0.527922816882:
        m1=111
        m2=141
        mass1=111.0
        mass2=141.0
if randomnumber >0.527922816882 and randomnumber <=0.528443100697:
        m1=112
        m2=140
        mass1=112.0
        mass2=140.0
if randomnumber >0.528443100697 and randomnumber <=0.528655941483:
        m1=113
        m2=139
        mass1=113.0
        mass2=139.0
if randomnumber >0.528655941483 and randomnumber <=0.528745233792:
        m1=114
        m2=138
        mass1=114.0
        mass2=138.0
if randomnumber >0.528745233792 and randomnumber <=0.528755407561:
        m1=115
        m2=137
        mass1=115.0
        mass2=137.0
if randomnumber >0.528755407561 and randomnumber <=0.528756508962:
        m1=116
        m2=136
        mass1=116.0
        mass2=136.0
if randomnumber >0.528756508962 and randomnumber <=0.528756557308:
        m1=117
        m2=135
        mass1=117.0
        mass2=135.0
if randomnumber >0.528756557308 and randomnumber <=0.528756558568:
        m1=118
        m2=134
        mass1=118.0
        mass2=134.0
if randomnumber >0.528756558568 and randomnumber <=0.528756558585:
        m1=119
        m2=133
        mass1=119.0
        mass2=133.0
if randomnumber >0.528756558585 and randomnumber <=0.528756558585:
        m1=120
        m2=132
        mass1=120.0
        mass2=132.0
```

```
if randomnumber >0.528756558585 and randomnumber <=0.528756558585:
    m1=121
    m2=131
    mass1=121.0
    mass2=131.0
if randomnumber >0.528756558585 and randomnumber <=0.528756558585:
    m1=122
    m2=130
    mass1=122.0
    mass2=130.0
if randomnumber >0.528756558585 and randomnumber <=0.528756558585:
    m1=124
    m2=128
    mass1=124.0
    mass2=128.0
if randomnumber >0.528756558585 and randomnumber <=0.528756558585:
    m1=99
    m2=153
    mass1=99.0
    mass2=153.0
if randomnumber >0.528756558585 and randomnumber <=0.528756558586:
    m1=101
    m2=151
    mass1=101.0
    mass2=151.0
if randomnumber >0.528756558586 and randomnumber <=0.528756558597:
    m1=102
    m2=150
    mass1=102.0
    mass2=150.0
if randomnumber >0.528756558597 and randomnumber <=0.528756559868:
    m1=103
    m2=149
    mass1=103.0
    mass2=149.0
if randomnumber >0.528756559868 and randomnumber <=0.528756590894:
    m1=104
    m2=148
    mass1=104.0
    mass2=148.0
if randomnumber >0.528756590894 and randomnumber <=0.528756737577:
    m1=105
    m2=147
    mass1=105.0
    mass2=147.0
if randomnumber >0.528756737577 and randomnumber <=0.528758108393:
    m1=106
    m2=146
    mass1=106.0
    mass2=146.0
if randomnumber >0.528758108393 and randomnumber <=0.528759362291:
    m1=107
    m2=145
    mass1=107.0
    mass2=145.0
if randomnumber >0.528759362291 and randomnumber <=0.528983325078:
    m1=108
    m2=144
```

```
        mass1=108.0
        mass2=144.0
if randomnumber >0.528983325078 and randomnumber <=0.529299974781:
        m1=109
        m2=143
        mass1=109.0
        mass2=143.0
if randomnumber >0.529299974781 and randomnumber <=0.529591828596:
        m1=110
        m2=142
        mass1=110.0
        mass2=142.0
if randomnumber >0.529591828596 and randomnumber <=0.529679014101:
        m1=111
        m2=141
        mass1=111.0
        mass2=141.0
if randomnumber >0.529679014101 and randomnumber <=0.529880598457:
        m1=112
        m2=140
        mass1=112.0
        mass2=140.0
if randomnumber >0.529880598457 and randomnumber <=0.530126453358:
        m1=113
        m2=139
        mass1=113.0
        mass2=139.0
if randomnumber >0.530126453358 and randomnumber <=0.530307048758:
        m1=114
        m2=138
        mass1=114.0
        mass2=138.0
if randomnumber >0.530307048758 and randomnumber <=0.530407908715:
        m1=115
        m2=137
        mass1=115.0
        mass2=137.0
if randomnumber >0.530407908715 and randomnumber <=0.530445932391:
        m1=116
        m2=136
        mass1=116.0
        mass2=136.0
if randomnumber >0.530445932391 and randomnumber <=0.530454020595:
        m1=117
        m2=135
        mass1=117.0
        mass2=135.0
if randomnumber >0.530454020595 and randomnumber <=0.530454732265:
        m1=118
        m2=134
        mass1=118.0
        mass2=134.0
if randomnumber >0.530454732265 and randomnumber <=0.530454778411:
        m1=119
        m2=133
        mass1=119.0
        mass2=133.0
if randomnumber >0.530454778411 and randomnumber <=0.530454779964:
```

```
        m1=120
        m2=132
        mass1=120.0
        mass2=132.0
if randomnumber >0.530454779964 and randomnumber <=0.530454780015:
        m1=121
        m2=131
        mass1=121.0
        mass2=131.0
if randomnumber >0.530454780015 and randomnumber <=0.530454780016:
        m1=122
        m2=130
        mass1=122.0
        mass2=130.0
if randomnumber >0.530454780016 and randomnumber <=0.530454780016:
        m1=123
        m2=129
        mass1=123.0
        mass2=129.0
if randomnumber >0.530454780016 and randomnumber <=0.530454780016:
        m1=124
        m2=128
        mass1=124.0
        mass2=128.0
if randomnumber >0.530454780016 and randomnumber <=0.530454780016:
        m1=99
        m2=153
        mass1=99.0
        mass2=153.0
if randomnumber >0.530454780016 and randomnumber <=0.530454780016:
        m1=101
        m2=151
        mass1=101.0
        mass2=151.0
if randomnumber >0.530454780016 and randomnumber <=0.530454780016:
        m1=102
        m2=150
        mass1=102.0
        mass2=150.0
if randomnumber >0.530454780016 and randomnumber <=0.530454780016:
        m1=103
        m2=149
        mass1=103.0
        mass2=149.0
if randomnumber >0.530454780016 and randomnumber <=0.530454780018:
        m1=104
        m2=148
        mass1=104.0
        mass2=148.0
if randomnumber >0.530454780018 and randomnumber <=0.530454780155:
        m1=105
        m2=147
        mass1=105.0
        mass2=147.0
if randomnumber >0.530454780155 and randomnumber <=0.530454785323:
        m1=106
        m2=146
        mass1=106.0
```

```
        mass2=146.0
if randomnumber >0.530454785323 and randomnumber <=0.530454895519:
        m1=107
        m2=145
        mass1=107.0
        mass2=145.0
if randomnumber >0.530454895519 and randomnumber <=0.530454967251:
        m1=108
        m2=144
        mass1=108.0
        mass2=144.0
if randomnumber >0.530454967251 and randomnumber <=0.530454969522:
        m1=109
        m2=143
        mass1=109.0
        mass2=143.0
if randomnumber >0.530454969522 and randomnumber <=0.530454970996:
        m1=110
        m2=142
        mass1=110.0
        mass2=142.0
if randomnumber >0.530454970996 and randomnumber <=0.53045510226:
        m1=111
        m2=141
        mass1=111.0
        mass2=141.0
if randomnumber >0.53045510226 and randomnumber <=0.530455187547:
        m1=112
        m2=140
        mass1=112.0
        mass2=140.0
if randomnumber >0.530455187547 and randomnumber <=0.530457299971:
        m1=113
        m2=139
        mass1=113.0
        mass2=139.0
if randomnumber >0.530457299971 and randomnumber <=0.530525389253:
        m1=114
        m2=138
        mass1=114.0
        mass2=138.0
if randomnumber >0.530525389253 and randomnumber <=0.530646830927:
        m1=115
        m2=137
        mass1=115.0
        mass2=137.0
if randomnumber >0.530646830927 and randomnumber <=0.530849324655:
        m1=116
        m2=136
        mass1=116.0
        mass2=136.0
if randomnumber >0.530849324655 and randomnumber <=0.530974437702:
        m1=117
        m2=135
        mass1=117.0
        mass2=135.0
if randomnumber >0.530974437702 and randomnumber <=0.53102317032:
        m1=118
```

```
    m2=134
    mass1=118.0
    mass2=134.0
if randomnumber >0.53102317032 and randomnumber <=0.531032512439:
    m1=119
    m2=133
    mass1=119.0
    mass2=133.0
if randomnumber >0.531032512439 and randomnumber <=0.531033884951:
    m1=120
    m2=132
    mass1=120.0
    mass2=132.0
if randomnumber >0.531033884951 and randomnumber <=0.531034024461:
    m1=121
    m2=131
    mass1=121.0
    mass2=131.0
if randomnumber >0.531034024461 and randomnumber <=0.531034033611:
    m1=122
    m2=130
    mass1=122.0
    mass2=130.0
if randomnumber >0.531034033611 and randomnumber <=0.531034033816:
    m1=123
    m2=129
    mass1=123.0
    mass2=129.0
if randomnumber >0.531034033816 and randomnumber <=0.531034033816:
    m1=124
    m2=128
    mass1=124.0
    mass2=128.0
if randomnumber >0.531034033816 and randomnumber <=0.531034033816:
    m1=125
    m2=127
    mass1=125.0
    mass2=127.0
if randomnumber >0.531034033816 and randomnumber <=0.531034033816:
    m1=126
    m2=126
    mass1=126.0
    mass2=126.0
if randomnumber >0.531034033816 and randomnumber <=0.531034033816:
    m1=128
    m2=124
    mass1=128.0
    mass2=124.0
if randomnumber >0.531034033816 and randomnumber <=0.531034033816:
    m1=129
    m2=123
    mass1=129.0
    mass2=123.0
if randomnumber >0.531034033816 and randomnumber <=0.531034033816:
    m1=130
    m2=122
    mass1=130.0
    mass2=122.0
```

```
if randomnumber >0.531034033816 and randomnumber <=0.531034033816:
    m1=103
    m2=149
    mass1=103.0
    mass2=149.0
if randomnumber >0.531034033816 and randomnumber <=0.531034033816:
    m1=105
    m2=147
    mass1=105.0
    mass2=147.0
if randomnumber >0.531034033816 and randomnumber <=0.531034033816:
    m1=106
    m2=146
    mass1=106.0
    mass2=146.0
if randomnumber >0.531034033816 and randomnumber <=0.531034033821:
    m1=107
    m2=145
    mass1=107.0
    mass2=145.0
if randomnumber >0.531034033821 and randomnumber <=0.531034033943:
    m1=108
    m2=144
    mass1=108.0
    mass2=144.0
if randomnumber >0.531034033943 and randomnumber <=0.53103403406:
    m1=109
    m2=143
    mass1=109.0
    mass2=143.0
if randomnumber >0.53103403406 and randomnumber <=0.53103403406:
    m1=110
    m2=142
    mass1=110.0
    mass2=142.0
if randomnumber >0.53103403406 and randomnumber <=0.53103403406:
    m1=111
    m2=141
    mass1=111.0
    mass2=141.0
if randomnumber >0.53103403406 and randomnumber <=0.53103403406:
    m1=112
    m2=140
    mass1=112.0
    mass2=140.0
if randomnumber >0.53103403406 and randomnumber <=0.531034034068:
    m1=113
    m2=139
    mass1=113.0
    mass2=139.0
if randomnumber >0.531034034068 and randomnumber <=0.531034034075:
    m1=114
    m2=138
    mass1=114.0
    mass2=138.0
if randomnumber >0.531034034075 and randomnumber <=0.531042110994:
    m1=115
    m2=137
```

```
        mass1=115.0
        mass2=137.0
if randomnumber >0.531042110994 and randomnumber <=0.531067736844:
        m1=116
        m2=136
        mass1=116.0
        mass2=136.0
if randomnumber >0.531067736844 and randomnumber <=0.531142688374:
        m1=117
        m2=135
        mass1=117.0
        mass2=135.0
if randomnumber >0.531142688374 and randomnumber <=0.53125183976:
        m1=118
        m2=134
        mass1=118.0
        mass2=134.0
if randomnumber >0.53125183976 and randomnumber <=0.531307627006:
        m1=119
        m2=133
        mass1=119.0
        mass2=133.0
if randomnumber >0.531307627006 and randomnumber <=0.531339708706:
        m1=120
        m2=132
        mass1=120.0
        mass2=132.0
if randomnumber >0.531339708706 and randomnumber <=0.531355749555:
        m1=121
        m2=131
        mass1=121.0
        mass2=131.0
if randomnumber >0.531355749555 and randomnumber <=0.531358375965:
        m1=122
        m2=130
        mass1=122.0
        mass2=130.0
if randomnumber >0.531358375965 and randomnumber <=0.53135968917:
        m1=123
        m2=129
        mass1=123.0
        mass2=129.0
if randomnumber >0.53135968917 and randomnumber <=0.531359689174:
        m1=124
        m2=128
        mass1=124.0
        mass2=128.0
if randomnumber >0.531359689174 and randomnumber <=0.531359689174:
        m1=125
        m2=127
        mass1=125.0
        mass2=127.0
if randomnumber >0.531359689174 and randomnumber <=0.531359689174:
        m1=126
        m2=126
        mass1=126.0
        mass2=126.0
if randomnumber >0.531359689174 and randomnumber <=0.531359689174:
```

```
        m1=127
        m2=125
        mass1=127.0
        mass2=125.0
if randomnumber >0.531359689174 and randomnumber <=0.531359689174:
        m1=128
        m2=124
        mass1=128.0
        mass2=124.0
if randomnumber >0.531359689174 and randomnumber <=0.531359689174:
        m1=129
        m2=123
        mass1=129.0
        mass2=123.0
if randomnumber >0.531359689174 and randomnumber <=0.53135968927:
        m1=130
        m2=122
        mass1=130.0
        mass2=122.0
if randomnumber >0.53135968927 and randomnumber <=0.531359689272:
        m1=131
        m2=121
        mass1=131.0
        mass2=121.0
if randomnumber >0.531359689272 and randomnumber <=0.531359689272:
        m1=105
        m2=147
        mass1=105.0
        mass2=147.0
if randomnumber >0.531359689272 and randomnumber <=0.531359689272:
        m1=106
        m2=146
        mass1=106.0
        mass2=146.0
if randomnumber >0.531359689272 and randomnumber <=0.531359689272:
        m1=107
        m2=145
        mass1=107.0
        mass2=145.0
if randomnumber >0.531359689272 and randomnumber <=0.531359689272:
        m1=108
        m2=144
        mass1=108.0
        mass2=144.0
if randomnumber >0.531359689272 and randomnumber <=0.531359689272:
        m1=109
        m2=143
        mass1=109.0
        mass2=143.0
if randomnumber >0.531359689272 and randomnumber <=0.531359689272:
        m1=110
        m2=142
        mass1=110.0
        mass2=142.0
if randomnumber >0.531359689272 and randomnumber <=0.531359689272:
        m1=111
        m2=141
        mass1=111.0
```

```
        mass2=141.0
if randomnumber >0.531359689272 and randomnumber <=0.531359689272:
    m1=112
    m2=140
    mass1=112.0
    mass2=140.0
if randomnumber >0.531359689272 and randomnumber <=0.531359689272:
    m1=113
    m2=139
    mass1=113.0
    mass2=139.0
if randomnumber >0.531359689272 and randomnumber <=0.531359689272:
    m1=114
    m2=138
    mass1=114.0
    mass2=138.0
if randomnumber >0.531359689272 and randomnumber <=0.531359739146:
    m1=115
    m2=137
    mass1=115.0
    mass2=137.0
if randomnumber >0.531359739146 and randomnumber <=0.531359777554:
    m1=116
    m2=136
    mass1=116.0
    mass2=136.0
if randomnumber >0.531359777554 and randomnumber <=0.531370870601:
    m1=117
    m2=135
    mass1=117.0
    mass2=135.0
if randomnumber >0.531370870601 and randomnumber <=0.531379410667:
    m1=118
    m2=134
    mass1=118.0
    mass2=134.0
if randomnumber >0.531379410667 and randomnumber <=0.531465952383:
    m1=119
    m2=133
    mass1=119.0
    mass2=133.0
if randomnumber >0.531465952383 and randomnumber <=0.531509223241:
    m1=120
    m2=132
    mass1=120.0
    mass2=132.0
if randomnumber >0.531509223241 and randomnumber <=0.531636449304:
    m1=121
    m2=131
    mass1=121.0
    mass2=131.0
if randomnumber >0.531636449304 and randomnumber <=0.531700062336:
    m1=122
    m2=130
    mass1=122.0
    mass2=130.0
if randomnumber >0.531700062336 and randomnumber <=0.531728280734:
    m1=123
```

```
    m2=129
    mass1=123.0
    mass2=129.0
if randomnumber >0.531728280734 and randomnumber <=0.531729828342:
    m1=124
    m2=128
    mass1=124.0
    mass2=128.0
if randomnumber >0.531729828342 and randomnumber <=0.531730220891:
    m1=125
    m2=127
    mass1=125.0
    mass2=127.0
if randomnumber >0.531730220891 and randomnumber <=0.5317303508:
    m1=126
    m2=126
    mass1=126.0
    mass2=126.0
if randomnumber >0.5317303508 and randomnumber <=0.531730400899:
    m1=127
    m2=125
    mass1=127.0
    mass2=125.0
if randomnumber >0.531730400899 and randomnumber <=0.531730423266:
    m1=128
    m2=124
    mass1=128.0
    mass2=124.0
if randomnumber >0.531730423266 and randomnumber <=0.53173042391:
    m1=129
    m2=123
    mass1=129.0
    mass2=123.0
if randomnumber >0.53173042391 and randomnumber <=0.53173129938:
    m1=130
    m2=122
    mass1=130.0
    mass2=122.0
if randomnumber >0.53173129938 and randomnumber <=0.531731352188:
    m1=131
    m2=121
    mass1=131.0
    mass2=121.0
if randomnumber >0.531731352188 and randomnumber <=0.531731355396:
    m1=132
    m2=120
    mass1=132.0
    mass2=120.0
if randomnumber >0.531731355396 and randomnumber <=0.531731355412:
    m1=133
    m2=119
    mass1=133.0
    mass2=119.0
if randomnumber >0.531731355412 and randomnumber <=0.531731355412:
    m1=134
    m2=118
    mass1=134.0
    mass2=118.0
```

```
if randomnumber >0.531731355412 and randomnumber <=0.531731355412:
    m1=136
    m2=116
    mass1=136.0
    mass2=116.0
if randomnumber >0.531731355412 and randomnumber <=0.531731355412:
    m1=107
    m2=145
    mass1=107.0
    mass2=145.0
if randomnumber >0.531731355412 and randomnumber <=0.531731355412:
    m1=109
    m2=143
    mass1=109.0
    mass2=143.0
if randomnumber >0.531731355412 and randomnumber <=0.531731355412:
    m1=111
    m2=141
    mass1=111.0
    mass2=141.0
if randomnumber >0.531731355412 and randomnumber <=0.531731355412:
    m1=112
    m2=140
    mass1=112.0
    mass2=140.0
if randomnumber >0.531731355412 and randomnumber <=0.531731355412:
    m1=113
    m2=139
    mass1=113.0
    mass2=139.0
if randomnumber >0.531731355412 and randomnumber <=0.531731355412:
    m1=114
    m2=138
    mass1=114.0
    mass2=138.0
if randomnumber >0.531731355412 and randomnumber <=0.531731355414:
    m1=115
    m2=137
    mass1=115.0
    mass2=137.0
if randomnumber >0.531731355414 and randomnumber <=0.531731356251:
    m1=116
    m2=136
    mass1=116.0
    mass2=136.0
if randomnumber >0.531731356251 and randomnumber <=0.531731365989:
    m1=117
    m2=135
    mass1=117.0
    mass2=135.0
if randomnumber >0.531731365989 and randomnumber <=0.53173202711:
    m1=118
    m2=134
    mass1=118.0
    mass2=134.0
if randomnumber >0.53173202711 and randomnumber <=0.531733313205:
    m1=119
    m2=133
```

```
        mass1=119.0
        mass2=133.0
if randomnumber >0.531733313205 and randomnumber <=0.531746368031:
        m1=120
        m2=132
        mass1=120.0
        mass2=132.0
if randomnumber >0.531746368031 and randomnumber <=0.531765411838:
        m1=121
        m2=131
        mass1=121.0
        mass2=131.0
if randomnumber >0.531765411838 and randomnumber <=0.531861218461:
        m1=122
        m2=130
        mass1=122.0
        mass2=130.0
if randomnumber >0.531861218461 and randomnumber <=0.531928379282:
        m1=123
        m2=129
        mass1=123.0
        mass2=129.0
if randomnumber >0.531928379282 and randomnumber <=0.532052136971:
        m1=124
        m2=128
        mass1=124.0
        mass2=128.0
if randomnumber >0.532052136971 and randomnumber <=0.532246559326:
        m1=125
        m2=127
        mass1=125.0
        mass2=127.0
if randomnumber >0.532246559326 and randomnumber <=0.532426013776:
        m1=126
        m2=126
        mass1=126.0
        mass2=126.0
if randomnumber >0.532426013776 and randomnumber <=0.532644610145:
        m1=127
        m2=125
        mass1=127.0
        mass2=125.0
if randomnumber >0.532644610145 and randomnumber <=0.532975447728:
        m1=128
        m2=124
        mass1=128.0
        mass2=124.0
if randomnumber >0.532975447728 and randomnumber <=0.533199777313:
        m1=129
        m2=123
        mass1=129.0
        mass2=123.0
if randomnumber >0.533199777313 and randomnumber <=0.533353954303:
        m1=130
        m2=122
        mass1=130.0
        mass2=122.0
if randomnumber >0.533353954303 and randomnumber <=0.533440088384:
```

```
    m1=131
    m2=121
    mass1=131.0
    mass2=121.0
if randomnumber >0.533440088384 and randomnumber <=0.53346366114:
    m1=132
    m2=120
    mass1=132.0
    mass2=120.0
if randomnumber >0.53346366114 and randomnumber <=0.533463876321:
    m1=133
    m2=119
    mass1=133.0
    mass2=119.0
if randomnumber >0.533463876321 and randomnumber <=0.533463881376:
    m1=134
    m2=118
    mass1=134.0
    mass2=118.0
if randomnumber >0.533463881376 and randomnumber <=0.533463881415:
    m1=135
    m2=117
    mass1=135.0
    mass2=117.0
if randomnumber >0.533463881415 and randomnumber <=0.533463881415:
    m1=136
    m2=116
    mass1=136.0
    mass2=116.0
if randomnumber >0.533463881415 and randomnumber <=0.533463881415:
    m1=111
    m2=141
    mass1=111.0
    mass2=141.0
if randomnumber >0.533463881415 and randomnumber <=0.533463881415:
    m1=112
    m2=140
    mass1=112.0
    mass2=140.0
if randomnumber >0.533463881415 and randomnumber <=0.533463881415:
    m1=113
    m2=139
    mass1=113.0
    mass2=139.0
if randomnumber >0.533463881415 and randomnumber <=0.533463881415:
    m1=114
    m2=138
    mass1=114.0
    mass2=138.0
if randomnumber >0.533463881415 and randomnumber <=0.533463881415:
    m1=115
    m2=137
    mass1=115.0
    mass2=137.0
if randomnumber >0.533463881415 and randomnumber <=0.533463881415:
    m1=116
    m2=136
    mass1=116.0
```

```
        mass2=136.0
if randomnumber >0.533463881415 and randomnumber <=0.533463881432:
        m1=117
        m2=135
        mass1=117.0
        mass2=135.0
if randomnumber >0.533463881432 and randomnumber <=0.53346388144:
        m1=118
        m2=134
        mass1=118.0
        mass2=134.0
if randomnumber >0.53346388144 and randomnumber <=0.533463908438:
        m1=119
        m2=133
        mass1=119.0
        mass2=133.0
if randomnumber >0.533463908438 and randomnumber <=0.533463929224:
        m1=120
        m2=132
        mass1=120.0
        mass2=132.0
if randomnumber >0.533463929224 and randomnumber <=0.533468221849:
        m1=121
        m2=131
        mass1=121.0
        mass2=131.0
if randomnumber >0.533468221849 and randomnumber <=0.533471271873:
        m1=122
        m2=130
        mass1=122.0
        mass2=130.0
if randomnumber >0.533471271873 and randomnumber <=0.533553814786:
        m1=123
        m2=129
        mass1=123.0
        mass2=129.0
if randomnumber >0.533553814786 and randomnumber <=0.533577751856:
        m1=124
        m2=128
        mass1=124.0
        mass2=128.0
if randomnumber >0.533577751856 and randomnumber <=0.53401147091:
        m1=125
        m2=127
        mass1=125.0
        mass2=127.0
if randomnumber >0.53401147091 and randomnumber <=0.534137250452:
        m1=126
        m2=126
        mass1=126.0
        mass2=126.0
if randomnumber >0.534137250452 and randomnumber <=0.536570337079:
        m1=127
        m2=125
        mass1=127.0
        mass2=125.0
if randomnumber >0.536570337079 and randomnumber <=0.538828299216:
        m1=128
```

```
        m2=124
        mass1=128.0
        mass2=124.0
if randomnumber >0.538828299216 and randomnumber <=0.542001026283:
        m1=129
        m2=123
        mass1=129.0
        mass2=123.0
if randomnumber >0.542001026283 and randomnumber <=0.546287461507:
        m1=130
        m2=122
        mass1=130.0
        mass2=122.0
if randomnumber >0.546287461507 and randomnumber <=0.550656977077:
        m1=131
        m2=121
        mass1=131.0
        mass2=121.0
if randomnumber >0.550656977077 and randomnumber <=0.5523731067:
        m1=132
        m2=120
        mass1=132.0
        mass2=120.0
if randomnumber >0.5523731067 and randomnumber <=0.552566817373:
        m1=133
        m2=119
        mass1=133.0
        mass2=119.0
if randomnumber >0.552566817373 and randomnumber <=0.552588517729:
        m1=134
        m2=118
        mass1=134.0
        mass2=118.0
if randomnumber >0.552588517729 and randomnumber <=0.55258932538:
        m1=135
        m2=117
        mass1=135.0
        mass2=117.0
if randomnumber >0.55258932538 and randomnumber <=0.552589336281:
        m1=136
        m2=116
        mass1=136.0
        mass2=116.0
if randomnumber >0.552589336281 and randomnumber <=0.552589336527:
        m1=137
        m2=115
        mass1=137.0
        mass2=115.0
if randomnumber >0.552589336527 and randomnumber <=0.552589336529:
        m1=138
        m2=114
        mass1=138.0
        mass2=114.0
if randomnumber >0.552589336529 and randomnumber <=0.552589336529:
        m1=113
        m2=139
        mass1=113.0
        mass2=139.0
```

```
if randomnumber >0.552589336529 and randomnumber <=0.552589336529:
    m1=115
    m2=137
    mass1=115.0
    mass2=137.0
if randomnumber >0.552589336529 and randomnumber <=0.552589336529:
    m1=117
    m2=135
    mass1=117.0
    mass2=135.0
if randomnumber >0.552589336529 and randomnumber <=0.552589336529:
    m1=118
    m2=134
    mass1=118.0
    mass2=134.0
if randomnumber >0.552589336529 and randomnumber <=0.552589336529:
    m1=119
    m2=133
    mass1=119.0
    mass2=133.0
if randomnumber >0.552589336529 and randomnumber <=0.552589336765:
    m1=120
    m2=132
    mass1=120.0
    mass2=132.0
if randomnumber >0.552589336765 and randomnumber <=0.552589336905:
    m1=121
    m2=131
    mass1=121.0
    mass2=131.0
if randomnumber >0.552589336905 and randomnumber <=0.552589559443:
    m1=122
    m2=130
    mass1=122.0
    mass2=130.0
if randomnumber >0.552589559443 and randomnumber <=0.552589677491:
    m1=123
    m2=129
    mass1=123.0
    mass2=129.0
if randomnumber >0.552589677491 and randomnumber <=0.55259024231:
    m1=124
    m2=128
    mass1=124.0
    mass2=128.0
if randomnumber >0.55259024231 and randomnumber <=0.552590430583:
    m1=125
    m2=127
    mass1=125.0
    mass2=127.0
if randomnumber >0.552590430583 and randomnumber <=0.552612560207:
    m1=126
    m2=126
    mass1=126.0
    mass2=126.0
if randomnumber >0.552612560207 and randomnumber <=0.552620320811:
    m1=127
    m2=125
```

```
        mass1=127.0
        mass2=125.0
if randomnumber >0.552620320811 and randomnumber <=0.553295483471:
        m1=128
        m2=124
        mass1=128.0
        mass2=124.0
if randomnumber >0.553295483471 and randomnumber <=0.553619774713:
        m1=129
        m2=123
        mass1=129.0
        mass2=123.0
if randomnumber >0.553619774713 and randomnumber <=0.560279645226:
        m1=130
        m2=122
        mass1=130.0
        mass2=122.0
if randomnumber >0.560279645226 and randomnumber <=0.563625853137:
        m1=131
        m2=121
        mass1=131.0
        mass2=121.0
if randomnumber >0.563625853137 and randomnumber <=0.577183324033:
        m1=132
        m2=120
        mass1=132.0
        mass2=120.0
if randomnumber >0.577183324033 and randomnumber <=0.580262922489:
        m1=133
        m2=119
        mass1=133.0
        mass2=119.0
if randomnumber >0.580262922489 and randomnumber <=0.582516219159:
        m1=134
        m2=118
        mass1=134.0
        mass2=118.0
if randomnumber >0.582516219159 and randomnumber <=0.583642867494:
        m1=135
        m2=117
        mass1=135.0
        mass2=117.0
if randomnumber >0.583642867494 and randomnumber <=0.583659377149:
        m1=136
        m2=116
        mass1=136.0
        mass2=116.0
if randomnumber >0.583659377149 and randomnumber <=0.583660930406:
        m1=137
        m2=115
        mass1=137.0
        mass2=115.0
if randomnumber >0.583660930406 and randomnumber <=0.583660967175:
        m1=138
        m2=114
        mass1=138.0
        mass2=114.0
if randomnumber >0.583660967175 and randomnumber <=0.583660968158:
```

```
        m1=139
        m2=113
        mass1=139.0
        mass2=113.0
if randomnumber >0.583660968158 and randomnumber <=0.58366096819:
        m1=140
        m2=112
        mass1=140.0
        mass2=112.0
if randomnumber >0.58366096819 and randomnumber <=0.583660968193:
        m1=141
        m2=111
        mass1=141.0
        mass2=111.0
if randomnumber >0.583660968193 and randomnumber <=0.583660968193:
        m1=115
        m2=137
        mass1=115.0
        mass2=137.0
if randomnumber >0.583660968193 and randomnumber <=0.583660968193:
        m1=117
        m2=135
        mass1=117.0
        mass2=135.0
if randomnumber >0.583660968193 and randomnumber <=0.583660968193:
        m1=118
        m2=134
        mass1=118.0
        mass2=134.0
if randomnumber >0.583660968193 and randomnumber <=0.583660968193:
        m1=119
        m2=133
        mass1=119.0
        mass2=133.0
if randomnumber >0.583660968193 and randomnumber <=0.583660968193:
        m1=120
        m2=132
        mass1=120.0
        mass2=132.0
if randomnumber >0.583660968193 and randomnumber <=0.583660968195:
        m1=121
        m2=131
        mass1=121.0
        mass2=131.0
if randomnumber >0.583660968195 and randomnumber <=0.583660968196:
        m1=122
        m2=130
        mass1=122.0
        mass2=130.0
if randomnumber >0.583660968196 and randomnumber <=0.58366097529:
        m1=123
        m2=129
        mass1=123.0
        mass2=129.0
if randomnumber >0.58366097529 and randomnumber <=0.583660980752:
        m1=124
        m2=128
        mass1=124.0
```

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```
        mass2=128.0
if randomnumber >0.583660980752 and randomnumber <=0.583660980787:
        m1=125
        m2=127
        mass1=125.0
        mass2=127.0
if randomnumber >0.583660980787 and randomnumber <=0.583660980814:
        m1=126
        m2=126
        mass1=126.0
        mass2=126.0
if randomnumber >0.583660980814 and randomnumber <=0.583660995138:
        m1=127
        m2=125
        mass1=127.0
        mass2=125.0
if randomnumber >0.583660995138 and randomnumber <=0.583661005304:
        m1=128
        m2=124
        mass1=128.0
        mass2=124.0
if randomnumber >0.583661005304 and randomnumber <=0.583664817839:
        m1=129
        m2=123
        mass1=129.0
        mass2=123.0
if randomnumber >0.583664817839 and randomnumber <=0.583667523324:
        m1=130
        m2=122
        mass1=130.0
        mass2=122.0
if randomnumber >0.583667523324 and randomnumber <=0.59112393491:
        m1=131
        m2=121
        mass1=131.0
        mass2=121.0
if randomnumber >0.59112393491 and randomnumber <=0.596035514574:
        m1=132
        m2=120
        mass1=132.0
        mass2=120.0
if randomnumber >0.596035514574 and randomnumber <=0.622339320173:
        m1=133
        m2=119
        mass1=133.0
        mass2=119.0
if randomnumber >0.622339320173 and randomnumber <=0.638670660181:
        m1=134
        m2=118
        mass1=134.0
        mass2=118.0
if randomnumber >0.638670660181 and randomnumber <=0.651057138205:
        m1=135
        m2=117
        mass1=135.0
        mass2=117.0
if randomnumber >0.651057138205 and randomnumber <=0.653916104092:
        m1=136
```

```
        m2=116
        mass1=136.0
        mass2=116.0
if randomnumber >0.653916104092 and randomnumber <=0.654646498322:
        m1=137
        m2=115
        mass1=137.0
        mass2=115.0
if randomnumber >0.654646498322 and randomnumber <=0.654712616359:
        m1=138
        m2=114
        mass1=138.0
        mass2=114.0
if randomnumber >0.654712616359 and randomnumber <=0.654717208343:
        m1=139
        m2=113
        mass1=139.0
        mass2=113.0
if randomnumber >0.654717208343 and randomnumber <=0.654718004709:
        m1=140
        m2=112
        mass1=140.0
        mass2=112.0
if randomnumber >0.654718004709 and randomnumber <=0.654718062276:
        m1=141
        m2=111
        mass1=141.0
        mass2=111.0
if randomnumber >0.654718062276 and randomnumber <=0.654718065478:
        m1=142
        m2=110
        mass1=142.0
        mass2=110.0
if randomnumber >0.654718065478 and randomnumber <=0.654718065483:
        m1=143
        m2=109
        mass1=143.0
        mass2=109.0
if randomnumber >0.654718065483 and randomnumber <=0.654718065483:
        m1=144
        m2=108
        mass1=144.0
        mass2=108.0
if randomnumber >0.654718065483 and randomnumber <=0.654718065483:
        m1=121
        m2=131
        mass1=121.0
        mass2=131.0
if randomnumber >0.654718065483 and randomnumber <=0.654718065484:
        m1=123
        m2=129
        mass1=123.0
        mass2=129.0
if randomnumber >0.654718065484 and randomnumber <=0.654718065484:
        m1=125
        m2=127
        mass1=125.0
        mass2=127.0
```

```
if randomnumber >0.654718065484 and randomnumber <=0.654718065484:
    m1=126
    m2=126
    mass1=126.0
    mass2=126.0
if randomnumber >0.654718065484 and randomnumber <=0.654718065484:
    m1=127
    m2=125
    mass1=127.0
    mass2=125.0
if randomnumber >0.654718065484 and randomnumber <=0.654718583988:
    m1=128
    m2=124
    mass1=128.0
    mass2=124.0
if randomnumber >0.654718583988 and randomnumber <=0.654718583991:
    m1=129
    m2=123
    mass1=129.0
    mass2=123.0
if randomnumber >0.654718583991 and randomnumber <=0.654745079668:
    m1=130
    m2=122
    mass1=130.0
    mass2=122.0
if randomnumber >0.654745079668 and randomnumber <=0.654753026665:
    m1=131
    m2=121
    mass1=131.0
    mass2=121.0
if randomnumber >0.654753026665 and randomnumber <=0.656254301895:
    m1=132
    m2=120
    mass1=132.0
    mass2=120.0
if randomnumber >0.656254301895 and randomnumber <=0.660132616006:
    m1=133
    m2=119
    mass1=133.0
    mass2=119.0
if randomnumber >0.660132616006 and randomnumber <=0.669950437723:
    m1=134
    m2=118
    mass1=134.0
    mass2=118.0
if randomnumber >0.669950437723 and randomnumber <=0.676640582941:
    m1=135
    m2=117
    mass1=135.0
    mass2=117.0
if randomnumber >0.676640582941 and randomnumber <=0.69297344798:
    m1=136
    m2=116
    mass1=136.0
    mass2=116.0
if randomnumber >0.69297344798 and randomnumber <=0.702245189685:
    m1=137
    m2=115
```

```
        mass1=137.0
        mass2=115.0
if randomnumber >0.702245189685 and randomnumber <=0.709428372049:
        m1=138
        m2=114
        mass1=138.0
        mass2=114.0
if randomnumber >0.709428372049 and randomnumber <=0.711229016676:
        m1=139
        m2=113
        mass1=139.0
        mass2=113.0
if randomnumber >0.711229016676 and randomnumber <=0.711564796491:
        m1=140
        m2=112
        mass1=140.0
        mass2=112.0
if randomnumber >0.711564796491 and randomnumber <=0.711604496572:
        m1=141
        m2=111
        mass1=141.0
        mass2=111.0
if randomnumber >0.711604496572 and randomnumber <=0.711618464565:
        m1=142
        m2=110
        mass1=142.0
        mass2=110.0
if randomnumber >0.711618464565 and randomnumber <=0.711618529582:
        m1=143
        m2=109
        mass1=143.0
        mass2=109.0
if randomnumber >0.711618529582 and randomnumber <=0.711618532982:
        m1=144
        m2=108
        mass1=144.0
        mass2=108.0
if randomnumber >0.711618532982 and randomnumber <=0.711618532998:
        m1=145
        m2=107
        mass1=145.0
        mass2=107.0
if randomnumber >0.711618532998 and randomnumber <=0.711618532998:
        m1=146
        m2=106
        mass1=146.0
        mass2=106.0
if randomnumber >0.711618532998 and randomnumber <=0.711618532998:
        m1=124
        m2=128
        mass1=124.0
        mass2=128.0
if randomnumber >0.711618532998 and randomnumber <=0.711618532998:
        m1=125
        m2=127
        mass1=125.0
        mass2=127.0
if randomnumber >0.711618532998 and randomnumber <=0.711618532998:
```

```
    m1=126
    m2=126
    mass1=126.0
    mass2=126.0
if randomnumber >0.711618532998 and randomnumber <=0.711618532998:
    m1=127
    m2=125
    mass1=127.0
    mass2=125.0
if randomnumber >0.711618532998 and randomnumber <=0.711618532998:
    m1=128
    m2=124
    mass1=128.0
    mass2=124.0
if randomnumber >0.711618532998 and randomnumber <=0.711618532998:
    m1=129
    m2=123
    mass1=129.0
    mass2=123.0
if randomnumber >0.711618532998 and randomnumber <=0.711618532998:
    m1=130
    m2=122
    mass1=130.0
    mass2=122.0
if randomnumber >0.711618532998 and randomnumber <=0.711618771916:
    m1=131
    m2=121
    mass1=131.0
    mass2=121.0
if randomnumber >0.711618771916 and randomnumber <=0.711618941362:
    m1=132
    m2=120
    mass1=132.0
    mass2=120.0
if randomnumber >0.711618941362 and randomnumber <=0.711863208987:
    m1=133
    m2=119
    mass1=133.0
    mass2=119.0
if randomnumber >0.711863208987 and randomnumber <=0.713021716931:
    m1=134
    m2=118
    mass1=134.0
    mass2=118.0
if randomnumber >0.713021716931 and randomnumber <=0.718238398983:
    m1=135
    m2=117
    mass1=135.0
    mass2=117.0
if randomnumber >0.718238398983 and randomnumber <=0.722487476576:
    m1=136
    m2=116
    mass1=136.0
    mass2=116.0
if randomnumber >0.722487476576 and randomnumber <=0.743295067436:
    m1=137
    m2=115
    mass1=137.0
```

```
        mass2=115.0
if randomnumber >0.743295067436 and randomnumber <=0.765468352548:
        m1=138
        m2=114
        mass1=138.0
        mass2=114.0
if randomnumber >0.765468352548 and randomnumber <=0.78123785953:
        m1=139
        m2=113
        mass1=139.0
        mass2=113.0
if randomnumber >0.78123785953 and randomnumber <=0.789938843949:
        m1=140
        m2=112
        mass1=140.0
        mass2=112.0
if randomnumber >0.789938843949 and randomnumber <=0.79261264273:
        m1=141
        m2=111
        mass1=141.0
        mass2=111.0
if randomnumber >0.79261264273 and randomnumber <=0.79340890139:
        m1=142
        m2=110
        mass1=142.0
        mass2=110.0
if randomnumber >0.79340890139 and randomnumber <=0.793475343864:
        m1=143
        m2=109
        mass1=143.0
        mass2=109.0
if randomnumber >0.793475343864 and randomnumber <=0.793508565101:
        m1=144
        m2=108
        mass1=144.0
        mass2=108.0
if randomnumber >0.793508565101 and randomnumber <=0.793508885339:
        m1=145
        m2=107
        mass1=145.0
        mass2=107.0
if randomnumber >0.793508885339 and randomnumber <=0.79350889398:
        m1=146
        m2=106
        mass1=146.0
        mass2=106.0
if randomnumber >0.79350889398 and randomnumber <=0.793508893994:
        m1=147
        m2=105
        mass1=147.0
        mass2=105.0
if randomnumber >0.793508893994 and randomnumber <=0.793508893994:
        m1=148
        m2=104
        mass1=148.0
        mass2=104.0
if randomnumber >0.793508893994 and randomnumber <=0.793508893994:
        m1=150
```

```
        m2=102
        mass1=150.0
        mass2=102.0
if randomnumber >0.793508893994 and randomnumber <=0.793508893994:
        m1=127
        m2=125
        mass1=127.0
        mass2=125.0
if randomnumber >0.793508893994 and randomnumber <=0.793508893994:
        m1=129
        m2=123
        mass1=129.0
        mass2=123.0
if randomnumber >0.793508893994 and randomnumber <=0.793508894009:
        m1=131
        m2=121
        mass1=131.0
        mass2=121.0
if randomnumber >0.793508894009 and randomnumber <=0.793508895692:
        m1=132
        m2=120
        mass1=132.0
        mass2=120.0
if randomnumber >0.793508895692 and randomnumber <=0.793509010915:
        m1=133
        m2=119
        mass1=133.0
        mass2=119.0
if randomnumber >0.793509010915 and randomnumber <=0.793512795208:
        m1=134
        m2=118
        mass1=134.0
        mass2=118.0
if randomnumber >0.793512795208 and randomnumber <=0.793550282276:
        m1=135
        m2=117
        mass1=135.0
        mass2=117.0
if randomnumber >0.793550282276 and randomnumber <=0.793861046034:
        m1=136
        m2=116
        mass1=136.0
        mass2=116.0
if randomnumber >0.793861046034 and randomnumber <=0.794136214871:
        m1=137
        m2=115
        mass1=137.0
        mass2=115.0
if randomnumber >0.794136214871 and randomnumber <=0.799225641488:
        m1=138
        m2=114
        mass1=138.0
        mass2=114.0
if randomnumber >0.799225641488 and randomnumber <=0.802574571863:
        m1=139
        m2=113
        mass1=139.0
        mass2=113.0
```

```
if randomnumber >0.802574571863 and randomnumber <=0.815433301413:
    m1=140
    m2=112
    mass1=140.0
    mass2=112.0
if randomnumber >0.815433301413 and randomnumber <=0.831627445037:
    m1=141
    m2=111
    mass1=141.0
    mass2=111.0
if randomnumber >0.831627445037 and randomnumber <=0.839515869901:
    m1=142
    m2=110
    mass1=142.0
    mass2=110.0
if randomnumber >0.839515869901 and randomnumber <=0.843355549873:
    m1=143
    m2=109
    mass1=143.0
    mass2=109.0
if randomnumber >0.843355549873 and randomnumber <=0.844246083742:
    m1=144
    m2=108
    mass1=144.0
    mass2=108.0
if randomnumber >0.844246083742 and randomnumber <=0.844404080994:
    m1=145
    m2=107
    mass1=145.0
    mass2=107.0
if randomnumber >0.844404080994 and randomnumber <=0.844416094686:
    m1=146
    m2=106
    mass1=146.0
    mass2=106.0
if randomnumber >0.844416094686 and randomnumber <=0.844416289464:
    m1=147
    m2=105
    mass1=147.0
    mass2=105.0
if randomnumber >0.844416289464 and randomnumber <=0.844416297993:
    m1=148
    m2=104
    mass1=148.0
    mass2=104.0
if randomnumber >0.844416297993 and randomnumber <=0.844416298052:
    m1=149
    m2=103
    mass1=149.0
    mass2=103.0
if randomnumber >0.844416298052 and randomnumber <=0.844416298055:
    m1=150
    m2=102
    mass1=150.0
    mass2=102.0
if randomnumber >0.844416298055 and randomnumber <=0.844416298055:
    m1=151
    m2=101
```

```
        mass1=151.0
        mass2=101.0
if randomnumber >0.844416298055 and randomnumber <=0.844416298055:
        m1=129
        m2=123
        mass1=129.0
        mass2=123.0
if randomnumber >0.844416298055 and randomnumber <=0.844416298055:
        m1=131
        m2=121
        mass1=131.0
        mass2=121.0
if randomnumber >0.844416298055 and randomnumber <=0.844416298055:
        m1=132
        m2=120
        mass1=132.0
        mass2=120.0
if randomnumber >0.844416298055 and randomnumber <=0.844416298063:
        m1=133
        m2=119
        mass1=133.0
        mass2=119.0
if randomnumber >0.844416298063 and randomnumber <=0.844416299203:
        m1=134
        m2=118
        mass1=134.0
        mass2=118.0
if randomnumber >0.844416299203 and randomnumber <=0.844416368111:
        m1=135
        m2=117
        mass1=135.0
        mass2=117.0
if randomnumber >0.844416368111 and randomnumber <=0.84441779767:
        m1=136
        m2=116
        mass1=136.0
        mass2=116.0
if randomnumber >0.84441779767 and randomnumber <=0.844444739543:
        m1=137
        m2=115
        mass1=137.0
        mass2=115.0
if randomnumber >0.844444739543 and randomnumber <=0.844470286312:
        m1=138
        m2=114
        mass1=138.0
        mass2=114.0
if randomnumber >0.844470286312 and randomnumber <=0.845748539756:
        m1=139
        m2=113
        mass1=139.0
        mass2=113.0
if randomnumber >0.845748539756 and randomnumber <=0.854108820767:
        m1=140
        m2=112
        mass1=140.0
        mass2=112.0
if randomnumber >0.854108820767 and randomnumber <=0.864433116852:
```

```
        m1=141
        m2=111
        mass1=141.0
        mass2=111.0
if randomnumber >0.864433116852 and randomnumber <=0.881812492627:
        m1=142
        m2=110
        mass1=142.0
        mass2=110.0
if randomnumber >0.881812492627 and randomnumber <=0.898114631098:
        m1=143
        m2=109
        mass1=143.0
        mass2=109.0
if randomnumber >0.898114631098 and randomnumber <=0.910295060377:
        m1=144
        m2=108
        mass1=144.0
        mass2=108.0
if randomnumber >0.910295060377 and randomnumber <=0.914830132273:
        m1=145
        m2=107
        mass1=145.0
        mass2=107.0
if randomnumber >0.914830132273 and randomnumber <=0.916172075565:
        m1=146
        m2=106
        mass1=146.0
        mass2=106.0
if randomnumber >0.916172075565 and randomnumber <=0.916371121026:
        m1=147
        m2=105
        mass1=147.0
        mass2=105.0
if randomnumber >0.916371121026 and randomnumber <=0.916386049224:
        m1=148
        m2=104
        mass1=148.0
        mass2=104.0
if randomnumber >0.916386049224 and randomnumber <=0.916387274824:
        m1=149
        m2=103
        mass1=149.0
        mass2=103.0
if randomnumber >0.916387274824 and randomnumber <=0.916387342603:
        m1=150
        m2=102
        mass1=150.0
        mass2=102.0
if randomnumber >0.916387342603 and randomnumber <=0.91638734652:
        m1=151
        m2=101
        mass1=151.0
        mass2=101.0
if randomnumber >0.91638734652 and randomnumber <=0.916387346551:
        m1=152
        m2=100
        mass1=152.0
```

```
        mass2=100.0
if randomnumber >0.916387346551 and randomnumber <=0.916387346551:
        m1=153
        m2=99
        mass1=153.0
        mass2=99.0
if randomnumber >0.916387346551 and randomnumber <=0.916387346551:
        m1=154
        m2=98
        mass1=154.0
        mass2=98.0
if randomnumber >0.916387346551 and randomnumber <=0.916387346551:
        m1=133
        m2=119
        mass1=133.0
        mass2=119.0
if randomnumber >0.916387346551 and randomnumber <=0.916387346553:
        m1=135
        m2=117
        mass1=135.0
        mass2=117.0
if randomnumber >0.916387346553 and randomnumber <=0.916387362481:
        m1=137
        m2=115
        mass1=137.0
        mass2=115.0
if randomnumber >0.916387362481 and randomnumber <=0.91638771041:
        m1=138
        m2=114
        mass1=138.0
        mass2=114.0
if randomnumber >0.91638771041 and randomnumber <=0.916393522419:
        m1=139
        m2=113
        mass1=139.0
        mass2=113.0
if randomnumber >0.916393522419 and randomnumber <=0.916451117223:
        m1=140
        m2=112
        mass1=140.0
        mass2=112.0
if randomnumber >0.916451117223 and randomnumber <=0.916858527219:
        m1=141
        m2=111
        mass1=141.0
        mass2=111.0
if randomnumber >0.916858527219 and randomnumber <=0.918549115382:
        m1=142
        m2=110
        mass1=142.0
        mass2=110.0
if randomnumber >0.918549115382 and randomnumber <=0.923153299462:
        m1=143
        m2=109
        mass1=143.0
        mass2=109.0
if randomnumber >0.923153299462 and randomnumber <=0.930548291803:
        m1=144
```

```
        m2=108
        mass1=144.0
        mass2=108.0
if randomnumber >0.930548291803 and randomnumber <=0.940132439104:
        m1=145
        m2=107
        mass1=145.0
        mass2=107.0
if randomnumber >0.940132439104 and randomnumber <=0.946692030301:
        m1=146
        m2=106
        mass1=146.0
        mass2=106.0
if randomnumber >0.946692030301 and randomnumber <=0.9499718259:
        m1=147
        m2=105
        mass1=147.0
        mass2=105.0
if randomnumber >0.9499718259 and randomnumber <=0.950632978035:
        m1=148
        m2=104
        mass1=148.0
        mass2=104.0
if randomnumber >0.950632978035 and randomnumber <=0.950838199875:
        m1=149
        m2=103
        mass1=149.0
        mass2=103.0
if randomnumber >0.950838199875 and randomnumber <=0.950867638299:
        m1=150
        m2=102
        mass1=150.0
        mass2=102.0
if randomnumber >0.950867638299 and randomnumber <=0.95087033987:
        m1=151
        m2=101
        mass1=151.0
        mass2=101.0
if randomnumber >0.95087033987 and randomnumber <=0.950870475991:
        m1=152
        m2=100
        mass1=152.0
        mass2=100.0
if randomnumber >0.950870475991 and randomnumber <=0.950870480798:
        m1=153
        m2=99
        mass1=153.0
        mass2=99.0
if randomnumber >0.950870480798 and randomnumber <=0.950870480901:
        m1=154
        m2=98
        mass1=154.0
        mass2=98.0
if randomnumber >0.950870480901 and randomnumber <=0.950870480901:
        m1=155
        m2=97
        mass1=155.0
        mass2=97.0
```

```
if randomnumber >0.950870480901 and randomnumber <=0.950870480901:
    m1=156
    m2=96
    mass1=156.0
    mass2=96.0
if randomnumber >0.950870480901 and randomnumber <=0.950870480901:
    m1=135
    m2=117
    mass1=135.0
    mass2=117.0
if randomnumber >0.950870480901 and randomnumber <=0.950870480902:
    m1=137
    m2=115
    mass1=137.0
    mass2=115.0
if randomnumber >0.950870480902 and randomnumber <=0.950870480946:
    m1=138
    m2=114
    mass1=138.0
    mass2=114.0
if randomnumber >0.950870480946 and randomnumber <=0.950870482855:
    m1=139
    m2=113
    mass1=139.0
    mass2=113.0
if randomnumber >0.950870482855 and randomnumber <=0.95087048421:
    m1=140
    m2=112
    mass1=140.0
    mass2=112.0
if randomnumber >0.95087048421 and randomnumber <=0.950871777646:
    m1=141
    m2=111
    mass1=141.0
    mass2=111.0
if randomnumber >0.950871777646 and randomnumber <=0.950891924785:
    m1=142
    m2=110
    mass1=142.0
    mass2=110.0
if randomnumber >0.950891924785 and randomnumber <=0.951042494567:
    m1=143
    m2=109
    mass1=143.0
    mass2=109.0
if randomnumber >0.951042494567 and randomnumber <=0.951699997923:
    m1=144
    m2=108
    mass1=144.0
    mass2=108.0
if randomnumber >0.951699997923 and randomnumber <=0.954276951534:
    m1=145
    m2=107
    mass1=145.0
    mass2=107.0
if randomnumber >0.954276951534 and randomnumber <=0.96013866557:
    m1=146
    m2=106
```

```
        mass1=146.0
        mass2=106.0
if randomnumber >0.96013866557 and randomnumber <=0.967009046959:
        m1=147
        m2=105
        mass1=147.0
        mass2=105.0
if randomnumber >0.967009046959 and randomnumber <=0.972038042778:
        m1=148
        m2=104
        mass1=148.0
        mass2=104.0
if randomnumber >0.972038042778 and randomnumber <=0.975212357008:
        m1=149
        m2=103
        mass1=149.0
        mass2=103.0
if randomnumber >0.975212357008 and randomnumber <=0.976782529787:
        m1=150
        m2=102
        mass1=150.0
        mass2=102.0
if randomnumber >0.976782529787 and randomnumber <=0.977139162435:
        m1=151
        m2=101
        mass1=151.0
        mass2=101.0
if randomnumber >0.977139162435 and randomnumber <=0.977205856596:
        m1=152
        m2=100
        mass1=152.0
        mass2=100.0
if randomnumber >0.977205856596 and randomnumber <=0.97721184935:
        m1=153
        m2=99
        mass1=153.0
        mass2=99.0
if randomnumber >0.97721184935 and randomnumber <=0.9772123334:
        m1=154
        m2=98
        mass1=154.0
        mass2=98.0
if randomnumber >0.9772123334 and randomnumber <=0.977212352942:
        m1=155
        m2=97
        mass1=155.0
        mass2=97.0
if randomnumber >0.977212352942 and randomnumber <=0.977212353637:
        m1=156
        m2=96
        mass1=156.0
        mass2=96.0
if randomnumber >0.977212353637 and randomnumber <=0.977212353647:
        m1=157
        m2=95
        mass1=157.0
        mass2=95.0
if randomnumber >0.977212353647 and randomnumber <=0.977212353647:
```

```
    m1=158
    m2=94
    mass1=158.0
    mass2=94.0
if randomnumber >0.977212353647 and randomnumber <=0.977212353647:
    m1=159
    m2=93
    mass1=159.0
    mass2=93.0
if randomnumber >0.977212353647 and randomnumber <=0.977212353647:
    m1=160
    m2=92
    mass1=160.0
    mass2=92.0
if randomnumber >0.977212353647 and randomnumber <=0.977212353647:
    m1=139
    m2=113
    mass1=139.0
    mass2=113.0
if randomnumber >0.977212353647 and randomnumber <=0.977212353649:
    m1=140
    m2=112
    mass1=140.0
    mass2=112.0
if randomnumber >0.977212353649 and randomnumber <=0.977212353792:
    m1=141
    m2=111
    mass1=141.0
    mass2=111.0
if randomnumber >0.977212353792 and randomnumber <=0.977212359949:
    m1=142
    m2=110
    mass1=142.0
    mass2=110.0
if randomnumber >0.977212359949 and randomnumber <=0.977212363027:
    m1=143
    m2=109
    mass1=143.0
    mass2=109.0
if randomnumber >0.977212363027 and randomnumber <=0.977214428007:
    m1=144
    m2=108
    mass1=144.0
    mass2=108.0
if randomnumber >0.977214428007 and randomnumber <=0.977216286264:
    m1=145
    m2=107
    mass1=145.0
    mass2=107.0
if randomnumber >0.977216286264 and randomnumber <=0.977326268172:
    m1=146
    m2=106
    mass1=146.0
    mass2=106.0
if randomnumber >0.977326268172 and randomnumber <=0.978112207449:
    m1=147
    m2=105
    mass1=147.0
```

```
            mass2=105.0
if randomnumber >0.978112207449 and randomnumber <=0.981602361421:
        m1=148
        m2=104
        mass1=148.0
        mass2=104.0
if randomnumber >0.981602361421 and randomnumber <=0.983347438406:
        m1=149
        m2=103
        mass1=149.0
        mass2=103.0
if randomnumber >0.983347438406 and randomnumber <=0.98622465949:
        m1=150
        m2=102
        mass1=150.0
        mass2=102.0
if randomnumber >0.98622465949 and randomnumber <=0.988326300216:
        m1=151
        m2=101
        mass1=151.0
        mass2=101.0
if randomnumber >0.988326300216 and randomnumber <=0.989232756546:
        m1=152
        m2=100
        mass1=152.0
        mass2=100.0
if randomnumber >0.989232756546 and randomnumber <=0.989511280453:
        m1=153
        m2=99
        mass1=153.0
        mass2=99.0
if randomnumber >0.989511280453 and randomnumber <=0.989566067956:
        m1=154
        m2=98
        mass1=154.0
        mass2=98.0
if randomnumber >0.989566067956 and randomnumber <=0.989574139215:
        m1=155
        m2=97
        mass1=155.0
        mass2=97.0
if randomnumber >0.989574139215 and randomnumber <=0.989574873479:
        m1=156
        m2=96
        mass1=156.0
        mass2=96.0
if randomnumber >0.989574873479 and randomnumber <=0.989574914089:
        m1=157
        m2=95
        mass1=157.0
        mass2=95.0
if randomnumber >0.989574914089 and randomnumber <=0.989574915196:
        m1=158
        m2=94
        mass1=158.0
        mass2=94.0
if randomnumber >0.989574915196 and randomnumber <=0.98957491522:
        m1=159
```

```
        m2=93
        mass1=159.0
        mass2=93.0
if randomnumber >0.98957491522 and randomnumber <=0.98957491522:
        m1=160
        m2=92
        mass1=160.0
        mass2=92.0
if randomnumber >0.98957491522 and randomnumber <=0.98957491522:
        m1=161
        m2=91
        mass1=161.0
        mass2=91.0
if randomnumber >0.98957491522 and randomnumber <=0.98957491522:
        m1=162
        m2=90
        mass1=162.0
        mass2=90.0
if randomnumber >0.98957491522 and randomnumber <=0.98957491522:
        m1=140
        m2=112
        mass1=140.0
        mass2=112.0
if randomnumber >0.98957491522 and randomnumber <=0.98957491522:
        m1=141
        m2=111
        mass1=141.0
        mass2=111.0
if randomnumber >0.98957491522 and randomnumber <=0.98957491522:
        m1=142
        m2=110
        mass1=142.0
        mass2=110.0
if randomnumber >0.98957491522 and randomnumber <=0.989574915236:
        m1=143
        m2=109
        mass1=143.0
        mass2=109.0
if randomnumber >0.989574915236 and randomnumber <=0.98957491601:
        m1=144
        m2=108
        mass1=144.0
        mass2=108.0
if randomnumber >0.98957491601 and randomnumber <=0.989574949504:
        m1=145
        m2=107
        mass1=145.0
        mass2=107.0
if randomnumber >0.989574949504 and randomnumber <=0.989575407573:
        m1=146
        m2=106
        mass1=146.0
        mass2=106.0
if randomnumber >0.989575407573 and randomnumber <=0.989584371258:
        m1=147
        m2=105
        mass1=147.0
        mass2=105.0
```

```
if randomnumber >0.989584371258 and randomnumber <=0.989661920821:
    m1=148
    m2=104
    mass1=148.0
    mass2=104.0
if randomnumber >0.989661920821 and randomnumber <=0.989943353586:
    m1=149
    m2=103
    mass1=149.0
    mass2=103.0
if randomnumber >0.989943353586 and randomnumber <=0.990924479993:
    m1=150
    m2=102
    mass1=150.0
    mass2=102.0
if randomnumber >0.990924479993 and randomnumber <=0.992573220153:
    m1=151
    m2=101
    mass1=151.0
    mass2=101.0
if randomnumber >0.992573220153 and randomnumber <=0.994663733795:
    m1=152
    m2=100
    mass1=152.0
    mass2=100.0
if randomnumber >0.994663733795 and randomnumber <=0.996021842424:
    m1=153
    m2=99
    mass1=153.0
    mass2=99.0
if randomnumber >0.996021842424 and randomnumber <=0.996873143437:
    m1=154
    m2=98
    mass1=154.0
    mass2=98.0
if randomnumber >0.996873143437 and randomnumber <=0.997159620103:
    m1=155
    m2=97
    mass1=155.0
    mass2=97.0
if randomnumber >0.997159620103 and randomnumber <=0.997250059009:
    m1=156
    m2=96
    mass1=156.0
    mass2=96.0
if randomnumber >0.997250059009 and randomnumber <=0.997262383356:
    m1=157
    m2=95
    mass1=157.0
    mass2=95.0
if randomnumber >0.997262383356 and randomnumber <=0.99726362031:
    m1=158
    m2=94
    mass1=158.0
    mass2=94.0
if randomnumber >0.99726362031 and randomnumber <=0.997263687523:
    m1=159
    m2=93
```

```
        mass1=159.0
        mass2=93.0
if randomnumber >0.997263687523 and randomnumber <=0.997263690381:
        m1=160
        m2=92
        mass1=160.0
        mass2=92.0
if randomnumber >0.997263690381 and randomnumber <=0.997263690445:
        m1=161
        m2=91
        mass1=161.0
        mass2=91.0
if randomnumber >0.997263690445 and randomnumber <=0.997263690446:
        m1=162
        m2=90
        mass1=162.0
        mass2=90.0
if randomnumber >0.997263690446 and randomnumber <=0.997263690446:
        m1=163
        m2=89
        mass1=163.0
        mass2=89.0
if randomnumber >0.997263690446 and randomnumber <=0.997263690446:
        m1=164
        m2=88
        mass1=164.0
        mass2=88.0
if randomnumber >0.997263690446 and randomnumber <=0.997263690446:
        m1=141
        m2=111
        mass1=141.0
        mass2=111.0
if randomnumber >0.997263690446 and randomnumber <=0.997263690446:
        m1=143
        m2=109
        mass1=143.0
        mass2=109.0
if randomnumber >0.997263690446 and randomnumber <=0.997263690446:
        m1=144
        m2=108
        mass1=144.0
        mass2=108.0
if randomnumber >0.997263690446 and randomnumber <=0.997263690447:
        m1=145
        m2=107
        mass1=145.0
        mass2=107.0
if randomnumber >0.997263690447 and randomnumber <=0.997263690492:
        m1=146
        m2=106
        mass1=146.0
        mass2=106.0
if randomnumber >0.997263690492 and randomnumber <=0.997263694158:
        m1=147
        m2=105
        mass1=147.0
        mass2=105.0
if randomnumber >0.997263694158 and randomnumber <=0.997263726691:
```

```
        m1=148
        m2=104
        mass1=148.0
        mass2=104.0
if randomnumber >0.997263726691 and randomnumber <=0.997263752108:
        m1=149
        m2=103
        mass1=149.0
        mass2=103.0
if randomnumber >0.997263752108 and randomnumber <=0.997270247557:
        m1=150
        m2=102
        mass1=150.0
        mass2=102.0
if randomnumber >0.997270247557 and randomnumber <=0.997331078818:
        m1=151
        m2=101
        mass1=151.0
        mass2=101.0
if randomnumber >0.997331078818 and randomnumber <=0.997519999762:
        m1=152
        m2=100
        mass1=152.0
        mass2=100.0
if randomnumber >0.997519999762 and randomnumber <=0.99758297341:
        m1=153
        m2=99
        mass1=153.0
        mass2=99.0
if randomnumber >0.99758297341 and randomnumber <=0.998090610193:
        m1=154
        m2=98
        mass1=154.0
        mass2=98.0
if randomnumber >0.998090610193 and randomnumber <=0.998344428584:
        m1=155
        m2=97
        mass1=155.0
        mass2=97.0
if randomnumber >0.998344428584 and randomnumber <=0.998695379077:
        m1=156
        m2=96
        mass1=156.0
        mass2=96.0
if randomnumber >0.998695379077 and randomnumber <=0.998850190707:
        m1=157
        m2=95
        mass1=157.0
        mass2=95.0
if randomnumber >0.998850190707 and randomnumber <=0.998886265731:
        m1=158
        m2=94
        mass1=158.0
        mass2=94.0
if randomnumber >0.998886265731 and randomnumber <=0.99889316215:
        m1=159
        m2=93
        mass1=159.0
```

```
        mass2=93.0
if randomnumber >0.99889316215 and randomnumber <=0.998893873821:
        m1=160
        m2=92
        mass1=160.0
        mass2=92.0
if randomnumber >0.998893873821 and randomnumber <=0.998893932562:
        m1=161
        m2=91
        mass1=161.0
        mass2=91.0
if randomnumber >0.998893932562 and randomnumber <=0.998893934912:
        m1=162
        m2=90
        mass1=162.0
        mass2=90.0
if randomnumber >0.998893934912 and randomnumber <=0.998893934979:
        m1=163
        m2=89
        mass1=163.0
        mass2=89.0
if randomnumber >0.998893934979 and randomnumber <=0.99889393498:
        m1=164
        m2=88
        mass1=164.0
        mass2=88.0
if randomnumber >0.99889393498 and randomnumber <=0.99889393498:
        m1=165
        m2=87
        mass1=165.0
        mass2=87.0
if randomnumber >0.99889393498 and randomnumber <=0.99889393498:
        m1=166
        m2=86
        mass1=166.0
        mass2=86.0
if randomnumber >0.99889393498 and randomnumber <=0.99889393498:
        m1=167
        m2=85
        mass1=167.0
        mass2=85.0
if randomnumber >0.99889393498 and randomnumber <=0.99889393498:
        m1=143
        m2=109
        mass1=143.0
        mass2=109.0
if randomnumber >0.99889393498 and randomnumber <=0.99889393498:
        m1=144
        m2=108
        mass1=144.0
        mass2=108.0
if randomnumber >0.99889393498 and randomnumber <=0.99889393498:
        m1=145
        m2=107
        mass1=145.0
        mass2=107.0
if randomnumber >0.99889393498 and randomnumber <=0.99889393498:
        m1=146
```

```
    m2=106
    mass1=146.0
    mass2=106.0
if randomnumber >0.99889393498 and randomnumber <=0.99889393498:
    m1=147
    m2=105
    mass1=147.0
    mass2=105.0
if randomnumber >0.99889393498 and randomnumber <=0.998893934991:
    m1=148
    m2=104
    mass1=148.0
    mass2=104.0
if randomnumber >0.998893934991 and randomnumber <=0.998893935453:
    m1=149
    m2=103
    mass1=149.0
    mass2=103.0
if randomnumber >0.998893935453 and randomnumber <=0.9988939498:
    m1=150
    m2=102
    mass1=150.0
    mass2=102.0
if randomnumber >0.9988939498 and randomnumber <=0.998894167255:
    m1=151
    m2=101
    mass1=151.0
    mass2=101.0
if randomnumber >0.998894167255 and randomnumber <=0.998896595981:
    m1=152
    m2=100
    mass1=152.0
    mass2=100.0
if randomnumber >0.998896595981 and randomnumber <=0.998908541895:
    m1=153
    m2=99
    mass1=153.0
    mass2=99.0
if randomnumber >0.998908541895 and randomnumber <=0.998961499359:
    m1=154
    m2=98
    mass1=154.0
    mass2=98.0
if randomnumber >0.998961499359 and randomnumber <=0.999081664525:
    m1=155
    m2=97
    mass1=155.0
    mass2=97.0
if randomnumber >0.999081664525 and randomnumber <=0.999333342789:
    m1=156
    m2=96
    mass1=156.0
    mass2=96.0
if randomnumber >0.999333342789 and randomnumber <=0.999565291659:
    m1=157
    m2=95
    mass1=157.0
    mass2=95.0
```

```
if randomnumber >0.999565291659 and randomnumber <=0.999730783595:
    m1=158
    m2=94
    mass1=158.0
    mass2=94.0
if randomnumber >0.999730783595 and randomnumber <=0.999799262608:
    m1=159
    m2=93
    mass1=159.0
    mass2=93.0
if randomnumber >0.999799262608 and randomnumber <=0.999821810203:
    m1=160
    m2=92
    mass1=160.0
    mass2=92.0
if randomnumber >0.999821810203 and randomnumber <=0.999826215795:
    m1=161
    m2=91
    mass1=161.0
    mass2=91.0
if randomnumber >0.999826215795 and randomnumber <=0.999826842746:
    m1=162
    m2=90
    mass1=162.0
    mass2=90.0
if randomnumber >0.999826842746 and randomnumber <=0.99982688765:
    m1=163
    m2=89
    mass1=163.0
    mass2=89.0
if randomnumber >0.99982688765 and randomnumber <=0.999826890005:
    m1=164
    m2=88
    mass1=164.0
    mass2=88.0
if randomnumber >0.999826890005 and randomnumber <=0.999826890084:
    m1=165
    m2=87
    mass1=165.0
    mass2=87.0
if randomnumber >0.999826890084 and randomnumber <=0.999826890086:
    m1=166
    m2=86
    mass1=166.0
    mass2=86.0
if randomnumber >0.999826890086 and randomnumber <=0.999826890086:
    m1=167
    m2=85
    mass1=167.0
    mass2=85.0
if randomnumber >0.999826890086 and randomnumber <=0.999826890086:
    m1=168
    m2=84
    mass1=168.0
    mass2=84.0
if randomnumber >0.999826890086 and randomnumber <=0.999826890086:
    m1=169
    m2=83
```

```
        mass1=169.0
        mass2=83.0
if randomnumber >0.999826890086 and randomnumber <=0.999826890086:
        m1=170
        m2=82
        mass1=170.0
        mass2=82.0
if randomnumber >0.999826890086 and randomnumber <=0.999826890086:
        m1=147
        m2=105
        mass1=147.0
        mass2=105.0
if randomnumber >0.999826890086 and randomnumber <=0.999826890086:
        m1=149
        m2=103
        mass1=149.0
        mass2=103.0
if randomnumber >0.999826890086 and randomnumber <=0.999826890112:
        m1=151
        m2=101
        mass1=151.0
        mass2=101.0
if randomnumber >0.999826890112 and randomnumber <=0.999826890879:
        m1=152
        m2=100
        mass1=152.0
        mass2=100.0
if randomnumber >0.999826890879 and randomnumber <=0.999826891135:
        m1=153
        m2=99
        mass1=153.0
        mass2=99.0
if randomnumber >0.999826891135 and randomnumber <=0.999827049284:
        m1=154
        m2=98
        mass1=154.0
        mass2=98.0
if randomnumber >0.999827049284 and randomnumber <=0.999827128359:
        m1=155
        m2=97
        mass1=155.0
        mass2=97.0
if randomnumber >0.999827128359 and randomnumber <=0.99983378196:
        m1=156
        m2=96
        mass1=156.0
        mass2=96.0
if randomnumber >0.99983378196 and randomnumber <=0.999853313438:
        m1=157
        m2=95
        mass1=157.0
        mass2=95.0
if randomnumber >0.999853313438 and randomnumber <=0.999883700714:
        m1=158
        m2=94
        mass1=158.0
        mass2=94.0
if randomnumber >0.999883700714 and randomnumber <=0.999922345698:
```

```
        m1=159
        m2=93
        mass1=159.0
        mass2=93.0
if randomnumber >0.999922345698 and randomnumber <=0.999948270901:
        m1=160
        m2=92
        mass1=160.0
        mass2=92.0
if randomnumber >0.999948270901 and randomnumber <=0.999963899483:
        m1=161
        m2=91
        mass1=161.0
        mass2=91.0
if randomnumber >0.999963899483 and randomnumber <=0.999968773875:
        m1=162
        m2=90
        mass1=162.0
        mass2=90.0
if randomnumber >0.999968773875 and randomnumber <=0.999969943049:
        m1=163
        m2=89
        mass1=163.0
        mass2=89.0
if randomnumber >0.999969943049 and randomnumber <=0.999970085384:
        m1=164
        m2=88
        mass1=164.0
        mass2=88.0
if randomnumber >0.999970085384 and randomnumber <=0.999970102554:
        m1=165
        m2=87
        mass1=165.0
        mass2=87.0
if randomnumber >0.999970102554 and randomnumber <=0.999970103904:
        m1=166
        m2=86
        mass1=166.0
        mass2=86.0
if randomnumber >0.999970103904 and randomnumber <=0.999970103943:
        m1=167
        m2=85
        mass1=167.0
        mass2=85.0
if randomnumber >0.999970103943 and randomnumber <=0.999970103944:
        m1=168
        m2=84
        mass1=168.0
        mass2=84.0
if randomnumber >0.999970103944 and randomnumber <=0.999970103944:
        m1=169
        m2=83
        mass1=169.0
        mass2=83.0
if randomnumber >0.999970103944 and randomnumber <=0.999970103944:
        m1=170
        m2=82
        mass1=170.0
```

```
        mass2=82.0
if randomnumber >0.999970103944 and randomnumber <=0.999970103944:
        m1=171
        m2=81
        mass1=171.0
        mass2=81.0
if randomnumber >0.999970103944 and randomnumber <=0.999970103944:
        m1=147
        m2=105
        mass1=147.0
        mass2=105.0
if randomnumber >0.999970103944 and randomnumber <=0.999970103944:
        m1=149
        m2=103
        mass1=149.0
        mass2=103.0
if randomnumber >0.999970103944 and randomnumber <=0.999970103944:
        m1=151
        m2=101
        mass1=151.0
        mass2=101.0
if randomnumber >0.999970103944 and randomnumber <=0.999970103944:
        m1=152
        m2=100
        mass1=152.0
        mass2=100.0
if randomnumber >0.999970103944 and randomnumber <=0.999970103945:
        m1=153
        m2=99
        mass1=153.0
        mass2=99.0
if randomnumber >0.999970103945 and randomnumber <=0.999970103997:
        m1=154
        m2=98
        mass1=154.0
        mass2=98.0
if randomnumber >0.999970103997 and randomnumber <=0.999970104935:
        m1=155
        m2=97
        mass1=155.0
        mass2=97.0
if randomnumber >0.999970104935 and randomnumber <=0.999970127189:
        m1=156
        m2=96
        mass1=156.0
        mass2=96.0
if randomnumber >0.999970127189 and randomnumber <=0.999970290986:
        m1=157
        m2=95
        mass1=157.0
        mass2=95.0
if randomnumber >0.999970290986 and randomnumber <=0.999971149511:
        m1=158
        m2=94
        mass1=158.0
        mass2=94.0
if randomnumber >0.999971149511 and randomnumber <=0.999973708142:
        m1=159
```

```
    m2=93
    mass1=159.0
    mass2=93.0
if randomnumber >0.999973708142 and randomnumber <=0.999979169948:
    m1=160
    m2=92
    mass1=160.0
    mass2=92.0
if randomnumber >0.999979169948 and randomnumber <=0.999986258409:
    m1=161
    m2=91
    mass1=161.0
    mass2=91.0
if randomnumber >0.999986258409 and randomnumber <=0.999993002382:
    m1=162
    m2=90
    mass1=162.0
    mass2=90.0
if randomnumber >0.999993002382 and randomnumber <=0.999996385654:
    m1=163
    m2=89
    mass1=163.0
    mass2=89.0
if randomnumber >0.999996385654 and randomnumber <=0.999997639552:
    m1=164
    m2=88
    mass1=164.0
    mass2=88.0
if randomnumber >0.999997639552 and randomnumber <=0.999997976184:
    m1=165
    m2=87
    mass1=165.0
    mass2=87.0
if randomnumber >0.999997976184 and randomnumber <=0.999998065991:
    m1=166
    m2=86
    mass1=166.0
    mass2=86.0
if randomnumber >0.999998065991 and randomnumber <=0.999998072091:
    m1=167
    m2=85
    mass1=167.0
    mass2=85.0
if randomnumber >0.999998072091 and randomnumber <=0.999998072486:
    m1=168
    m2=84
    mass1=168.0
    mass2=84.0
if randomnumber >0.999998072486 and randomnumber <=0.999998072504:
    m1=169
    m2=83
    mass1=169.0
    mass2=83.0
if randomnumber >0.999998072504 and randomnumber <=0.999998072505:
    m1=170
    m2=82
    mass1=170.0
    mass2=82.0
```

```
if randomnumber >0.999998072505 and randomnumber <=0.999998072505:
    m1=171
    m2=81
    mass1=171.0
    mass2=81.0
if randomnumber >0.999998072505 and randomnumber <=0.999998072505:
    m1=172
    m2=80
    mass1=172.0
    mass2=80.0
if randomnumber >0.999998072505 and randomnumber <=0.999998072505:
    m1=151
    m2=101
    mass1=151.0
    mass2=101.0
if randomnumber >0.999998072505 and randomnumber <=0.999998072505:
    m1=153
    m2=99
    mass1=153.0
    mass2=99.0
if randomnumber >0.999998072505 and randomnumber <=0.999998072505:
    m1=155
    m2=97
    mass1=155.0
    mass2=97.0
if randomnumber >0.999998072505 and randomnumber <=0.999998072506:
    m1=156
    m2=96
    mass1=156.0
    mass2=96.0
if randomnumber >0.999998072506 and randomnumber <=0.999998072506:
    m1=157
    m2=95
    mass1=157.0
    mass2=95.0
if randomnumber >0.999998072506 and randomnumber <=0.999998073133:
    m1=158
    m2=94
    mass1=158.0
    mass2=94.0
if randomnumber >0.999998073133 and randomnumber <=0.999998073196:
    m1=159
    m2=93
    mass1=159.0
    mass2=93.0
if randomnumber >0.999998073196 and randomnumber <=0.999998108667:
    m1=160
    m2=92
    mass1=160.0
    mass2=92.0
if randomnumber >0.999998108667 and randomnumber <=0.99999826964:
    m1=161
    m2=91
    mass1=161.0
    mass2=91.0
if randomnumber >0.99999826964 and randomnumber <=0.999998622087:
    m1=162
    m2=90
```

```
     mass1=162.0
     mass2=90.0
if randomnumber >0.999998622087 and randomnumber <=0.999998798311:
     m1=163
     m2=89
     mass1=163.0
     mass2=89.0
if randomnumber >0.999998798311 and randomnumber <=0.999999236046:
     m1=164
     m2=88
     mass1=164.0
     mass2=88.0
if randomnumber >0.999999236046 and randomnumber <=0.999999593577:
     m1=165
     m2=87
     mass1=165.0
     mass2=87.0
if randomnumber >0.999999593577 and randomnumber <=0.999999794088:
     m1=166
     m2=86
     mass1=166.0
     mass2=86.0
if randomnumber >0.999999794088 and randomnumber <=0.999999836167:
     m1=167
     m2=85
     mass1=167.0
     mass2=85.0
if randomnumber >0.999999836167 and randomnumber <=0.999999842323:
     m1=168
     m2=84
     mass1=168.0
     mass2=84.0
if randomnumber >0.999999842323 and randomnumber <=0.999999843318:
     m1=169
     m2=83
     mass1=169.0
     mass2=83.0
if randomnumber >0.999999843318 and randomnumber <=0.999999843376:
     m1=170
     m2=82
     mass1=170.0
     mass2=82.0
if randomnumber >0.999999843376 and randomnumber <=0.999999843382:
     m1=171
     m2=81
     mass1=171.0
     mass2=81.0
if randomnumber >0.999999843382 and randomnumber <=0.999999843382:
     m1=172
     m2=80
     mass1=172.0
     mass2=80.0
if randomnumber >0.999999843382 and randomnumber <=0.999999843382:
     m1=155
     m2=97
     mass1=155.0
     mass2=97.0
if randomnumber >0.999999843382 and randomnumber <=0.999999843382:
```

```
        m1=156
        m2=96
        mass1=156.0
        mass2=96.0
if randomnumber >0.999999843382 and randomnumber <=0.999999843382:
        m1=157
        m2=95
        mass1=157.0
        mass2=95.0
if randomnumber >0.999999843382 and randomnumber <=0.999999843382:
        m1=158
        m2=94
        mass1=158.0
        mass2=94.0
if randomnumber >0.999999843382 and randomnumber <=0.999999843384:
        m1=159
        m2=93
        mass1=159.0
        mass2=93.0
if randomnumber >0.999999843384 and randomnumber <=0.99999984341:
        m1=160
        m2=92
        mass1=160.0
        mass2=92.0
if randomnumber >0.99999984341 and randomnumber <=0.999999843723:
        m1=161
        m2=91
        mass1=161.0
        mass2=91.0
if randomnumber >0.999999843723 and randomnumber <=0.999999846202:
        m1=162
        m2=90
        mass1=162.0
        mass2=90.0
if randomnumber >0.999999846202 and randomnumber <=0.99999985603:
        m1=163
        m2=89
        mass1=163.0
        mass2=89.0
if randomnumber >0.99999985603 and randomnumber <=0.999999881334:
        m1=164
        m2=88
        mass1=164.0
        mass2=88.0
if randomnumber >0.999999881334 and randomnumber <=0.999999928327:
        m1=165
        m2=87
        mass1=165.0
        mass2=87.0
if randomnumber >0.999999928327 and randomnumber <=0.999999934427:
        m1=166
        m2=86
        mass1=166.0
        mass2=86.0
if randomnumber >0.999999934427 and randomnumber <=0.999999970462:
        m1=167
        m2=85
        mass1=167.0
```

```
    mass2=85.0
if randomnumber >0.999999970462 and randomnumber <=0.999999986447:
    m1=168
    m2=84
    mass1=168.0
    mass2=84.0
if randomnumber >0.999999986447 and randomnumber <=0.999999991931:
    m1=169
    m2=83
    mass1=169.0
    mass2=83.0
if randomnumber >0.999999991931 and randomnumber <=0.999999992931:
    m1=170
    m2=82
    mass1=170.0
    mass2=82.0
if randomnumber >0.999999992931 and randomnumber <=0.999999993181:
    m1=171
    m2=81
    mass1=171.0
    mass2=81.0
if randomnumber >0.999999993181 and randomnumber <=0.999999993213:
    m1=172
    m2=80
    mass1=172.0
    mass2=80.0
if randomnumber >0.999999993213 and randomnumber <=0.999999993213:
    m1=159
    m2=93
    mass1=159.0
    mass2=93.0
if randomnumber >0.999999993213 and randomnumber <=0.999999993213:
    m1=161
    m2=91
    mass1=161.0
    mass2=91.0
if randomnumber >0.999999993213 and randomnumber <=0.999999993213:
    m1=162
    m2=90
    mass1=162.0
    mass2=90.0
if randomnumber >0.999999993213 and randomnumber <=0.999999993214:
    m1=163
    m2=89
    mass1=163.0
    mass2=89.0
if randomnumber >0.999999993214 and randomnumber <=0.999999993243:
    m1=164
    m2=88
    mass1=164.0
    mass2=88.0
if randomnumber >0.999999993243 and randomnumber <=0.999999993271:
    m1=165
    m2=87
    mass1=165.0
    mass2=87.0
if randomnumber >0.999999993271 and randomnumber <=0.999999994335:
    m1=166
```

```
        m2=86
        mass1=166.0
        mass2=86.0
if randomnumber >0.999999994335 and randomnumber <=0.999999995081:
        m1=167
        m2=85
        mass1=167.0
        mass2=85.0
if randomnumber >0.999999995081 and randomnumber <=0.999999996724:
        m1=168
        m2=84
        mass1=168.0
        mass2=84.0
if randomnumber >0.999999996724 and randomnumber <=0.999999998486:
        m1=169
        m2=83
        mass1=169.0
        mass2=83.0
if randomnumber >0.999999998486 and randomnumber <=0.999999999145:
        m1=170
        m2=82
        mass1=170.0
        mass2=82.0
if randomnumber >0.999999999145 and randomnumber <=0.999999999474:
        m1=171
        m2=81
        mass1=171.0
        mass2=81.0
if randomnumber >0.999999999474 and randomnumber <=0.99999999961:
        m1=172
        m2=80
        mass1=172.0
        mass2=80.0
if randomnumber >0.99999999961 and randomnumber <=0.99999999961:
        m1=161
        m2=91
        mass1=161.0
        mass2=91.0
if randomnumber >0.99999999961 and randomnumber <=0.99999999961:
        m1=162
        m2=90
        mass1=162.0
        mass2=90.0
if randomnumber >0.99999999961 and randomnumber <=0.99999999961:
        m1=163
        m2=89
        mass1=163.0
        mass2=89.0
if randomnumber >0.99999999961 and randomnumber <=0.99999999961:
        m1=164
        m2=88
        mass1=164.0
        mass2=88.0
if randomnumber >0.99999999961 and randomnumber <=0.999999999611:
        m1=165
        m2=87
        mass1=165.0
        mass2=87.0
```

```
if randomnumber >0.999999999611 and randomnumber <=0.999999999612:
    m1=166
    m2=86
    mass1=166.0
    mass2=86.0
if randomnumber >0.999999999612 and randomnumber <=0.999999999619:
    m1=167
    m2=85
    mass1=167.0
    mass2=85.0
if randomnumber >0.999999999619 and randomnumber <=0.99999999962:
    m1=168
    m2=84
    mass1=168.0
    mass2=84.0
if randomnumber >0.99999999962 and randomnumber <=0.999999999683:
    m1=169
    m2=83
    mass1=169.0
    mass2=83.0
if randomnumber >0.999999999683 and randomnumber <=0.999999999759:
    m1=170
    m2=82
    mass1=170.0
    mass2=82.0
if randomnumber >0.999999999759 and randomnumber <=0.999999999887:
    m1=171
    m2=81
    mass1=171.0
    mass2=81.0
if randomnumber >0.999999999887 and randomnumber <=0.999999999995:
    m1=172
    m2=80
    mass1=172.0
    mass2=80.0
if randomnumber >0.999999999995 and randomnumber <=0.999999999995:
    m1=165
    m2=87
    mass1=165.0
    mass2=87.0
if randomnumber >0.999999999995 and randomnumber <=0.999999999995:
    m1=166
    m2=86
    mass1=166.0
    mass2=86.0
if randomnumber >0.999999999995 and randomnumber <=0.999999999995:
    m1=167
    m2=85
    mass1=167.0
    mass2=85.0
if randomnumber >0.999999999995 and randomnumber <=0.999999999995:
    m1=168
    m2=84
    mass1=168.0
    mass2=84.0
if randomnumber >0.999999999995 and randomnumber <=0.999999999995:
    m1=169
    m2=83
```

```
    mass1=169.0
    mass2=83.0
if randomnumber >0.999999999995 and randomnumber <=0.999999999995:
    m1=170
    m2=82
    mass1=170.0
    mass2=82.0
if randomnumber >0.999999999995 and randomnumber <=0.999999999997:
    m1=171
    m2=81
    mass1=171.0
    mass2=81.0
if randomnumber >0.999999999997 and randomnumber <=1.0:
    m1=172
    m2=80
    mass1=172.0
    mass2=80.0
if randomnumber >1.0 and randomnumber <=1.0:
    m1=166
    m2=86
    mass1=166.0
    mass2=86.0
if randomnumber >1.0 and randomnumber <=1.0:
    m1=167
    m2=85
    mass1=167.0
    mass2=85.0
if randomnumber >1.0 and randomnumber <=1.0:
    m1=168
    m2=84
    mass1=168.0
    mass2=84.0
if randomnumber >1.0 and randomnumber <=1.0:
    m1=169
    m2=83
    mass1=169.0
    mass2=83.0
if randomnumber >1.0 and randomnumber <=1.0:
    m1=170
    m2=82
    mass1=170.0
    mass2=82.0
if randomnumber >1.0 and randomnumber <=1.0:
    m1=171
    m2=81
    mass1=171.0
    mass2=81.0
if randomnumber >1.0 and randomnumber <=1.0:
    m1=172
    m2=80
    mass1=172.0
    mass2=80.0
if randomnumber >1.0 and randomnumber <=1.0:
    m1=169
    m2=83
    mass1=169.0
    mass2=83.0
if randomnumber >1.0 and randomnumber <=1.0:
```

m1=171
m2=81
mass1=171.0
mass2=81.0

Kinetic Energy of the Fission Fragments from a Spontaneously Fissioning [240]Pu Source
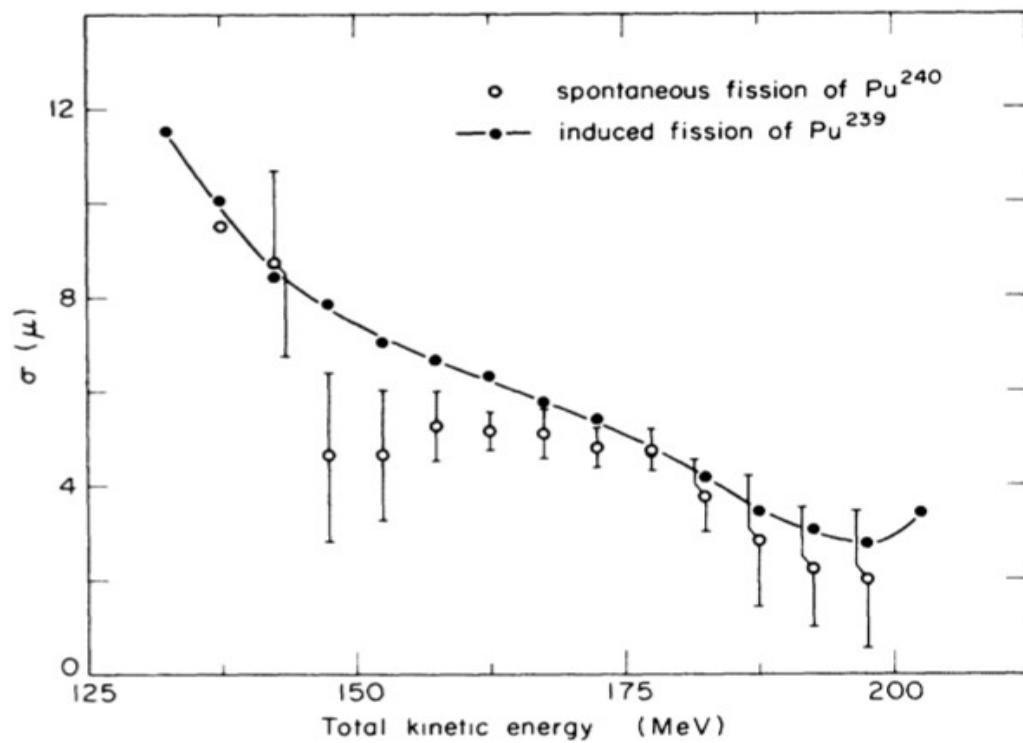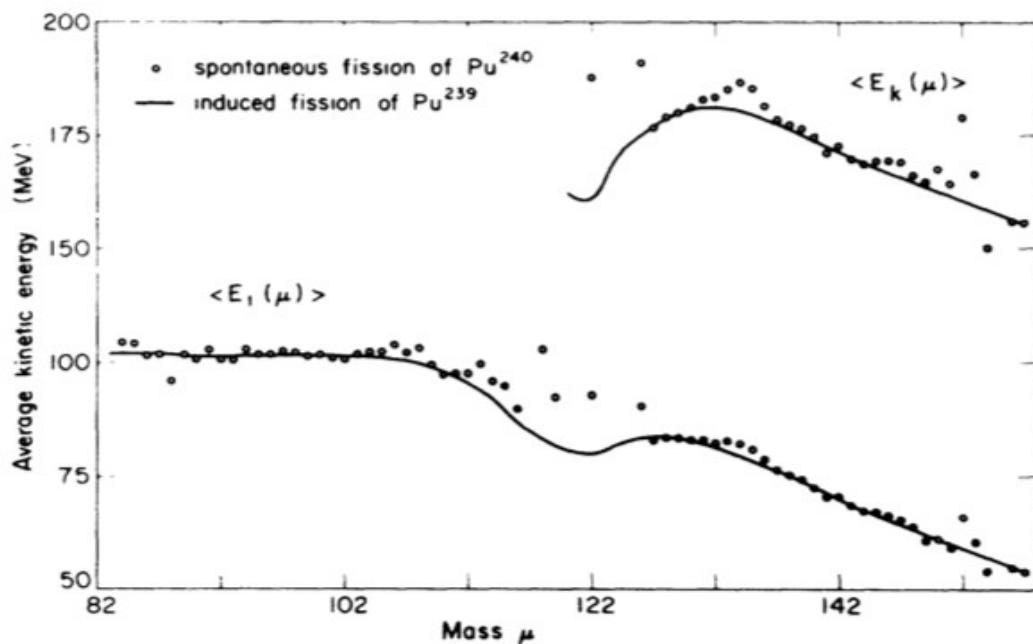
These plots were taken from Ref. 14.

In the simulation, data about the kinetic energy of the fission fragments was obtained by fitting piece-wise defined functions to these plots. The dots on the lower curve in the top plot represent the average kinetic energy of fission fragments from the spontaneous fission of ^{240}Pu as a function of fragment mass. The white dots in the bottom plot represent the standard deviations of the total kinetic from the spontaneous fission of ^{240}Pu. Piece-wise defined functions were fit to these functions.

Neutrons Released from Each Fragment from a Spontaneously Fissioning ^{240}Pu Source

This plot was taken from Ref. 15.
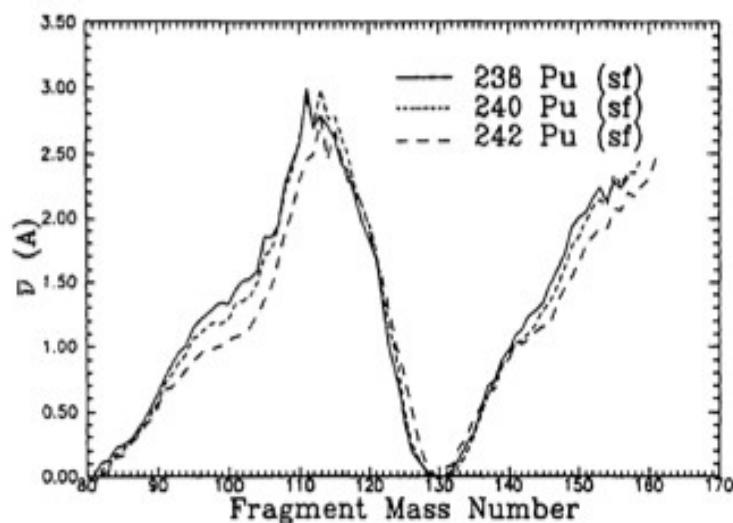
This plot shows the average neutron multiplicity as a function of fragment mass for a spontaneously fissioning ^{240}Pu source. A Piece-wise defined function was fit to the ^{240}Pu spontaneous fission curve.

Code to Simulate the Distribution of Angles Between Neutrons from a Spontaneously
Fissioning ^{240}Pu Source

Below is the python code used to simulate the distribution of angles between neutrons
from a spontaneously fissioning ^{240}Pu source. In order to run this code, one must also
save the text files Wattenergy.txt, Wattcumuprob2.txt, and energyefficiency.txt to the
directory that one runs this program in. The text for the required files is given below the
text for this program. This data is size 7 font to conserve space. If you wish to use this
data, please copy and paste it from the electronic version of this thesis. If this code is
executed, it will generate an output file entitled angbins.txt. For a given run, one must
execute the code twice. First one must generate data for the angular bins for neutrons
from the same fission fragment. This is done by commenting out
"probdet.append(probf12)" and "diffsamearray.append(diffsamef12)" in the code. One
must ensure that "probdet.append(probf1)", "diffsamearray.append(diffsamef1)",
"probdet.append(probf2)", and "diffsamearray.append(diffsamef2)" are not commented.
Once the output file is generated one must normalize the angular frequencies by dividing
by the sum of all of the angular bins from the same fission fragment. Next, one must
generate data for the angular bins for neutrons from opposite fission fragments. This is
done by commenting "probdet.append(probf1)", "diffsamearray.append(diffsamef1)",
"probdet.append(probf2)", and "diffsamearray.append(diffsamef2)". One must ensure
that "probdet.append(probf12)" and "diffsamearray.append(diffsamef12)" are not
commented. Delete the old output file. Once the output file is generated one must

normalize the angular frequencies by dividing by the sum of all of the angular bins from opposite fission fragments. One can then sum the normalized frequencies from the same and opposite fission fragments. This process is equivalent to assuming that it is equally likely that a pair of neutrons be emitted from the same fragment as opposite fragments. The resulting distribution will have the correct shape but not the correct magnitude. One needs to normalize the results to the magnitude of the experimental results. An easy way to do this is to divide both the simulated distribution and the experimental distribution by their respective averages.

```
import random
import math
import sys
import re
random.seed()
filename1 = "Wattenergy.txt"
filename2 = "Wattcumuprob2.txt"
pin1 = open(filename1,'r')
lines1 = pin1.readlines();
pin2 = open(filename2,'r')
lines2 = pin2.readlines();
Wattenergy=[]
Wattcumuprob=[]
for line in lines1:
    values1 = re.split('\s+', line);
    Wattenergy.append(float(values1[0]))
for line in lines2:
    values2 = re.split('\s+', line);
    Wattcumuprob.append(float(values2[0]))
filename3 = "energyefficiency.txt"
pin3 = open(filename3,'r')
lines3 = pin3.readlines();
energyE=[]
efficiencyE=[]
for line in lines3:
    values3 = re.split('\s+', line);
    energyE.append(float(values3[0]))
    efficiencyE.append(float(values3[1]))
bin0=0
bin1=0
bin2=0
bin3=0
bin4=0
bin5=0
bin6=0
bin7=0
bin8=0
bin9=0
bin10=0
bin11=0
```

```
bin12=0
bin13=0
bin14=0
bin15=0
bin16=0
bin17=0
bin18=0
bin19=0
bin20=0
bin21=0
bin22=0
bin23=0
bin24=0
bin25=0
bin26=0
bin27=0
bin28=0
bin29=0
bin30=0
bin31=0
bin32=0
bin33=0
bin34=0
bin35=0
bin36=0
bin37=0
bin38=0
bin39=0
bin40=0
bin41=0
bin42=0
bin43=0
bin44=0
bin45=0
bin46=0
bin47=0
bin48=0
bin49=0
bin50=0
bin51=0
bin52=0
bin53=0
bin54=0
bin55=0
bin56=0
bin57=0
bin58=0
bin59=0
bin60=0
bin61=0
bin62=0
bin63=0
bin64=0
bin65=0
bin66=0
bin67=0
bin68=0
bin69=0
bin70=0
bin71=0
bin72=0
bin73=0
bin74=0
bin75=0
bin76=0
bin77=0
bin78=0
bin79=0
bin80=0
bin81=0
bin82=0
bin83=0
```

```
bin84=0
bin85=0
bin86=0
bin87=0
bin88=0
bin89=0
bin90=0
bin91=0
bin92=0
bin93=0
bin94=0
bin95=0
bin96=0
bin97=0
bin98=0
bin99=0
bin100=0
bin101=0
bin102=0
bin103=0
bin104=0
bin105=0
bin106=0
bin107=0
bin108=0
bin109=0
bin110=0
bin111=0
bin112=0
bin113=0
bin114=0
bin115=0
bin116=0
bin117=0
bin118=0
bin119=0
bin120=0
bin121=0
bin122=0
bin123=0
bin124=0
bin125=0
bin126=0
bin127=0
bin128=0
bin129=0
bin130=0
bin131=0
bin132=0
bin133=0
bin134=0
bin135=0
bin136=0
bin137=0
bin138=0
bin139=0
bin140=0
bin141=0
bin142=0
bin143=0
bin144=0
bin145=0
bin146=0
bin147=0
bin148=0
bin149=0
bin150=0
bin151=0
bin152=0
bin153=0
bin154=0
bin155=0
```

```
bin156=0
bin157=0
bin158=0
bin159=0
bin160=0
bin161=0
bin162=0
bin163=0
bin164=0
bin165=0
bin166=0
bin167=0
bin168=0
bin169=0
bin170=0
bin171=0
bin172=0
bin173=0
bin174=0
bin175=0
bin176=0
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bin209=0
bin210=0
bin211=0
bin212=0
bin213=0
bin214=0
bin215=0
bin216=0
bin217=0
bin218=0
bin219=0
bin220=0
bin221=0
bin222=0
bin223=0
bin224=0
bin225=0
bin226=0
bin227=0
```

```
bin228=0
bin229=0
bin230=0
bin231=0
bin232=0
bin233=0
bin234=0
bin235=0
bin236=0
bin237=0
bin238=0
bin239=0
bin240=0
bin241=0
bin242=0
bin243=0
bin244=0
bin245=0
bin246=0
bin247=0
bin248=0
bin249=0
bin250=0
bin251=0
bin252=0
bin253=0
bin254=0
bin255=0
bin256=0
bin257=0
bin258=0
bin259=0
bin260=0
bin261=0
bin262=0
bin263=0
bin264=0
bin265=0
bin266=0
bin267=0
bin268=0
bin269=0
bin270=0
bin271=0
bin272=0
bin273=0
bin274=0
bin275=0
bin276=0
bin277=0
bin278=0
bin279=0
bin280=0
bin281=0
bin282=0
bin283=0
bin284=0
bin285=0
bin286=0
bin287=0
bin288=0
bin289=0
bin290=0
bin291=0
bin292=0
bin293=0
bin294=0
bin295=0
bin296=0
bin297=0
bin298=0
bin299=0
```

```
bin300=0
bin301=0
bin302=0
bin303=0
bin304=0
bin305=0
bin306=0
bin307=0
bin308=0
bin309=0
bin310=0
bin311=0
bin312=0
bin313=0
bin314=0
bin315=0
bin316=0
bin317=0
bin318=0
bin319=0
bin320=0
bin321=0
bin322=0
bin323=0
bin324=0
bin325=0
bin326=0
bin327=0
bin328=0
bin329=0
bin330=0
bin331=0
bin332=0
bin333=0
bin334=0
bin335=0
bin336=0
bin337=0
bin338=0
bin339=0
bin340=0
bin341=0
bin342=0
bin343=0
bin344=0
bin345=0
bin346=0
bin347=0
bin348=0
bin349=0
bin350=0
bin351=0
bin352=0
bin353=0
bin354=0
bin355=0
bin356=0
bin357=0
bin358=0
bin359=0
bin360=0
# What fission fragments does Cf-252 break into?
# numbers that yield masses for random number (inclusive)
count=0
# upper range is how many spontaneous fissions you want to simulate
for count in range(0,50000):
    n1count=0
    n2count=0
    x=random.random()
    randomnumber=x
    if randomnumber <=1.07396695716e-18:
        m1=70
```

```
        m2=182
        mass1=70.0
        mass2=182.0
if randomnumber >1.07396695716e-18 and randomnumber <=2.08418300926e-12:
        m1=66
        m2=186
        mass1=66.0
        mass2=186.0
if randomnumber >2.08418300926e-12 and randomnumber <=2.51231649327e-12:
        m1=67
        m2=185
        mass1=67.0
        mass2=185.0
if randomnumber >2.51231649327e-12 and randomnumber <=2.60155796739e-12:
        m1=68
        m2=184
        mass1=68.0
        mass2=184.0
if randomnumber >2.60155796739e-12 and randomnumber <=2.61663759515e-12:
        m1=69
        m2=183
        mass1=69.0
        mass2=183.0
if randomnumber >2.61663759515e-12 and randomnumber <=2.61663759515e-12:
        m1=70
        m2=182
        mass1=70.0
        mass2=182.0
if randomnumber >2.61663759515e-12 and randomnumber <=2.61663759515e-12:
        m1=71
        m2=181
        mass1=71.0
        mass2=181.0
if randomnumber >2.61663759515e-12 and randomnumber <=2.61664272341e-12:
        m1=72
        m2=180
        mass1=72.0
        mass2=180.0
if randomnumber >2.61664272341e-12 and randomnumber <=2.07646441443e-10:
        m1=66
        m2=186
        mass1=66.0
        mass2=186.0
if randomnumber >2.07646441443e-10 and randomnumber <=3.10443754105e-10:
        m1=67
        m2=185
        mass1=67.0
        mass2=185.0
if randomnumber >3.10443754105e-10 and randomnumber <=3.8669421628e-10:
        m1=68
        m2=184
        mass1=68.0
        mass2=184.0
if randomnumber >3.8669421628e-10 and randomnumber <=4.19849142681e-10:
        m1=69
        m2=183
        mass1=69.0
        mass2=183.0
if randomnumber >4.19849142681e-10 and randomnumber <=4.30241839269e-10:
        m1=70
        m2=182
        mass1=70.0
        mass2=182.0
if randomnumber >4.30241839269e-10 and randomnumber <=4.31275460661e-10:
        m1=71
        m2=181
        mass1=71.0
        mass2=181.0
if randomnumber >4.31275460661e-10 and randomnumber <=4.3140423435e-10:
        m1=72
        m2=180
        mass1=72.0
```

```
    mass2=180.0
if randomnumber >4.3140423435e-10 and randomnumber <=4.3140423435e-10:
    m1=73
    m2=179
    mass1=73.0
    mass2=179.0
if randomnumber >4.3140423435e-10 and randomnumber <=4.3140423435e-10:
    m1=74
    m2=178
    mass1=74.0
    mass2=178.0
if randomnumber >4.3140423435e-10 and randomnumber <=4.3140423435e-10:
    m1=76
    m2=176
    mass1=76.0
    mass2=176.0
if randomnumber >4.3140423435e-10 and randomnumber <=1.08094918313e-09:
    m1=66
    m2=186
    mass1=66.0
    mass2=186.0
if randomnumber >1.08094918313e-09 and randomnumber <=2.13151537401e-09:
    m1=67
    m2=185
    mass1=67.0
    mass2=185.0
if randomnumber >2.13151537401e-09 and randomnumber <=3.87115872783e-09:
    m1=68
    m2=184
    mass1=68.0
    mass2=184.0
if randomnumber >3.87115872783e-09 and randomnumber <=6.5032168228e-09:
    m1=69
    m2=183
    mass1=69.0
    mass2=183.0
if randomnumber >6.5032168228e-09 and randomnumber <=8.54221827787e-09:
    m1=70
    m2=182
    mass1=70.0
    mass2=182.0
if randomnumber >8.54221827787e-09 and randomnumber <=9.27083330325e-09:
    m1=71
    m2=181
    mass1=71.0
    mass2=181.0
if randomnumber >9.27083330325e-09 and randomnumber <=9.50410386745e-09:
    m1=72
    m2=180
    mass1=72.0
    mass2=180.0
if randomnumber >9.50410386745e-09 and randomnumber <=9.54251162481e-09:
    m1=73
    m2=179
    mass1=73.0
    mass2=179.0
if randomnumber >9.54251162481e-09 and randomnumber <=9.54661221513e-09:
    m1=74
    m2=178
    mass1=74.0
    mass2=178.0
if randomnumber >9.54661221513e-09 and randomnumber <=9.54692286581e-09:
    m1=75
    m2=177
    mass1=75.0
    mass2=177.0
if randomnumber >9.54692286581e-09 and randomnumber <=9.54693500941e-09:
    m1=76
    m2=176
    mass1=76.0
    mass2=176.0
if randomnumber >9.54693500941e-09 and randomnumber <=9.54693594594e-09:
```

```
        m1=77
        m2=175
        mass1=77.0
        mass2=175.0
if randomnumber >9.54693594594e-09 and randomnumber <=9.92988386628e-09:
        m1=66
        m2=186
        mass1=66.0
        mass2=186.0
if randomnumber >9.92988386628e-09 and randomnumber <=1.12233198495e-08:
        m1=67
        m2=185
        mass1=67.0
        mass2=185.0
if randomnumber >1.12233198495e-08 and randomnumber <=1.76058040161e-08:
        m1=68
        m2=184
        mass1=68.0
        mass2=184.0
if randomnumber >1.76058040161e-08 and randomnumber <=3.83346580479e-08:
        m1=69
        m2=183
        mass1=69.0
        mass2=183.0
if randomnumber >3.83346580479e-08 and randomnumber <=9.0693463127e-08:
        m1=70
        m2=182
        mass1=70.0
        mass2=182.0
if randomnumber >9.0693463127e-08 and randomnumber <=1.32998467582e-07:
        m1=71
        m2=181
        mass1=71.0
        mass2=181.0
if randomnumber >1.32998467582e-07 and randomnumber <=1.81008164277e-07:
        m1=72
        m2=180
        mass1=72.0
        mass2=180.0
if randomnumber >1.81008164277e-07 and randomnumber <=2.007203869e-07:
        m1=73
        m2=179
        mass1=73.0
        mass2=179.0
if randomnumber >2.007203869e-07 and randomnumber <=2.08345433118e-07:
        m1=74
        m2=178
        mass1=74.0
        mass2=178.0
if randomnumber >2.08345433118e-07 and randomnumber <=2.09836558413e-07:
        m1=75
        m2=177
        mass1=75.0
        mass2=177.0
if randomnumber >2.09836558413e-07 and randomnumber <=2.10059097272e-07:
        m1=76
        m2=176
        mass1=76.0
        mass2=176.0
if randomnumber >2.10059097272e-07 and randomnumber <=2.10078582603e-07:
        m1=77
        m2=175
        mass1=77.0
        mass2=175.0
if randomnumber >2.10078582603e-07 and randomnumber <=2.10079926874e-07:
        m1=78
        m2=174
        mass1=78.0
        mass2=174.0
if randomnumber >2.10079926874e-07 and randomnumber <=2.10079972326e-07:
        m1=79
        m2=173
```

```
        mass1=79.0
        mass2=173.0
if randomnumber >2.10079972326e-07 and randomnumber <=2.10079972326e-07:
        m1=80
        m2=172
        mass1=80.0
        mass2=172.0
if randomnumber >2.10079972326e-07 and randomnumber <=2.10079972326e-07:
        m1=82
        m2=170
        mass1=82.0
        mass2=170.0
if randomnumber >2.10079972326e-07 and randomnumber <=2.10087766821e-07:
        m1=66
        m2=186
        mass1=66.0
        mass2=186.0
if randomnumber >2.10087766821e-07 and randomnumber <=2.10175878641e-07:
        m1=67
        m2=185
        mass1=67.0
        mass2=185.0
if randomnumber >2.10175878641e-07 and randomnumber <=2.11111787291e-07:
        m1=68
        m2=184
        mass1=68.0
        mass2=184.0
if randomnumber >2.11111787291e-07 and randomnumber <=2.11766980505e-07:
        m1=69
        m2=183
        mass1=69.0
        mass2=183.0
if randomnumber >2.11766980505e-07 and randomnumber <=2.61301652554e-07:
        m1=70
        m2=182
        mass1=70.0
        mass2=182.0
if randomnumber >2.61301652554e-07 and randomnumber <=2.98466791376e-07:
        m1=71
        m2=181
        mass1=71.0
        mass2=181.0
if randomnumber >2.98466791376e-07 and randomnumber <=5.93867717423e-07:
        m1=72
        m2=180
        mass1=72.0
        mass2=180.0
if randomnumber >5.93867717423e-07 and randomnumber <=9.95454350943e-07:
        m1=73
        m2=179
        mass1=73.0
        mass2=179.0
if randomnumber >9.95454350943e-07 and randomnumber <=1.35129059419e-06:
        m1=74
        m2=178
        mass1=74.0
        mass2=178.0
if randomnumber >1.35129059419e-06 and randomnumber <=1.60094112997e-06:
        m1=75
        m2=177
        mass1=75.0
        mass2=177.0
if randomnumber >1.60094112997e-06 and randomnumber <=1.69470121693e-06:
        m1=76
        m2=176
        mass1=76.0
        mass2=176.0
if randomnumber >1.69470121693e-06 and randomnumber <=1.72537090627e-06:
        m1=77
        m2=175
        mass1=77.0
        mass2=175.0
```

```
if randomnumber >1.72537090627e-06 and randomnumber <=1.73090049096e-06:
    m1=78
    m2=174
    mass1=78.0
    mass2=174.0
if randomnumber >1.73090049096e-06 and randomnumber <=1.73153869419e-06:
    m1=79
    m2=173
    mass1=79.0
    mass2=173.0
if randomnumber >1.73153869419e-06 and randomnumber <=1.73157953065e-06:
    m1=80
    m2=172
    mass1=80.0
    mass2=172.0
if randomnumber >1.73157953065e-06 and randomnumber <=1.73158111215e-06:
    m1=81
    m2=171
    mass1=81.0
    mass2=171.0
if randomnumber >1.73158111215e-06 and randomnumber <=1.73158113113e-06:
    m1=82
    m2=170
    mass1=82.0
    mass2=170.0
if randomnumber >1.73158113113e-06 and randomnumber <=1.73158115089e-06:
    m1=66
    m2=186
    mass1=66.0
    mass2=186.0
if randomnumber >1.73158115089e-06 and randomnumber <=1.73158171232e-06:
    m1=67
    m2=185
    mass1=67.0
    mass2=185.0
if randomnumber >1.73158171232e-06 and randomnumber <=1.73160232827e-06:
    m1=68
    m2=184
    mass1=68.0
    mass2=184.0
if randomnumber >1.73160232827e-06 and randomnumber <=1.73209089707e-06:
    m1=69
    m2=183
    mass1=69.0
    mass2=183.0
if randomnumber >1.73209089707e-06 and randomnumber <=1.73248683544e-06:
    m1=70
    m2=182
    mass1=70.0
    mass2=182.0
if randomnumber >1.73248683544e-06 and randomnumber <=1.77597791928e-06:
    m1=71
    m2=181
    mass1=71.0
    mass2=181.0
if randomnumber >1.77597791928e-06 and randomnumber <=1.81122264765e-06:
    m1=72
    m2=180
    mass1=72.0
    mass2=180.0
if randomnumber >1.81122264765e-06 and randomnumber <=2.74317525123e-06:
    m1=73
    m2=179
    mass1=73.0
    mass2=179.0
if randomnumber >2.74317525123e-06 and randomnumber <=5.239680609e-06:
    m1=74
    m2=178
    mass1=74.0
    mass2=178.0
if randomnumber >5.239680609e-06 and randomnumber <=9.10304940881e-06:
    m1=75
```

```
     m2=177
     mass1=75.0
     mass2=177.0
if randomnumber >9.10304940881e-06 and randomnumber <=1.39717926227e-05:
     m1=76
     m2=176
     mass1=76.0
     mass2=176.0
if randomnumber >1.39717926227e-05 and randomnumber <=1.77899752941e-05:
     m1=77
     m2=175
     mass1=77.0
     mass2=175.0
if randomnumber >1.77899752941e-05 and randomnumber <=2.02751841197e-05:
     m1=78
     m2=174
     mass1=78.0
     mass2=174.0
if randomnumber >2.02751841197e-05 and randomnumber <=2.10037991451e-05:
     m1=79
     m2=173
     mass1=79.0
     mass2=173.0
if randomnumber >2.10037991451e-05 and randomnumber <=2.11901896658e-05:
     m1=80
     m2=172
     mass1=80.0
     mass2=172.0
if randomnumber >2.11901896658e-05 and randomnumber <=2.12102407844e-05:
     m1=81
     m2=171
     mass1=81.0
     mass2=171.0
if randomnumber >2.12102407844e-05 and randomnumber <=2.12112292197e-05:
     m1=82
     m2=170
     mass1=82.0
     mass2=170.0
if randomnumber >2.12112292197e-05 and randomnumber <=2.12112569523e-05:
     m1=83
     m2=169
     mass1=83.0
     mass2=169.0
if randomnumber >2.12112569523e-05 and randomnumber <=2.12112575341e-05:
     m1=84
     m2=168
     mass1=84.0
     mass2=168.0
if randomnumber >2.12112575341e-05 and randomnumber <=2.12112575456e-05:
     m1=85
     m2=167
     mass1=85.0
     mass2=167.0
if randomnumber >2.12112575456e-05 and randomnumber <=2.12112575456e-05:
     m1=86
     m2=166
     mass1=86.0
     mass2=166.0
if randomnumber >2.12112575456e-05 and randomnumber <=2.12112575456e-05:
     m1=66
     m2=186
     mass1=66.0
     mass2=186.0
if randomnumber >2.12112575456e-05 and randomnumber <=2.12112575456e-05:
     m1=67
     m2=185
     mass1=67.0
     mass2=185.0
if randomnumber >2.12112575456e-05 and randomnumber <=2.1211257557e-05:
     m1=68
     m2=184
     mass1=68.0
```

```
        mass2=184.0
if randomnumber >2.1211257557e-05 and randomnumber <=2.12112585681e-05:
        m1=69
        m2=183
        mass1=69.0
        mass2=183.0
if randomnumber >2.12112585681e-05 and randomnumber <=2.12113024545e-05:
        m1=70
        m2=182
        mass1=70.0
        mass2=182.0
if randomnumber >2.12113024545e-05 and randomnumber <=2.12120706074e-05:
        m1=71
        m2=181
        mass1=71.0
        mass2=181.0
if randomnumber >2.12120706074e-05 and randomnumber <=2.12255698503e-05:
        m1=72
        m2=180
        mass1=72.0
        mass2=180.0
if randomnumber >2.12255698503e-05 and randomnumber <=2.12323194718e-05:
        m1=73
        m2=179
        mass1=73.0
        mass2=179.0
if randomnumber >2.12323194718e-05 and randomnumber <=2.19326954262e-05:
        m1=74
        m2=178
        mass1=74.0
        mass2=178.0
if randomnumber >2.19326954262e-05 and randomnumber <=2.22828834034e-05:
        m1=75
        m2=177
        mass1=75.0
        mass2=177.0
if randomnumber >2.22828834034e-05 and randomnumber <=3.09811001725e-05:
        m1=76
        m2=176
        mass1=76.0
        mass2=176.0
if randomnumber >3.09811001725e-05 and randomnumber <=5.23595048012e-05:
        m1=77
        m2=175
        mass1=77.0
        mass2=175.0
if randomnumber >5.23595048012e-05 and randomnumber <=8.34923519526e-05:
        m1=78
        m2=174
        mass1=78.0
        mass2=174.0
if randomnumber >8.34923519526e-05 and randomnumber <=0.000114517882049:
        m1=79
        m2=173
        mass1=79.0
        mass2=173.0
if randomnumber >0.000114517882049 and randomnumber <=0.000134998268856:
        m1=80
        m2=172
        mass1=80.0
        mass2=172.0
if randomnumber >0.000134998268856 and randomnumber <=0.00014353268591:
        m1=81
        m2=171
        mass1=81.0
        mass2=171.0
if randomnumber >0.00014353268591 and randomnumber <=0.000144673624358:
        m1=82
        m2=170
        mass1=82.0
        mass2=170.0
if randomnumber >0.000144673624358 and randomnumber <=0.000144802967956:
```

```
        m1=83
        m2=169
        mass1=83.0
        mass2=169.0
if randomnumber >0.000144802967956 and randomnumber <=0.000144810593002:
        m1=84
        m2=168
        mass1=84.0
        mass2=168.0
if randomnumber >0.000144810593002 and randomnumber <=0.000144810754529:
        m1=85
        m2=167
        mass1=85.0
        mass2=167.0
if randomnumber >0.000144810754529 and randomnumber <=0.000144810761194:
        m1=86
        m2=166
        mass1=86.0
        mass2=166.0
if randomnumber >0.000144810761194 and randomnumber <=0.000144810761447:
        m1=87
        m2=165
        mass1=87.0
        mass2=165.0
if randomnumber >0.000144810761447 and randomnumber <=0.000144810761447:
        m1=66
        m2=186
        mass1=66.0
        mass2=186.0
if randomnumber >0.000144810761447 and randomnumber <=0.000144810761447:
        m1=67
        m2=185
        mass1=67.0
        mass2=185.0
if randomnumber >0.000144810761447 and randomnumber <=0.000144810761447:
        m1=68
        m2=184
        mass1=68.0
        mass2=184.0
if randomnumber >0.000144810761447 and randomnumber <=0.000144810761447:
        m1=69
        m2=183
        mass1=69.0
        mass2=183.0
if randomnumber >0.000144810761447 and randomnumber <=0.000144810761473:
        m1=70
        m2=182
        mass1=70.0
        mass2=182.0
if randomnumber >0.000144810761473 and randomnumber <=0.000144810762603:
        m1=71
        m2=181
        mass1=71.0
        mass2=181.0
if randomnumber >0.000144810762603 and randomnumber <=0.000144810763168:
        m1=72
        m2=180
        mass1=72.0
        mass2=180.0
if randomnumber >0.000144810763168 and randomnumber <=0.000144812436163:
        m1=73
        m2=179
        mass1=73.0
        mass2=179.0
if randomnumber >0.000144812436163 and randomnumber <=0.000144812753592:
        m1=74
        m2=178
        mass1=74.0
        mass2=178.0
if randomnumber >0.000144812753592 and randomnumber <=0.000145154921596:
        m1=75
        m2=177
```

```
        mass1=75.0
        mass2=177.0
if randomnumber >0.000145154921596 and randomnumber <=0.000145452581828:
        m1=76
        m2=176
        mass1=76.0
        mass2=176.0
if randomnumber >0.000145452581828 and randomnumber <=0.000160527611905:
        m1=77
        m2=175
        mass1=77.0
        mass2=175.0
if randomnumber >0.000160527611905 and randomnumber <=0.000162487537635:
        m1=78
        m2=174
        mass1=78.0
        mass2=174.0
if randomnumber >0.000162487537635 and randomnumber <=0.00033058332458:
        m1=79
        m2=173
        mass1=79.0
        mass2=173.0
if randomnumber >0.00033058332458 and randomnumber <=0.000414631218052:
        m1=80
        m2=172
        mass1=80.0
        mass2=172.0
if randomnumber >0.000414631218052 and randomnumber <=0.000725942744767:
        m1=81
        m2=171
        mass1=81.0
        mass2=171.0
if randomnumber >0.000725942744767 and randomnumber <=0.000879020357081:
        m1=82
        m2=170
        mass1=82.0
        mass2=170.0
if randomnumber >0.000879020357081 and randomnumber <=0.000924426203121:
        m1=83
        m2=169
        mass1=83.0
        mass2=169.0
if randomnumber >0.000924426203121 and randomnumber <=0.0009349036237:
        m1=84
        m2=168
        mass1=84.0
        mass2=168.0
if randomnumber >0.0009349036237 and randomnumber <=0.000935513630786:
        m1=85
        m2=167
        mass1=85.0
        mass2=167.0
if randomnumber >0.000935513630786 and randomnumber <=0.000935612474312:
        m1=86
        m2=166
        mass1=86.0
        mass2=166.0
if randomnumber >0.000935612474312 and randomnumber <=0.000935617749477:
        m1=87
        m2=165
        mass1=87.0
        mass2=165.0
if randomnumber >0.000935617749477 and randomnumber <=0.000935617903108:
        m1=88
        m2=164
        mass1=88.0
        mass2=164.0
if randomnumber >0.000935617903108 and randomnumber <=0.000935617904938:
        m1=89
        m2=163
        mass1=89.0
        mass2=163.0
```

```
if randomnumber >0.000935617904938 and randomnumber <=0.000935617905416:
    m1=90
    m2=162
    mass1=90.0
    mass2=162.0
if randomnumber >0.000935617905416 and randomnumber <=0.000935617905416:
    m1=69
    m2=183
    mass1=69.0
    mass2=183.0
if randomnumber >0.000935617905416 and randomnumber <=0.000935617905416:
    m1=71
    m2=181
    mass1=71.0
    mass2=181.0
if randomnumber >0.000935617905416 and randomnumber <=0.000935617905425:
    m1=72
    m2=180
    mass1=72.0
    mass2=180.0
if randomnumber >0.000935617905425 and randomnumber <=0.000935617906233:
    m1=73
    m2=179
    mass1=73.0
    mass2=179.0
if randomnumber >0.000935617906233 and randomnumber <=0.000935617944415:
    m1=74
    m2=178
    mass1=74.0
    mass2=178.0
if randomnumber >0.000935617944415 and randomnumber <=0.000935617971131:
    m1=75
    m2=177
    mass1=75.0
    mass2=177.0
if randomnumber >0.000935617971131 and randomnumber <=0.000935649205647:
    m1=76
    m2=176
    mass1=76.0
    mass2=176.0
if randomnumber >0.000935649205647 and randomnumber <=0.000936207812326:
    m1=77
    m2=175
    mass1=77.0
    mass2=175.0
if randomnumber >0.000936207812326 and randomnumber <=0.000941788231415:
    m1=78
    m2=174
    mass1=78.0
    mass2=174.0
if randomnumber >0.000941788231415 and randomnumber <=0.00098705851907:
    m1=79
    m2=173
    mass1=79.0
    mass2=173.0
if randomnumber >0.00098705851907 and randomnumber <=0.00116749011909:
    m1=80
    m2=172
    mass1=80.0
    mass2=172.0
if randomnumber >0.00116749011909 and randomnumber <=0.0017468836034:
    m1=81
    m2=171
    mass1=81.0
    mass2=171.0
if randomnumber >0.0017468836034 and randomnumber <=0.00238803296951:
    m1=82
    m2=170
    mass1=82.0
    mass2=170.0
if randomnumber >0.00238803296951 and randomnumber <=0.00270860765256:
    m1=83
```

```
    m2=169
    mass1=83.0
    mass2=169.0
if randomnumber >0.00270860765256 and randomnumber <=0.00307959254539:
    m1=84
    m2=168
    mass1=84.0
    mass2=168.0
if randomnumber >0.00307959254539 and randomnumber <=0.0032650849918:
    m1=85
    m2=167
    mass1=85.0
    mass2=167.0
if randomnumber >0.0032650849918 and randomnumber <=0.00329899113759:
    m1=86
    m2=166
    mass1=86.0
    mass2=166.0
if randomnumber >0.00329899113759 and randomnumber <=0.00330614737772:
    m1=87
    m2=165
    mass1=87.0
    mass2=165.0
if randomnumber >0.00330614737772 and randomnumber <=0.00330672349521:
    m1=88
    m2=164
    mass1=88.0
    mass2=164.0
if randomnumber >0.00330672349521 and randomnumber <=0.00330674919268:
    m1=89
    m2=163
    mass1=89.0
    mass2=163.0
if randomnumber >0.00330674919268 and randomnumber <=0.00330675475701:
    m1=90
    m2=162
    mass1=90.0
    mass2=162.0
if randomnumber >0.00330675475701 and randomnumber <=0.00330675475751:
    m1=92
    m2=160
    mass1=92.0
    mass2=160.0
if randomnumber >0.00330675475751 and randomnumber <=0.00330675475751:
    m1=72
    m2=180
    mass1=72.0
    mass2=180.0
if randomnumber >0.00330675475751 and randomnumber <=0.00330675475751:
    m1=73
    m2=179
    mass1=73.0
    mass2=179.0
if randomnumber >0.00330675475751 and randomnumber <=0.00330675475751:
    m1=74
    m2=178
    mass1=74.0
    mass2=178.0
if randomnumber >0.00330675475751 and randomnumber <=0.00330675475803:
    m1=75
    m2=177
    mass1=75.0
    mass2=177.0
if randomnumber >0.00330675475803 and randomnumber <=0.0033067547979:
    m1=76
    m2=176
    mass1=76.0
    mass2=176.0
if randomnumber >0.0033067547979 and randomnumber <=0.00330675648558:
    m1=77
    m2=175
    mass1=77.0
```

```
        mass2=175.0
if randomnumber >0.00330675648558 and randomnumber <=0.00330675795412:
        m1=78
        m2=174
        mass1=78.0
        mass2=174.0
if randomnumber >0.00330675795412 and randomnumber <=0.00330804969901:
        m1=79
        m2=173
        mass1=79.0
        mass2=173.0
if randomnumber >0.00330804969901 and randomnumber <=0.00330821745025:
        m1=80
        m2=172
        mass1=80.0
        mass2=172.0
if randomnumber >0.00330821745025 and randomnumber <=0.0034454740434:
        m1=81
        m2=171
        mass1=81.0
        mass2=171.0
if randomnumber >0.0034454740434 and randomnumber <=0.00356488798999:
        m1=82
        m2=170
        mass1=82.0
        mass2=170.0
if randomnumber >0.00356488798999 and randomnumber <=0.00444638180871:
        m1=83
        m2=169
        mass1=83.0
        mass2=169.0
if randomnumber >0.00444638180871 and randomnumber <=0.00465581104187:
        m1=84
        m2=168
        mass1=84.0
        mass2=168.0
if randomnumber >0.00465581104187 and randomnumber <=0.00694812028499:
        m1=85
        m2=167
        mass1=85.0
        mass2=167.0
if randomnumber >0.00694812028499 and randomnumber <=0.00808178941442:
        m1=86
        m2=166
        mass1=86.0
        mass2=166.0
if randomnumber >0.00808178941442 and randomnumber <=0.00885473768011:
        m1=87
        m2=165
        mass1=87.0
        mass2=165.0
if randomnumber >0.00885473768011 and randomnumber <=0.00909212018201:
        m1=88
        m2=164
        mass1=88.0
        mass2=164.0
if randomnumber >0.00909212018201 and randomnumber <=0.00912055886273:
        m1=89
        m2=163
        mass1=89.0
        mass2=163.0
if randomnumber >0.00912055886273 and randomnumber <=0.00912742150599:
        m1=90
        m2=162
        mass1=90.0
        mass2=162.0
if randomnumber >0.00912742150599 and randomnumber <=0.00912742150599:
        m1=91
        m2=161
        mass1=91.0
        mass2=161.0
if randomnumber >0.00912742150599 and randomnumber <=0.0091274342704:
```

```
        m1=92
        m2=160
        mass1=92.0
        mass2=160.0
if randomnumber >0.0091274342704 and randomnumber <=0.00912743692112:
        m1=93
        m2=159
        mass1=93.0
        mass2=159.0
if randomnumber >0.00912743692112 and randomnumber <=0.00912743820891:
        m1=94
        m2=158
        mass1=94.0
        mass2=158.0
if randomnumber >0.00912743820891 and randomnumber <=0.00912743820935:
        m1=95
        m2=157
        mass1=95.0
        mass2=157.0
if randomnumber >0.00912743820935 and randomnumber <=0.00912743820937:
        m1=96
        m2=156
        mass1=96.0
        mass2=156.0
if randomnumber >0.00912743820937 and randomnumber <=0.00912743820937:
        m1=75
        m2=177
        mass1=75.0
        mass2=177.0
if randomnumber >0.00912743820937 and randomnumber <=0.00912743820956:
        m1=77
        m2=175
        mass1=77.0
        mass2=175.0
if randomnumber >0.00912743820956 and randomnumber <=0.0091274382097:
        m1=78
        m2=174
        mass1=78.0
        mass2=174.0
if randomnumber >0.0091274382097 and randomnumber <=0.00912743960989:
        m1=79
        m2=173
        mass1=79.0
        mass2=173.0
if randomnumber >0.00912743960989 and randomnumber <=0.00912744690174:
        m1=80
        m2=172
        mass1=80.0
        mass2=172.0
if randomnumber >0.00912744690174 and randomnumber <=0.00912745311477:
        m1=81
        m2=171
        mass1=81.0
        mass2=171.0
if randomnumber >0.00912745311477 and randomnumber <=0.00913470539802:
        m1=82
        m2=170
        mass1=82.0
        mass2=170.0
if randomnumber >0.00913470539802 and randomnumber <=0.00913687995222:
        m1=83
        m2=169
        mass1=83.0
        mass2=169.0
if randomnumber >0.00913687995222 and randomnumber <=0.00956521112554:
        m1=84
        m2=168
        mass1=84.0
        mass2=168.0
if randomnumber >0.00956521112554 and randomnumber <=0.0098393406816:
        m1=85
        m2=167
```

```
    mass1=85.0
    mass2=167.0
if randomnumber >0.0098393406816 and randomnumber <=0.0119754923129:
    m1=86
    m2=166
    mass1=86.0
    mass2=166.0
if randomnumber >0.0119754923129 and randomnumber <=0.0130435681286:
    m1=87
    m2=165
    mass1=87.0
    mass2=165.0
if randomnumber >0.0130435681286 and randomnumber <=0.0156733499723:
    m1=88
    m2=164
    mass1=88.0
    mass2=164.0
if randomnumber >0.0156733499723 and randomnumber <=0.0176151673616:
    m1=89
    m2=163
    mass1=89.0
    mass2=163.0
if randomnumber >0.0176151673616 and randomnumber <=0.018820654194:
    m1=90
    m2=162
    mass1=90.0
    mass2=162.0
if randomnumber >0.018820654194 and randomnumber <=0.0189326977182:
    m1=91
    m2=161
    mass1=91.0
    mass2=161.0
if randomnumber >0.0189326977182 and randomnumber <=0.0189466148763:
    m1=92
    m2=160
    mass1=92.0
    mass2=160.0
if randomnumber >0.0189466148763 and randomnumber <=0.0189838338431:
    m1=93
    m2=159
    mass1=93.0
    mass2=159.0
if randomnumber >0.0189838338431 and randomnumber <=0.0189991461229:
    m1=94
    m2=158
    mass1=94.0
    mass2=158.0
if randomnumber >0.0189991461229 and randomnumber <=0.0189991522796:
    m1=95
    m2=157
    mass1=95.0
    mass2=157.0
if randomnumber >0.0189991522796 and randomnumber <=0.0189991557815:
    m1=96
    m2=156
    mass1=96.0
    mass2=156.0
if randomnumber >0.0189991557815 and randomnumber <=0.0189991562177:
    m1=97
    m2=155
    mass1=97.0
    mass2=155.0
if randomnumber >0.0189991562177 and randomnumber <=0.0189991562177:
    m1=77
    m2=175
    mass1=77.0
    mass2=175.0
if randomnumber >0.0189991562177 and randomnumber <=0.0189991562177:
    m1=78
    m2=174
    mass1=78.0
    mass2=174.0
```

```
if randomnumber >0.0189991562177 and randomnumber <=0.0189991562178:
    m1=79
    m2=173
    mass1=79.0
    mass2=173.0
if randomnumber >0.0189991562178 and randomnumber <=0.0189991562179:
    m1=80
    m2=172
    mass1=80.0
    mass2=172.0
if randomnumber >0.0189991562179 and randomnumber <=0.0189991575554:
    m1=81
    m2=171
    mass1=81.0
    mass2=171.0
if randomnumber >0.0189991575554 and randomnumber <=0.0189991577293:
    m1=82
    m2=170
    mass1=82.0
    mass2=170.0
if randomnumber >0.0189991577293 and randomnumber <=0.0190000219005:
    m1=83
    m2=169
    mass1=83.0
    mass2=169.0
if randomnumber >0.0190000219005 and randomnumber <=0.0190001856979:
    m1=84
    m2=168
    mass1=84.0
    mass2=168.0
if randomnumber >0.0190001856979 and randomnumber <=0.019070121794:
    m1=85
    m2=167
    mass1=85.0
    mass2=167.0
if randomnumber >0.019070121794 and randomnumber <=0.0190834289394:
    m1=86
    m2=166
    mass1=86.0
    mass2=166.0
if randomnumber >0.0190834289394 and randomnumber <=0.0206885192991:
    m1=87
    m2=165
    mass1=87.0
    mass2=165.0
if randomnumber >0.0206885192991 and randomnumber <=0.0249082485013:
    m1=88
    m2=164
    mass1=88.0
    mass2=164.0
if randomnumber >0.0249082485013 and randomnumber <=0.0311227532352:
    m1=89
    m2=163
    mass1=89.0
    mass2=163.0
if randomnumber >0.0311227532352 and randomnumber <=0.0373183927606:
    m1=90
    m2=162
    mass1=90.0
    mass2=162.0
if randomnumber >0.0373183927606 and randomnumber <=0.0412546919718:
    m1=91
    m2=161
    mass1=91.0
    mass2=161.0
if randomnumber >0.0412546919718 and randomnumber <=0.0429981761465:
    m1=92
    m2=160
    mass1=92.0
    mass2=160.0
if randomnumber >0.0429981761465 and randomnumber <=0.0433579435829:
    m1=93
```

```
    m2=159
    mass1=93.0
    mass2=159.0
if randomnumber >0.0433579435829 and randomnumber <=0.0434795490567:
    m1=94
    m2=158
    mass1=94.0
    mass2=158.0
if randomnumber >0.0434795490567 and randomnumber <=0.0434858406603:
    m1=95
    m2=157
    mass1=95.0
    mass2=157.0
if randomnumber >0.0434858406603 and randomnumber <=0.0435319130017:
    m1=96
    m2=156
    mass1=96.0
    mass2=156.0
if randomnumber >0.0435319130017 and randomnumber <=0.0435409892005:
    m1=97
    m2=155
    mass1=97.0
    mass2=155.0
if randomnumber >0.0435409892005 and randomnumber <=0.0435409904657:
    m1=98
    m2=154
    mass1=98.0
    mass2=154.0
if randomnumber >0.0435409904657 and randomnumber <=0.0435409904804:
    m1=99
    m2=153
    mass1=99.0
    mass2=153.0
if randomnumber >0.0435409904804 and randomnumber <=0.0435409904808:
    m1=100
    m2=152
    mass1=100.0
    mass2=152.0
if randomnumber >0.0435409904808 and randomnumber <=0.0435409904808:
    m1=79
    m2=173
    mass1=79.0
    mass2=173.0
if randomnumber >0.0435409904808 and randomnumber <=0.0435409904808:
    m1=81
    m2=171
    mass1=81.0
    mass2=171.0
if randomnumber >0.0435409904808 and randomnumber <=0.0435409907638:
    m1=83
    m2=169
    mass1=83.0
    mass2=169.0
if randomnumber >0.0435409907638 and randomnumber <=0.0435409909818:
    m1=84
    m2=168
    mass1=84.0
    mass2=168.0
if randomnumber >0.0435409909818 and randomnumber <=0.0435412304655:
    m1=85
    m2=167
    mass1=85.0
    mass2=167.0
if randomnumber >0.0435412304655 and randomnumber <=0.0435422640857:
    m1=86
    m2=166
    mass1=86.0
    mass2=166.0
if randomnumber >0.0435422640857 and randomnumber <=0.0435427808959:
    m1=87
    m2=165
    mass1=87.0
```

```
        mass2=165.0
if randomnumber >0.0435427808959 and randomnumber <=0.0438664847183:
        m1=88
        m2=164
        mass1=88.0
        mass2=164.0
if randomnumber >0.0438664847183 and randomnumber <=0.0453062672752:
        m1=89
        m2=163
        mass1=89.0
        mass2=163.0
if randomnumber >0.0453062672752 and randomnumber <=0.0495137566848:
        m1=90
        m2=162
        mass1=90.0
        mass2=162.0
if randomnumber >0.0495137566848 and randomnumber <=0.0529230783208:
        m1=91
        m2=161
        mass1=91.0
        mass2=161.0
if randomnumber >0.0529230783208 and randomnumber <=0.0620029484276:
        m1=92
        m2=160
        mass1=92.0
        mass2=160.0
if randomnumber >0.0620029484276 and randomnumber <=0.0696590036258:
        m1=93
        m2=159
        mass1=93.0
        mass2=159.0
if randomnumber >0.0696590036258 and randomnumber <=0.0736360776696:
        m1=94
        m2=158
        mass1=94.0
        mass2=158.0
if randomnumber >0.0736360776696 and randomnumber <=0.0760774785437:
        m1=95
        m2=157
        mass1=95.0
        mass2=157.0
if randomnumber >0.0760774785437 and randomnumber <=0.0762981930125:
        m1=96
        m2=156
        mass1=96.0
        mass2=156.0
if randomnumber >0.0762981930125 and randomnumber <=0.0763284390818:
        m1=97
        m2=155
        mass1=97.0
        mass2=155.0
if randomnumber >0.0763284390818 and randomnumber <=0.0763322685611:
        m1=98
        m2=154
        mass1=98.0
        mass2=154.0
if randomnumber >0.0763322685611 and randomnumber <=0.0763324756632:
        m1=99
        m2=153
        mass1=99.0
        mass2=153.0
if randomnumber >0.0763324756632 and randomnumber <=0.0763324872985:
        m1=100
        m2=152
        mass1=100.0
        mass2=152.0
if randomnumber >0.0763324872985 and randomnumber <=0.0763324873769:
        m1=101
        m2=151
        mass1=101.0
        mass2=151.0
if randomnumber >0.0763324873769 and randomnumber <=0.0763324873787:
```

```
        m1=102
        m2=150
        mass1=102.0
        mass2=150.0
if randomnumber >0.0763324873787 and randomnumber <=0.0763324873791:
        m1=103
        m2=149
        mass1=103.0
        mass2=149.0
if randomnumber >0.0763324873791 and randomnumber <=0.0763324873791:
        m1=83
        m2=169
        mass1=83.0
        mass2=169.0
if randomnumber >0.0763324873791 and randomnumber <=0.0763324873804:
        m1=84
        m2=168
        mass1=84.0
        mass2=168.0
if randomnumber >0.0763324873804 and randomnumber <=0.0763324874442:
        m1=85
        m2=167
        mass1=85.0
        mass2=167.0
if randomnumber >0.0763324874442 and randomnumber <=0.0763324874761:
        m1=86
        m2=166
        mass1=86.0
        mass2=166.0
if randomnumber >0.0763324874761 and randomnumber <=0.0763326590119:
        m1=87
        m2=165
        mass1=87.0
        mass2=165.0
if randomnumber >0.0763326590119 and randomnumber <=0.076332691602:
        m1=88
        m2=164
        mass1=88.0
        mass2=164.0
if randomnumber >0.076332691602 and randomnumber <=0.0764180018829:
        m1=89
        m2=163
        mass1=89.0
        mass2=163.0
if randomnumber >0.0764180018829 and randomnumber <=0.0769653177346:
        m1=90
        m2=162
        mass1=90.0
        mass2=162.0
if randomnumber >0.0769653177346 and randomnumber <=0.0791460341851:
        m1=91
        m2=161
        mass1=91.0
        mass2=161.0
if randomnumber >0.0791460341851 and randomnumber <=0.0849319484904:
        m1=92
        m2=160
        mass1=92.0
        mass2=160.0
if randomnumber >0.0849319484904 and randomnumber <=0.0970425087178:
        m1=93
        m2=159
        mass1=93.0
        mass2=159.0
if randomnumber >0.0970425087178 and randomnumber <=0.113563291568:
        m1=94
        m2=158
        mass1=94.0
        mass2=158.0
if randomnumber >0.113563291568 and randomnumber <=0.128316280107:
        m1=95
        m2=157
```

```
        mass1=95.0
        mass2=157.0
if randomnumber >0.128316280107 and randomnumber <=0.13860719494:
        m1=96
        m2=156
        mass1=96.0
        mass2=156.0
if randomnumber >0.13860719494 and randomnumber <=0.143050731037:
        m1=97
        m2=155
        mass1=97.0
        mass2=155.0
if randomnumber >0.143050731037 and randomnumber <=0.144899481946:
        m1=98
        m2=154
        mass1=98.0
        mass2=154.0
if randomnumber >0.144899481946 and randomnumber <=0.145111121911:
        m1=99
        m2=153
        mass1=99.0
        mass2=153.0
if randomnumber >0.145111121911 and randomnumber <=0.145149303737:
        m1=100
        m2=152
        mass1=100.0
        mass2=152.0
if randomnumber >0.145149303737 and randomnumber <=0.14515093599:
        m1=101
        m2=151
        mass1=101.0
        mass2=151.0
if randomnumber >0.14515093599 and randomnumber <=0.145150981344:
        m1=102
        m2=150
        mass1=102.0
        mass2=150.0
if randomnumber >0.145150981344 and randomnumber <=0.14515098962:
        m1=103
        m2=149
        mass1=103.0
        mass2=149.0
if randomnumber >0.14515098962 and randomnumber <=0.145150989673:
        m1=104
        m2=148
        mass1=104.0
        mass2=148.0
if randomnumber >0.145150989673 and randomnumber <=0.145150989676:
        m1=105
        m2=147
        mass1=105.0
        mass2=147.0
if randomnumber >0.145150989676 and randomnumber <=0.145150989676:
        m1=85
        m2=167
        mass1=85.0
        mass2=167.0
if randomnumber >0.145150989676 and randomnumber <=0.145150989692:
        m1=87
        m2=165
        mass1=87.0
        mass2=165.0
if randomnumber >0.145150989692 and randomnumber <=0.145150990703:
        m1=88
        m2=164
        mass1=88.0
        mass2=164.0
if randomnumber >0.145150990703 and randomnumber <=0.145151039165:
        m1=89
        m2=163
        mass1=89.0
        mass2=163.0
```

```
if randomnumber >0.145151039165 and randomnumber <=0.14515162347:
    m1=90
    m2=162
    mass1=90.0
    mass2=162.0
if randomnumber >0.14515162347 and randomnumber <=0.145159172258:
    m1=91
    m2=161
    mass1=91.0
    mass2=161.0
if randomnumber >0.145159172258 and randomnumber <=0.145166175995:
    m1=92
    m2=160
    mass1=92.0
    mass2=160.0
if randomnumber >0.145166175995 and randomnumber <=0.146149278167:
    m1=93
    m2=159
    mass1=93.0
    mass2=159.0
if randomnumber >0.146149278167 and randomnumber <=0.146640829252:
    m1=94
    m2=158
    mass1=94.0
    mass2=158.0
if randomnumber >0.146640829252 and randomnumber <=0.156117377085:
    m1=95
    m2=157
    mass1=95.0
    mass2=157.0
if randomnumber >0.156117377085 and randomnumber <=0.170160531083:
    m1=96
    m2=156
    mass1=96.0
    mass2=156.0
if randomnumber >0.170160531083 and randomnumber <=0.191147567356:
    m1=97
    m2=155
    mass1=97.0
    mass2=155.0
if randomnumber >0.191147567356 and randomnumber <=0.206201664959:
    m1=98
    m2=154
    mass1=98.0
    mass2=154.0
if randomnumber >0.206201664959 and randomnumber <=0.21290756884:
    m1=99
    m2=153
    mass1=99.0
    mass2=153.0
if randomnumber >0.21290756884 and randomnumber <=0.214854723841:
    m1=100
    m2=152
    mass1=100.0
    mass2=152.0
if randomnumber >0.214854723841 and randomnumber <=0.215329296803:
    m1=101
    m2=151
    mass1=101.0
    mass2=151.0
if randomnumber >0.215329296803 and randomnumber <=0.21536386374:
    m1=102
    m2=150
    mass1=102.0
    mass2=150.0
if randomnumber >0.21536386374 and randomnumber <=0.215369571426:
    m1=103
    m2=149
    mass1=103.0
    mass2=149.0
if randomnumber >0.215369571426 and randomnumber <=0.215369986003:
    m1=104
```

```
      m2=148
      mass1=104.0
      mass2=148.0
if randomnumber >0.215369986003 and randomnumber <=0.215370021386:
      m1=105
      m2=147
      mass1=105.0
      mass2=147.0
if randomnumber >0.215370021386 and randomnumber <=0.215370021427:
      m1=106
      m2=146
      mass1=106.0
      mass2=146.0
if randomnumber >0.215370021427 and randomnumber <=0.215370021431:
      m1=107
      m2=145
      mass1=107.0
      mass2=145.0
if randomnumber >0.215370021431 and randomnumber <=0.215370021431:
      m1=108
      m2=144
      mass1=108.0
      mass2=144.0
if randomnumber >0.215370021431 and randomnumber <=0.215370021431:
      m1=87
      m2=165
      mass1=87.0
      mass2=165.0
if randomnumber >0.215370021431 and randomnumber <=0.215370021431:
      m1=88
      m2=164
      mass1=88.0
      mass2=164.0
if randomnumber >0.215370021431 and randomnumber <=0.215370021435:
      m1=89
      m2=163
      mass1=89.0
      mass2=163.0
if randomnumber >0.215370021435 and randomnumber <=0.215370021775:
      m1=90
      m2=162
      mass1=90.0
      mass2=162.0
if randomnumber >0.215370021775 and randomnumber <=0.215370021944:
      m1=91
      m2=161
      mass1=91.0
      mass2=161.0
if randomnumber >0.215370021944 and randomnumber <=0.215370555134:
      m1=92
      m2=160
      mass1=92.0
      mass2=160.0
if randomnumber >0.215370555134 and randomnumber <=0.215380077998:
      m1=93
      m2=159
      mass1=93.0
      mass2=159.0
if randomnumber >0.215380077998 and randomnumber <=0.215550325774:
      m1=94
      m2=158
      mass1=94.0
      mass2=158.0
if randomnumber >0.215550325774 and randomnumber <=0.216259098441:
      m1=95
      m2=157
      mass1=95.0
      mass2=157.0
if randomnumber >0.216259098441 and randomnumber <=0.219293956981:
      m1=96
      m2=156
      mass1=96.0
```

```
        mass2=156.0
if randomnumber >0.219293956981 and randomnumber <=0.228242504902:
        m1=97
        m2=155
        mass1=97.0
        mass2=155.0
if randomnumber >0.228242504902 and randomnumber <=0.244746794816:
        m1=98
        m2=154
        mass1=98.0
        mass2=154.0
if randomnumber >0.244746794816 and randomnumber <=0.266002123727:
        m1=99
        m2=153
        mass1=99.0
        mass2=153.0
if randomnumber >0.266002123727 and randomnumber <=0.293018571056:
        m1=100
        m2=152
        mass1=100.0
        mass2=152.0
if randomnumber >0.293018571056 and randomnumber <=0.306171066924:
        m1=101
        m2=151
        mass1=101.0
        mass2=151.0
if randomnumber >0.306171066924 and randomnumber <=0.313049581816:
        m1=102
        m2=150
        mass1=102.0
        mass2=150.0
if randomnumber >0.313049581816 and randomnumber <=0.314311794184:
        m1=103
        m2=149
        mass1=103.0
        mass2=149.0
if randomnumber >0.314311794184 and randomnumber <=0.314656435564:
        m1=104
        m2=148
        mass1=104.0
        mass2=148.0
if randomnumber >0.314656435564 and randomnumber <=0.314692593843:
        m1=105
        m2=147
        mass1=105.0
        mass2=147.0
if randomnumber >0.314692593843 and randomnumber <=0.314693627419:
        m1=106
        m2=146
        mass1=106.0
        mass2=146.0
if randomnumber >0.314693627419 and randomnumber <=0.314693707427:
        m1=107
        m2=145
        mass1=107.0
        mass2=145.0
if randomnumber >0.314693707427 and randomnumber <=0.314693709997:
        m1=108
        m2=144
        mass1=108.0
        mass2=144.0
if randomnumber >0.314693709997 and randomnumber <=0.314693709997:
        m1=109
        m2=143
        mass1=109.0
        mass2=143.0
if randomnumber >0.314693709997 and randomnumber <=0.314693709997:
        m1=110
        m2=142
        mass1=110.0
        mass2=142.0
if randomnumber >0.314693709997 and randomnumber <=0.314693709997:
```

```
        m1=111
        m2=141
        mass1=111.0
        mass2=141.0
if randomnumber >0.314693709997 and randomnumber <=0.314693709997:
        m1=112
        m2=140
        mass1=112.0
        mass2=140.0
if randomnumber >0.314693709997 and randomnumber <=0.314693709997:
        m1=89
        m2=163
        mass1=89.0
        mass2=163.0
if randomnumber >0.314693709997 and randomnumber <=0.314693709997:
        m1=90
        m2=162
        mass1=90.0
        mass2=162.0
if randomnumber >0.314693709997 and randomnumber <=0.314693709997:
        m1=91
        m2=161
        mass1=91.0
        mass2=161.0
if randomnumber >0.314693709997 and randomnumber <=0.314693710038:
        m1=92
        m2=160
        mass1=92.0
        mass2=160.0
if randomnumber >0.314693710038 and randomnumber <=0.31469371298:
        m1=93
        m2=159
        mass1=93.0
        mass2=159.0
if randomnumber >0.31469371298 and randomnumber <=0.314693751099:
        m1=94
        m2=158
        mass1=94.0
        mass2=158.0
if randomnumber >0.314693751099 and randomnumber <=0.31469453422:
        m1=95
        m2=157
        mass1=95.0
        mass2=157.0
if randomnumber >0.31469453422 and randomnumber <=0.314695279779:
        m1=96
        m2=156
        mass1=96.0
        mass2=156.0
if randomnumber >0.314695279779 and randomnumber <=0.315148982399:
        m1=97
        m2=155
        mass1=97.0
        mass2=155.0
if randomnumber >0.315148982399 and randomnumber <=0.315486451046:
        m1=98
        m2=154
        mass1=98.0
        mass2=154.0
if randomnumber >0.315486451046 and randomnumber <=0.320716121285:
        m1=99
        m2=153
        mass1=99.0
        mass2=153.0
if randomnumber >0.320716121285 and randomnumber <=0.329932442204:
        m1=100
        m2=152
        mass1=100.0
        mass2=152.0
if randomnumber >0.329932442204 and randomnumber <=0.334170358823:
        m1=101
        m2=151
```

```
        mass1=101.0
        mass2=151.0
if randomnumber >0.334170358823 and randomnumber <=0.351556738447:
        m1=102
        m2=150
        mass1=102.0
        mass2=150.0
if randomnumber >0.351556738447 and randomnumber <=0.360249928259:
        m1=103
        m2=149
        mass1=103.0
        mass2=149.0
if randomnumber >0.360249928259 and randomnumber <=0.366820872471:
        m1=104
        m2=148
        mass1=104.0
        mass2=148.0
if randomnumber >0.366820872471 and randomnumber <=0.370106344577:
        m1=105
        m2=147
        mass1=105.0
        mass2=147.0
if randomnumber >0.370106344577 and randomnumber <=0.370303223928:
        m1=106
        m2=146
        mass1=106.0
        mass2=146.0
if randomnumber >0.370303223928 and randomnumber <=0.370358400201:
        m1=107
        m2=145
        mass1=107.0
        mass2=145.0
if randomnumber >0.370358400201 and randomnumber <=0.370363664323:
        m1=108
        m2=144
        mass1=108.0
        mass2=144.0
if randomnumber >0.370363664323 and randomnumber <=0.370363664333:
        m1=109
        m2=143
        mass1=109.0
        mass2=143.0
if randomnumber >0.370363664333 and randomnumber <=0.370363664333:
        m1=110
        m2=142
        mass1=110.0
        mass2=142.0
if randomnumber >0.370363664333 and randomnumber <=0.370363664333:
        m1=111
        m2=141
        mass1=111.0
        mass2=141.0
if randomnumber >0.370363664333 and randomnumber <=0.370363664333:
        m1=112
        m2=140
        mass1=112.0
        mass2=140.0
if randomnumber >0.370363664333 and randomnumber <=0.370363664333:
        m1=113
        m2=139
        mass1=113.0
        mass2=139.0
if randomnumber >0.370363664333 and randomnumber <=0.370363664333:
        m1=114
        m2=138
        mass1=114.0
        mass2=138.0
if randomnumber >0.370363664333 and randomnumber <=0.370363664333:
        m1=90
        m2=162
        mass1=90.0
        mass2=162.0
```

```
if randomnumber >0.370363664333 and randomnumber <=0.370363664333:
    m1=91
    m2=161
    mass1=91.0
    mass2=161.0
if randomnumber >0.370363664333 and randomnumber <=0.370363664333:
    m1=92
    m2=160
    mass1=92.0
    mass2=160.0
if randomnumber >0.370363664333 and randomnumber <=0.370363664334:
    m1=93
    m2=159
    mass1=93.0
    mass2=159.0
if randomnumber >0.370363664334 and randomnumber <=0.370363664334:
    m1=94
    m2=158
    mass1=94.0
    mass2=158.0
if randomnumber >0.370363664334 and randomnumber <=0.370363664861:
    m1=95
    m2=157
    mass1=95.0
    mass2=157.0
if randomnumber >0.370363664861 and randomnumber <=0.370363690334:
    m1=96
    m2=156
    mass1=96.0
    mass2=156.0
if randomnumber >0.370363690334 and randomnumber <=0.370364277748:
    m1=97
    m2=155
    mass1=97.0
    mass2=155.0
if randomnumber >0.370364277748 and randomnumber <=0.370375319996:
    m1=98
    m2=154
    mass1=98.0
    mass2=154.0
if randomnumber >0.370375319996 and randomnumber <=0.370587166687:
    m1=99
    m2=153
    mass1=99.0
    mass2=153.0
if randomnumber >0.370587166687 and randomnumber <=0.371388932406:
    m1=100
    m2=152
    mass1=100.0
    mass2=152.0
if randomnumber >0.371388932406 and randomnumber <=0.372168590812:
    m1=101
    m2=151
    mass1=101.0
    mass2=151.0
if randomnumber >0.372168590812 and randomnumber <=0.382088866426:
    m1=102
    m2=150
    mass1=102.0
    mass2=150.0
if randomnumber >0.382088866426 and randomnumber <=0.403625422504:
    m1=103
    m2=149
    mass1=103.0
    mass2=149.0
if randomnumber >0.403625422504 and randomnumber <=0.427874219463:
    m1=104
    m2=148
    mass1=104.0
    mass2=148.0
if randomnumber >0.427874219463 and randomnumber <=0.447723469021:
    m1=105
```

```
    m2=147
    mass1=105.0
    mass2=147.0
if randomnumber >0.447723469021 and randomnumber <=0.459954732694:
    m1=106
    m2=146
    mass1=106.0
    mass2=146.0
if randomnumber >0.459954732694 and randomnumber <=0.463264706978:
    m1=107
    m2=145
    mass1=107.0
    mass2=145.0
if randomnumber >0.463264706978 and randomnumber <=0.464478830009:
    m1=108
    m2=144
    mass1=108.0
    mass2=144.0
if randomnumber >0.464478830009 and randomnumber <=0.464512244756:
    m1=109
    m2=143
    mass1=109.0
    mass2=143.0
if randomnumber >0.464512244756 and randomnumber <=0.464512291749:
    m1=110
    m2=142
    mass1=110.0
    mass2=142.0
if randomnumber >0.464512291749 and randomnumber <=0.464512293178:
    m1=111
    m2=141
    mass1=111.0
    mass2=141.0
if randomnumber >0.464512293178 and randomnumber <=0.464512293211:
    m1=112
    m2=140
    mass1=112.0
    mass2=140.0
if randomnumber >0.464512293211 and randomnumber <=0.464512293211:
    m1=113
    m2=139
    mass1=113.0
    mass2=139.0
if randomnumber >0.464512293211 and randomnumber <=0.464512296284:
    m1=114
    m2=138
    mass1=114.0
    mass2=138.0
if randomnumber >0.464512296284 and randomnumber <=0.464512296285:
    m1=115
    m2=137
    mass1=115.0
    mass2=137.0
if randomnumber >0.464512296285 and randomnumber <=0.464512296285:
    m1=116
    m2=136
    mass1=116.0
    mass2=136.0
if randomnumber >0.464512296285 and randomnumber <=0.464512296285:
    m1=93
    m2=159
    mass1=93.0
    mass2=159.0
if randomnumber >0.464512296285 and randomnumber <=0.464512296285:
    m1=95
    m2=157
    mass1=95.0
    mass2=157.0
if randomnumber >0.464512296285 and randomnumber <=0.464512296308:
    m1=97
    m2=155
    mass1=97.0
```

```
            mass2=155.0
if randomnumber >0.464512296308 and randomnumber <=0.464512296331:
        m1=98
        m2=154
        mass1=98.0
        mass2=154.0
if randomnumber >0.464512296331 and randomnumber <=0.464512379981:
        m1=99
        m2=153
        mass1=99.0
        mass2=153.0
if randomnumber >0.464512379981 and randomnumber <=0.464512395853:
        m1=100
        m2=152
        mass1=100.0
        mass2=152.0
if randomnumber >0.464512395853 and randomnumber <=0.464582653505:
        m1=101
        m2=151
        mass1=101.0
        mass2=151.0
if randomnumber >0.464582653505 and randomnumber <=0.464962867664:
        m1=102
        m2=150
        mass1=102.0
        mass2=150.0
if randomnumber >0.464962867664 and randomnumber <=0.465152974744:
        m1=103
        m2=149
        mass1=103.0
        mass2=149.0
if randomnumber >0.465152974744 and randomnumber <=0.468215012741:
        m1=104
        m2=148
        mass1=104.0
        mass2=148.0
if randomnumber >0.468215012741 and randomnumber <=0.477219534979:
        m1=105
        m2=147
        mass1=105.0
        mass2=147.0
if randomnumber >0.477219534979 and randomnumber <=0.487530105778:
        m1=106
        m2=146
        mass1=106.0
        mass2=146.0
if randomnumber >0.487530105778 and randomnumber <=0.497813338969:
        m1=107
        m2=145
        mass1=107.0
        mass2=145.0
if randomnumber >0.497813338969 and randomnumber <=0.50134939075:
        m1=108
        m2=144
        mass1=108.0
        mass2=144.0
if randomnumber >0.50134939075 and randomnumber <=0.503629968545:
        m1=109
        m2=143
        mass1=109.0
        mass2=143.0
if randomnumber >0.503629968545 and randomnumber <=0.503856839624:
        m1=110
        m2=142
        mass1=110.0
        mass2=142.0
if randomnumber >0.503856839624 and randomnumber <=0.503894682554:
        m1=111
        m2=141
        mass1=111.0
        mass2=141.0
if randomnumber >0.503894682554 and randomnumber <=0.503898122303:
```

```
        m1=112
        m2=140
        mass1=112.0
        mass2=140.0
if randomnumber >0.503898122303 and randomnumber <=0.503898566816:
        m1=113
        m2=139
        mass1=113.0
        mass2=139.0
if randomnumber >0.503898566816 and randomnumber <=0.50390006359:
        m1=114
        m2=138
        mass1=114.0
        mass2=138.0
if randomnumber >0.50390006359 and randomnumber <=0.503900073545:
        m1=115
        m2=137
        mass1=115.0
        mass2=137.0
if randomnumber >0.503900073545 and randomnumber <=0.50390007437:
        m1=116
        m2=136
        mass1=116.0
        mass2=136.0
if randomnumber >0.50390007437 and randomnumber <=0.503900074372:
        m1=117
        m2=135
        mass1=117.0
        mass2=135.0
if randomnumber >0.503900074372 and randomnumber <=0.503900074372:
        m1=118
        m2=134
        mass1=118.0
        mass2=134.0
if randomnumber >0.503900074372 and randomnumber <=0.503900074372:
        m1=119
        m2=133
        mass1=119.0
        mass2=133.0
if randomnumber >0.503900074372 and randomnumber <=0.503900074372:
        m1=95
        m2=157
        mass1=95.0
        mass2=157.0
if randomnumber >0.503900074372 and randomnumber <=0.503900074372:
        m1=96
        m2=156
        mass1=96.0
        mass2=156.0
if randomnumber >0.503900074372 and randomnumber <=0.503900074372:
        m1=97
        m2=155
        mass1=97.0
        mass2=155.0
if randomnumber >0.503900074372 and randomnumber <=0.503900074372:
        m1=98
        m2=154
        mass1=98.0
        mass2=154.0
if randomnumber >0.503900074372 and randomnumber <=0.503900074377:
        m1=99
        m2=153
        mass1=99.0
        mass2=153.0
if randomnumber >0.503900074377 and randomnumber <=0.503900074777:
        m1=100
        m2=152
        mass1=100.0
        mass2=152.0
if randomnumber >0.503900074777 and randomnumber <=0.503900088502:
        m1=101
        m2=151
```

```
        mass1=101.0
        mass2=151.0
if randomnumber >0.503900088502 and randomnumber <=0.503900520589:
        m1=102
        m2=150
        mass1=102.0
        mass2=150.0
if randomnumber >0.503900520589 and randomnumber <=0.503907665533:
        m1=103
        m2=149
        mass1=103.0
        mass2=149.0
if randomnumber >0.503907665533 and randomnumber <=0.504045521068:
        m1=104
        m2=148
        mass1=104.0
        mass2=148.0
if randomnumber >0.504045521068 and randomnumber <=0.504302208778:
        m1=105
        m2=147
        mass1=105.0
        mass2=147.0
if randomnumber >0.504302208778 and randomnumber <=0.506132687547:
        m1=106
        m2=146
        mass1=106.0
        mass2=146.0
if randomnumber >0.506132687547 and randomnumber <=0.510862833608:
        m1=107
        m2=145
        mass1=107.0
        mass2=145.0
if randomnumber >0.510862833608 and randomnumber <=0.518102159736:
        m1=108
        m2=144
        mass1=108.0
        mass2=144.0
if randomnumber >0.518102159736 and randomnumber <=0.523726962901:
        m1=109
        m2=143
        mass1=109.0
        mass2=143.0
if randomnumber >0.523726962901 and randomnumber <=0.526539364483:
        m1=110
        m2=142
        mass1=110.0
        mass2=142.0
if randomnumber >0.526539364483 and randomnumber <=0.527922816882:
        m1=111
        m2=141
        mass1=111.0
        mass2=141.0
if randomnumber >0.527922816882 and randomnumber <=0.528443100697:
        m1=112
        m2=140
        mass1=112.0
        mass2=140.0
if randomnumber >0.528443100697 and randomnumber <=0.528655941483:
        m1=113
        m2=139
        mass1=113.0
        mass2=139.0
if randomnumber >0.528655941483 and randomnumber <=0.528745233792:
        m1=114
        m2=138
        mass1=114.0
        mass2=138.0
if randomnumber >0.528745233792 and randomnumber <=0.528755407561:
        m1=115
        m2=137
        mass1=115.0
        mass2=137.0
```

```
if randomnumber >0.528755407561 and randomnumber <=0.528756508962:
    m1=116
    m2=136
    mass1=116.0
    mass2=136.0
if randomnumber >0.528756508962 and randomnumber <=0.528756557308:
    m1=117
    m2=135
    mass1=117.0
    mass2=135.0
if randomnumber >0.528756557308 and randomnumber <=0.528756558568:
    m1=118
    m2=134
    mass1=118.0
    mass2=134.0
if randomnumber >0.528756558568 and randomnumber <=0.528756558585:
    m1=119
    m2=133
    mass1=119.0
    mass2=133.0
if randomnumber >0.528756558585 and randomnumber <=0.528756558585:
    m1=120
    m2=132
    mass1=120.0
    mass2=132.0
if randomnumber >0.528756558585 and randomnumber <=0.528756558585:
    m1=121
    m2=131
    mass1=121.0
    mass2=131.0
if randomnumber >0.528756558585 and randomnumber <=0.528756558585:
    m1=122
    m2=130
    mass1=122.0
    mass2=130.0
if randomnumber >0.528756558585 and randomnumber <=0.528756558585:
    m1=124
    m2=128
    mass1=124.0
    mass2=128.0
if randomnumber >0.528756558585 and randomnumber <=0.528756558585:
    m1=99
    m2=153
    mass1=99.0
    mass2=153.0
if randomnumber >0.528756558585 and randomnumber <=0.528756558586:
    m1=101
    m2=151
    mass1=101.0
    mass2=151.0
if randomnumber >0.528756558586 and randomnumber <=0.528756558597:
    m1=102
    m2=150
    mass1=102.0
    mass2=150.0
if randomnumber >0.528756558597 and randomnumber <=0.528756559868:
    m1=103
    m2=149
    mass1=103.0
    mass2=149.0
if randomnumber >0.528756559868 and randomnumber <=0.528756590894:
    m1=104
    m2=148
    mass1=104.0
    mass2=148.0
if randomnumber >0.528756590894 and randomnumber <=0.528756737577:
    m1=105
    m2=147
    mass1=105.0
    mass2=147.0
if randomnumber >0.528756737577 and randomnumber <=0.528758108393:
    m1=106
```

```
        m2=146
        mass1=106.0
        mass2=146.0
if randomnumber >0.528758108393 and randomnumber <=0.528759362291:
        m1=107
        m2=145
        mass1=107.0
        mass2=145.0
if randomnumber >0.528759362291 and randomnumber <=0.528983325078:
        m1=108
        m2=144
        mass1=108.0
        mass2=144.0
if randomnumber >0.528983325078 and randomnumber <=0.529299974781:
        m1=109
        m2=143
        mass1=109.0
        mass2=143.0
if randomnumber >0.529299974781 and randomnumber <=0.529591828596:
        m1=110
        m2=142
        mass1=110.0
        mass2=142.0
if randomnumber >0.529591828596 and randomnumber <=0.529679014101:
        m1=111
        m2=141
        mass1=111.0
        mass2=141.0
if randomnumber >0.529679014101 and randomnumber <=0.529880598457:
        m1=112
        m2=140
        mass1=112.0
        mass2=140.0
if randomnumber >0.529880598457 and randomnumber <=0.530126453358:
        m1=113
        m2=139
        mass1=113.0
        mass2=139.0
if randomnumber >0.530126453358 and randomnumber <=0.530307048758:
        m1=114
        m2=138
        mass1=114.0
        mass2=138.0
if randomnumber >0.530307048758 and randomnumber <=0.530407908715:
        m1=115
        m2=137
        mass1=115.0
        mass2=137.0
if randomnumber >0.530407908715 and randomnumber <=0.530445932391:
        m1=116
        m2=136
        mass1=116.0
        mass2=136.0
if randomnumber >0.530445932391 and randomnumber <=0.530454020595:
        m1=117
        m2=135
        mass1=117.0
        mass2=135.0
if randomnumber >0.530454020595 and randomnumber <=0.530454732265:
        m1=118
        m2=134
        mass1=118.0
        mass2=134.0
if randomnumber >0.530454732265 and randomnumber <=0.530454778411:
        m1=119
        m2=133
        mass1=119.0
        mass2=133.0
if randomnumber >0.530454778411 and randomnumber <=0.530454779964:
        m1=120
        m2=132
        mass1=120.0
```

```
            mass2=132.0
if randomnumber >0.530454779964 and randomnumber <=0.530454780015:
        m1=121
        m2=131
        mass1=121.0
        mass2=131.0
if randomnumber >0.530454780015 and randomnumber <=0.530454780016:
        m1=122
        m2=130
        mass1=122.0
        mass2=130.0
if randomnumber >0.530454780016 and randomnumber <=0.530454780016:
        m1=123
        m2=129
        mass1=123.0
        mass2=129.0
if randomnumber >0.530454780016 and randomnumber <=0.530454780016:
        m1=124
        m2=128
        mass1=124.0
        mass2=128.0
if randomnumber >0.530454780016 and randomnumber <=0.530454780016:
        m1=99
        m2=153
        mass1=99.0
        mass2=153.0
if randomnumber >0.530454780016 and randomnumber <=0.530454780016:
        m1=101
        m2=151
        mass1=101.0
        mass2=151.0
if randomnumber >0.530454780016 and randomnumber <=0.530454780016:
        m1=102
        m2=150
        mass1=102.0
        mass2=150.0
if randomnumber >0.530454780016 and randomnumber <=0.530454780016:
        m1=103
        m2=149
        mass1=103.0
        mass2=149.0
if randomnumber >0.530454780016 and randomnumber <=0.530454780018:
        m1=104
        m2=148
        mass1=104.0
        mass2=148.0
if randomnumber >0.530454780018 and randomnumber <=0.530454780155:
        m1=105
        m2=147
        mass1=105.0
        mass2=147.0
if randomnumber >0.530454780155 and randomnumber <=0.530454785323:
        m1=106
        m2=146
        mass1=106.0
        mass2=146.0
if randomnumber >0.530454785323 and randomnumber <=0.530454895519:
        m1=107
        m2=145
        mass1=107.0
        mass2=145.0
if randomnumber >0.530454895519 and randomnumber <=0.530454967251:
        m1=108
        m2=144
        mass1=108.0
        mass2=144.0
if randomnumber >0.530454967251 and randomnumber <=0.530454969522:
        m1=109
        m2=143
        mass1=109.0
        mass2=143.0
if randomnumber >0.530454969522 and randomnumber <=0.530454970996:
```

```
    m1=110
    m2=142
    mass1=110.0
    mass2=142.0
if randomnumber >0.530454970996 and randomnumber <=0.53045510226:
    m1=111
    m2=141
    mass1=111.0
    mass2=141.0
if randomnumber >0.53045510226 and randomnumber <=0.530455187547:
    m1=112
    m2=140
    mass1=112.0
    mass2=140.0
if randomnumber >0.530455187547 and randomnumber <=0.530457299971:
    m1=113
    m2=139
    mass1=113.0
    mass2=139.0
if randomnumber >0.530457299971 and randomnumber <=0.530525389253:
    m1=114
    m2=138
    mass1=114.0
    mass2=138.0
if randomnumber >0.530525389253 and randomnumber <=0.530646830927:
    m1=115
    m2=137
    mass1=115.0
    mass2=137.0
if randomnumber >0.530646830927 and randomnumber <=0.530849324655:
    m1=116
    m2=136
    mass1=116.0
    mass2=136.0
if randomnumber >0.530849324655 and randomnumber <=0.530974437702:
    m1=117
    m2=135
    mass1=117.0
    mass2=135.0
if randomnumber >0.530974437702 and randomnumber <=0.53102317032:
    m1=118
    m2=134
    mass1=118.0
    mass2=134.0
if randomnumber >0.53102317032 and randomnumber <=0.531032512439:
    m1=119
    m2=133
    mass1=119.0
    mass2=133.0
if randomnumber >0.531032512439 and randomnumber <=0.531033884951:
    m1=120
    m2=132
    mass1=120.0
    mass2=132.0
if randomnumber >0.531033884951 and randomnumber <=0.531034024461:
    m1=121
    m2=131
    mass1=121.0
    mass2=131.0
if randomnumber >0.531034024461 and randomnumber <=0.531034033611:
    m1=122
    m2=130
    mass1=122.0
    mass2=130.0
if randomnumber >0.531034033611 and randomnumber <=0.531034033816:
    m1=123
    m2=129
    mass1=123.0
    mass2=129.0
if randomnumber >0.531034033816 and randomnumber <=0.531034033816:
    m1=124
    m2=128
```

```
        mass1=124.0
        mass2=128.0
if randomnumber >0.531034033816 and randomnumber <=0.531034033816:
        m1=125
        m2=127
        mass1=125.0
        mass2=127.0
if randomnumber >0.531034033816 and randomnumber <=0.531034033816:
        m1=126
        m2=126
        mass1=126.0
        mass2=126.0
if randomnumber >0.531034033816 and randomnumber <=0.531034033816:
        m1=128
        m2=124
        mass1=128.0
        mass2=124.0
if randomnumber >0.531034033816 and randomnumber <=0.531034033816:
        m1=129
        m2=123
        mass1=129.0
        mass2=123.0
if randomnumber >0.531034033816 and randomnumber <=0.531034033816:
        m1=130
        m2=122
        mass1=130.0
        mass2=122.0
if randomnumber >0.531034033816 and randomnumber <=0.531034033816:
        m1=103
        m2=149
        mass1=103.0
        mass2=149.0
if randomnumber >0.531034033816 and randomnumber <=0.531034033816:
        m1=105
        m2=147
        mass1=105.0
        mass2=147.0
if randomnumber >0.531034033816 and randomnumber <=0.531034033816:
        m1=106
        m2=146
        mass1=106.0
        mass2=146.0
if randomnumber >0.531034033816 and randomnumber <=0.531034033821:
        m1=107
        m2=145
        mass1=107.0
        mass2=145.0
if randomnumber >0.531034033821 and randomnumber <=0.531034033943:
        m1=108
        m2=144
        mass1=108.0
        mass2=144.0
if randomnumber >0.531034033943 and randomnumber <=0.53103403406:
        m1=109
        m2=143
        mass1=109.0
        mass2=143.0
if randomnumber >0.53103403406 and randomnumber <=0.53103403406:
        m1=110
        m2=142
        mass1=110.0
        mass2=142.0
if randomnumber >0.53103403406 and randomnumber <=0.53103403406:
        m1=111
        m2=141
        mass1=111.0
        mass2=141.0
if randomnumber >0.53103403406 and randomnumber <=0.53103403406:
        m1=112
        m2=140
        mass1=112.0
        mass2=140.0
```

```
if randomnumber >0.53103403406 and randomnumber <=0.531034034068:
    m1=113
    m2=139
    mass1=113.0
    mass2=139.0
if randomnumber >0.531034034068 and randomnumber <=0.531034034075:
    m1=114
    m2=138
    mass1=114.0
    mass2=138.0
if randomnumber >0.531034034075 and randomnumber <=0.531042110994:
    m1=115
    m2=137
    mass1=115.0
    mass2=137.0
if randomnumber >0.531042110994 and randomnumber <=0.531067736844:
    m1=116
    m2=136
    mass1=116.0
    mass2=136.0
if randomnumber >0.531067736844 and randomnumber <=0.531142688374:
    m1=117
    m2=135
    mass1=117.0
    mass2=135.0
if randomnumber >0.531142688374 and randomnumber <=0.53125183976:
    m1=118
    m2=134
    mass1=118.0
    mass2=134.0
if randomnumber >0.53125183976 and randomnumber <=0.531307627006:
    m1=119
    m2=133
    mass1=119.0
    mass2=133.0
if randomnumber >0.531307627006 and randomnumber <=0.531339708706:
    m1=120
    m2=132
    mass1=120.0
    mass2=132.0
if randomnumber >0.531339708706 and randomnumber <=0.531355749555:
    m1=121
    m2=131
    mass1=121.0
    mass2=131.0
if randomnumber >0.531355749555 and randomnumber <=0.531358375965:
    m1=122
    m2=130
    mass1=122.0
    mass2=130.0
if randomnumber >0.531358375965 and randomnumber <=0.53135968917:
    m1=123
    m2=129
    mass1=123.0
    mass2=129.0
if randomnumber >0.53135968917 and randomnumber <=0.531359689174:
    m1=124
    m2=128
    mass1=124.0
    mass2=128.0
if randomnumber >0.531359689174 and randomnumber <=0.531359689174:
    m1=125
    m2=127
    mass1=125.0
    mass2=127.0
if randomnumber >0.531359689174 and randomnumber <=0.531359689174:
    m1=126
    m2=126
    mass1=126.0
    mass2=126.0
if randomnumber >0.531359689174 and randomnumber <=0.531359689174:
    m1=127
```

```
        m2=125
        mass1=127.0
        mass2=125.0
if randomnumber >0.531359689174 and randomnumber <=0.531359689174:
        m1=128
        m2=124
        mass1=128.0
        mass2=124.0
if randomnumber >0.531359689174 and randomnumber <=0.531359689174:
        m1=129
        m2=123
        mass1=129.0
        mass2=123.0
if randomnumber >0.531359689174 and randomnumber <=0.53135968927:
        m1=130
        m2=122
        mass1=130.0
        mass2=122.0
if randomnumber >0.53135968927 and randomnumber <=0.531359689272:
        m1=131
        m2=121
        mass1=131.0
        mass2=121.0
if randomnumber >0.531359689272 and randomnumber <=0.531359689272:
        m1=105
        m2=147
        mass1=105.0
        mass2=147.0
if randomnumber >0.531359689272 and randomnumber <=0.531359689272:
        m1=106
        m2=146
        mass1=106.0
        mass2=146.0
if randomnumber >0.531359689272 and randomnumber <=0.531359689272:
        m1=107
        m2=145
        mass1=107.0
        mass2=145.0
if randomnumber >0.531359689272 and randomnumber <=0.531359689272:
        m1=108
        m2=144
        mass1=108.0
        mass2=144.0
if randomnumber >0.531359689272 and randomnumber <=0.531359689272:
        m1=109
        m2=143
        mass1=109.0
        mass2=143.0
if randomnumber >0.531359689272 and randomnumber <=0.531359689272:
        m1=110
        m2=142
        mass1=110.0
        mass2=142.0
if randomnumber >0.531359689272 and randomnumber <=0.531359689272:
        m1=111
        m2=141
        mass1=111.0
        mass2=141.0
if randomnumber >0.531359689272 and randomnumber <=0.531359689272:
        m1=112
        m2=140
        mass1=112.0
        mass2=140.0
if randomnumber >0.531359689272 and randomnumber <=0.531359689272:
        m1=113
        m2=139
        mass1=113.0
        mass2=139.0
if randomnumber >0.531359689272 and randomnumber <=0.531359689272:
        m1=114
        m2=138
        mass1=114.0
```

```
        mass2=138.0
if randomnumber >0.531359689272 and randomnumber <=0.531359739146:
        m1=115
        m2=137
        mass1=115.0
        mass2=137.0
if randomnumber >0.531359739146 and randomnumber <=0.531359777554:
        m1=116
        m2=136
        mass1=116.0
        mass2=136.0
if randomnumber >0.531359777554 and randomnumber <=0.531370870601:
        m1=117
        m2=135
        mass1=117.0
        mass2=135.0
if randomnumber >0.531370870601 and randomnumber <=0.531379410667:
        m1=118
        m2=134
        mass1=118.0
        mass2=134.0
if randomnumber >0.531379410667 and randomnumber <=0.531465952383:
        m1=119
        m2=133
        mass1=119.0
        mass2=133.0
if randomnumber >0.531465952383 and randomnumber <=0.531509223241:
        m1=120
        m2=132
        mass1=120.0
        mass2=132.0
if randomnumber >0.531509223241 and randomnumber <=0.531636449304:
        m1=121
        m2=131
        mass1=121.0
        mass2=131.0
if randomnumber >0.531636449304 and randomnumber <=0.531700062336:
        m1=122
        m2=130
        mass1=122.0
        mass2=130.0
if randomnumber >0.531700062336 and randomnumber <=0.531728280734:
        m1=123
        m2=129
        mass1=123.0
        mass2=129.0
if randomnumber >0.531728280734 and randomnumber <=0.531729828342:
        m1=124
        m2=128
        mass1=124.0
        mass2=128.0
if randomnumber >0.531729828342 and randomnumber <=0.531730220891:
        m1=125
        m2=127
        mass1=125.0
        mass2=127.0
if randomnumber >0.531730220891 and randomnumber <=0.5317303508:
        m1=126
        m2=126
        mass1=126.0
        mass2=126.0
if randomnumber >0.5317303508 and randomnumber <=0.531730400899:
        m1=127
        m2=125
        mass1=127.0
        mass2=125.0
if randomnumber >0.531730400899 and randomnumber <=0.531730423266:
        m1=128
        m2=124
        mass1=128.0
        mass2=124.0
if randomnumber >0.531730423266 and randomnumber <=0.53173042391:
```

```
    m1=129
    m2=123
    mass1=129.0
    mass2=123.0
if randomnumber >0.53173042391 and randomnumber <=0.53173129938:
    m1=130
    m2=122
    mass1=130.0
    mass2=122.0
if randomnumber >0.53173129938 and randomnumber <=0.531731352188:
    m1=131
    m2=121
    mass1=131.0
    mass2=121.0
if randomnumber >0.531731352188 and randomnumber <=0.531731355396:
    m1=132
    m2=120
    mass1=132.0
    mass2=120.0
if randomnumber >0.531731355396 and randomnumber <=0.531731355412:
    m1=133
    m2=119
    mass1=133.0
    mass2=119.0
if randomnumber >0.531731355412 and randomnumber <=0.531731355412:
    m1=134
    m2=118
    mass1=134.0
    mass2=118.0
if randomnumber >0.531731355412 and randomnumber <=0.531731355412:
    m1=136
    m2=116
    mass1=136.0
    mass2=116.0
if randomnumber >0.531731355412 and randomnumber <=0.531731355412:
    m1=107
    m2=145
    mass1=107.0
    mass2=145.0
if randomnumber >0.531731355412 and randomnumber <=0.531731355412:
    m1=109
    m2=143
    mass1=109.0
    mass2=143.0
if randomnumber >0.531731355412 and randomnumber <=0.531731355412:
    m1=111
    m2=141
    mass1=111.0
    mass2=141.0
if randomnumber >0.531731355412 and randomnumber <=0.531731355412:
    m1=112
    m2=140
    mass1=112.0
    mass2=140.0
if randomnumber >0.531731355412 and randomnumber <=0.531731355412:
    m1=113
    m2=139
    mass1=113.0
    mass2=139.0
if randomnumber >0.531731355412 and randomnumber <=0.531731355412:
    m1=114
    m2=138
    mass1=114.0
    mass2=138.0
if randomnumber >0.531731355412 and randomnumber <=0.531731355414:
    m1=115
    m2=137
    mass1=115.0
    mass2=137.0
if randomnumber >0.531731355414 and randomnumber <=0.531731356251:
    m1=116
    m2=136
```

```
        mass1=116.0
        mass2=136.0
if randomnumber >0.531731356251 and randomnumber <=0.531731365989:
        m1=117
        m2=135
        mass1=117.0
        mass2=135.0
if randomnumber >0.531731365989 and randomnumber <=0.53173202711:
        m1=118
        m2=134
        mass1=118.0
        mass2=134.0
if randomnumber >0.53173202711 and randomnumber <=0.531733313205:
        m1=119
        m2=133
        mass1=119.0
        mass2=133.0
if randomnumber >0.531733313205 and randomnumber <=0.531746368031:
        m1=120
        m2=132
        mass1=120.0
        mass2=132.0
if randomnumber >0.531746368031 and randomnumber <=0.531765411838:
        m1=121
        m2=131
        mass1=121.0
        mass2=131.0
if randomnumber >0.531765411838 and randomnumber <=0.531861218461:
        m1=122
        m2=130
        mass1=122.0
        mass2=130.0
if randomnumber >0.531861218461 and randomnumber <=0.531928379282:
        m1=123
        m2=129
        mass1=123.0
        mass2=129.0
if randomnumber >0.531928379282 and randomnumber <=0.532052136971:
        m1=124
        m2=128
        mass1=124.0
        mass2=128.0
if randomnumber >0.532052136971 and randomnumber <=0.532246559326:
        m1=125
        m2=127
        mass1=125.0
        mass2=127.0
if randomnumber >0.532246559326 and randomnumber <=0.532426013776:
        m1=126
        m2=126
        mass1=126.0
        mass2=126.0
if randomnumber >0.532426013776 and randomnumber <=0.532644610145:
        m1=127
        m2=125
        mass1=127.0
        mass2=125.0
if randomnumber >0.532644610145 and randomnumber <=0.532975447728:
        m1=128
        m2=124
        mass1=128.0
        mass2=124.0
if randomnumber >0.532975447728 and randomnumber <=0.533199777313:
        m1=129
        m2=123
        mass1=129.0
        mass2=123.0
if randomnumber >0.533199777313 and randomnumber <=0.533353954303:
        m1=130
        m2=122
        mass1=130.0
        mass2=122.0
```

```
if randomnumber >0.533353954303 and randomnumber <=0.533440088384:
      m1=131
      m2=121
      mass1=131.0
      mass2=121.0
if randomnumber >0.533440088384 and randomnumber <=0.53346366114:
      m1=132
      m2=120
      mass1=132.0
      mass2=120.0
if randomnumber >0.53346366114 and randomnumber <=0.533463876321:
      m1=133
      m2=119
      mass1=133.0
      mass2=119.0
if randomnumber >0.533463876321 and randomnumber <=0.533463881376:
      m1=134
      m2=118
      mass1=134.0
      mass2=118.0
if randomnumber >0.533463881376 and randomnumber <=0.533463881415:
      m1=135
      m2=117
      mass1=135.0
      mass2=117.0
if randomnumber >0.533463881415 and randomnumber <=0.533463881415:
      m1=136
      m2=116
      mass1=136.0
      mass2=116.0
if randomnumber >0.533463881415 and randomnumber <=0.533463881415:
      m1=111
      m2=141
      mass1=111.0
      mass2=141.0
if randomnumber >0.533463881415 and randomnumber <=0.533463881415:
      m1=112
      m2=140
      mass1=112.0
      mass2=140.0
if randomnumber >0.533463881415 and randomnumber <=0.533463881415:
      m1=113
      m2=139
      mass1=113.0
      mass2=139.0
if randomnumber >0.533463881415 and randomnumber <=0.533463881415:
      m1=114
      m2=138
      mass1=114.0
      mass2=138.0
if randomnumber >0.533463881415 and randomnumber <=0.533463881415:
      m1=115
      m2=137
      mass1=115.0
      mass2=137.0
if randomnumber >0.533463881415 and randomnumber <=0.533463881415:
      m1=116
      m2=136
      mass1=116.0
      mass2=136.0
if randomnumber >0.533463881415 and randomnumber <=0.533463881432:
      m1=117
      m2=135
      mass1=117.0
      mass2=135.0
if randomnumber >0.533463881432 and randomnumber <=0.53346388144:
      m1=118
      m2=134
      mass1=118.0
      mass2=134.0
if randomnumber >0.53346388144 and randomnumber <=0.533463908438:
      m1=119
```

```
        m2=133
        mass1=119.0
        mass2=133.0
if randomnumber >0.533463908438 and randomnumber <=0.533463929224:
        m1=120
        m2=132
        mass1=120.0
        mass2=132.0
if randomnumber >0.533463929224 and randomnumber <=0.533468221849:
        m1=121
        m2=131
        mass1=121.0
        mass2=131.0
if randomnumber >0.533468221849 and randomnumber <=0.533471271873:
        m1=122
        m2=130
        mass1=122.0
        mass2=130.0
if randomnumber >0.533471271873 and randomnumber <=0.533553814786:
        m1=123
        m2=129
        mass1=123.0
        mass2=129.0
if randomnumber >0.533553814786 and randomnumber <=0.533577751856:
        m1=124
        m2=128
        mass1=124.0
        mass2=128.0
if randomnumber >0.533577751856 and randomnumber <=0.53401147091:
        m1=125
        m2=127
        mass1=125.0
        mass2=127.0
if randomnumber >0.53401147091 and randomnumber <=0.534137250452:
        m1=126
        m2=126
        mass1=126.0
        mass2=126.0
if randomnumber >0.534137250452 and randomnumber <=0.536570337079:
        m1=127
        m2=125
        mass1=127.0
        mass2=125.0
if randomnumber >0.536570337079 and randomnumber <=0.538828299216:
        m1=128
        m2=124
        mass1=128.0
        mass2=124.0
if randomnumber >0.538828299216 and randomnumber <=0.542001026283:
        m1=129
        m2=123
        mass1=129.0
        mass2=123.0
if randomnumber >0.542001026283 and randomnumber <=0.546287461507:
        m1=130
        m2=122
        mass1=130.0
        mass2=122.0
if randomnumber >0.546287461507 and randomnumber <=0.550656977077:
        m1=131
        m2=121
        mass1=131.0
        mass2=121.0
if randomnumber >0.550656977077 and randomnumber <=0.5523731067:
        m1=132
        m2=120
        mass1=132.0
        mass2=120.0
if randomnumber >0.5523731067 and randomnumber <=0.552566817373:
        m1=133
        m2=119
        mass1=133.0
```

```
        mass2=119.0
if randomnumber >0.552566817373 and randomnumber <=0.552588517729:
        m1=134
        m2=118
        mass1=134.0
        mass2=118.0
if randomnumber >0.552588517729 and randomnumber <=0.55258932538:
        m1=135
        m2=117
        mass1=135.0
        mass2=117.0
if randomnumber >0.55258932538 and randomnumber <=0.552589336281:
        m1=136
        m2=116
        mass1=136.0
        mass2=116.0
if randomnumber >0.552589336281 and randomnumber <=0.552589336527:
        m1=137
        m2=115
        mass1=137.0
        mass2=115.0
if randomnumber >0.552589336527 and randomnumber <=0.552589336529:
        m1=138
        m2=114
        mass1=138.0
        mass2=114.0
if randomnumber >0.552589336529 and randomnumber <=0.552589336529:
        m1=113
        m2=139
        mass1=113.0
        mass2=139.0
if randomnumber >0.552589336529 and randomnumber <=0.552589336529:
        m1=115
        m2=137
        mass1=115.0
        mass2=137.0
if randomnumber >0.552589336529 and randomnumber <=0.552589336529:
        m1=117
        m2=135
        mass1=117.0
        mass2=135.0
if randomnumber >0.552589336529 and randomnumber <=0.552589336529:
        m1=118
        m2=134
        mass1=118.0
        mass2=134.0
if randomnumber >0.552589336529 and randomnumber <=0.552589336529:
        m1=119
        m2=133
        mass1=119.0
        mass2=133.0
if randomnumber >0.552589336529 and randomnumber <=0.552589336765:
        m1=120
        m2=132
        mass1=120.0
        mass2=132.0
if randomnumber >0.552589336765 and randomnumber <=0.552589336905:
        m1=121
        m2=131
        mass1=121.0
        mass2=131.0
if randomnumber >0.552589336905 and randomnumber <=0.552589559443:
        m1=122
        m2=130
        mass1=122.0
        mass2=130.0
if randomnumber >0.552589559443 and randomnumber <=0.552589677491:
        m1=123
        m2=129
        mass1=123.0
        mass2=129.0
if randomnumber >0.552589677491 and randomnumber <=0.55259024231:
```

```python
        m1=124
        m2=128
        mass1=124.0
        mass2=128.0
if randomnumber >0.55259024231 and randomnumber <=0.552590430583:
        m1=125
        m2=127
        mass1=125.0
        mass2=127.0
if randomnumber >0.552590430583 and randomnumber <=0.552612560207:
        m1=126
        m2=126
        mass1=126.0
        mass2=126.0
if randomnumber >0.552612560207 and randomnumber <=0.552620320811:
        m1=127
        m2=125
        mass1=127.0
        mass2=125.0
if randomnumber >0.552620320811 and randomnumber <=0.553295483471:
        m1=128
        m2=124
        mass1=128.0
        mass2=124.0
if randomnumber >0.553295483471 and randomnumber <=0.553619774713:
        m1=129
        m2=123
        mass1=129.0
        mass2=123.0
if randomnumber >0.553619774713 and randomnumber <=0.560279645226:
        m1=130
        m2=122
        mass1=130.0
        mass2=122.0
if randomnumber >0.560279645226 and randomnumber <=0.563625853137:
        m1=131
        m2=121
        mass1=131.0
        mass2=121.0
if randomnumber >0.563625853137 and randomnumber <=0.577183324033:
        m1=132
        m2=120
        mass1=132.0
        mass2=120.0
if randomnumber >0.577183324033 and randomnumber <=0.580262922489:
        m1=133
        m2=119
        mass1=133.0
        mass2=119.0
if randomnumber >0.580262922489 and randomnumber <=0.582516219159:
        m1=134
        m2=118
        mass1=134.0
        mass2=118.0
if randomnumber >0.582516219159 and randomnumber <=0.583642867494:
        m1=135
        m2=117
        mass1=135.0
        mass2=117.0
if randomnumber >0.583642867494 and randomnumber <=0.583659377149:
        m1=136
        m2=116
        mass1=136.0
        mass2=116.0
if randomnumber >0.583659377149 and randomnumber <=0.583660930406:
        m1=137
        m2=115
        mass1=137.0
        mass2=115.0
if randomnumber >0.583660930406 and randomnumber <=0.583660967175:
        m1=138
        m2=114
```

```
        mass1=138.0
        mass2=114.0
if randomnumber >0.583660967175 and randomnumber <=0.583660968158:
        m1=139
        m2=113
        mass1=139.0
        mass2=113.0
if randomnumber >0.583660968158 and randomnumber <=0.58366096819:
        m1=140
        m2=112
        mass1=140.0
        mass2=112.0
if randomnumber >0.58366096819 and randomnumber <=0.583660968193:
        m1=141
        m2=111
        mass1=141.0
        mass2=111.0
if randomnumber >0.583660968193 and randomnumber <=0.583660968193:
        m1=115
        m2=137
        mass1=115.0
        mass2=137.0
if randomnumber >0.583660968193 and randomnumber <=0.583660968193:
        m1=117
        m2=135
        mass1=117.0
        mass2=135.0
if randomnumber >0.583660968193 and randomnumber <=0.583660968193:
        m1=118
        m2=134
        mass1=118.0
        mass2=134.0
if randomnumber >0.583660968193 and randomnumber <=0.583660968193:
        m1=119
        m2=133
        mass1=119.0
        mass2=133.0
if randomnumber >0.583660968193 and randomnumber <=0.583660968193:
        m1=120
        m2=132
        mass1=120.0
        mass2=132.0
if randomnumber >0.583660968193 and randomnumber <=0.583660968195:
        m1=121
        m2=131
        mass1=121.0
        mass2=131.0
if randomnumber >0.583660968195 and randomnumber <=0.583660968196:
        m1=122
        m2=130
        mass1=122.0
        mass2=130.0
if randomnumber >0.583660968196 and randomnumber <=0.58366097529:
        m1=123
        m2=129
        mass1=123.0
        mass2=129.0
if randomnumber >0.58366097529 and randomnumber <=0.583660980752:
        m1=124
        m2=128
        mass1=124.0
        mass2=128.0
if randomnumber >0.583660980752 and randomnumber <=0.583660980787:
        m1=125
        m2=127
        mass1=125.0
        mass2=127.0
if randomnumber >0.583660980787 and randomnumber <=0.583660980814:
        m1=126
        m2=126
        mass1=126.0
        mass2=126.0
```

```
if randomnumber >0.583660980814 and randomnumber <=0.583660995138:
    m1=127
    m2=125
    mass1=127.0
    mass2=125.0
if randomnumber >0.583660995138 and randomnumber <=0.583661005304:
    m1=128
    m2=124
    mass1=128.0
    mass2=124.0
if randomnumber >0.583661005304 and randomnumber <=0.583664817839:
    m1=129
    m2=123
    mass1=129.0
    mass2=123.0
if randomnumber >0.583664817839 and randomnumber <=0.583667523324:
    m1=130
    m2=122
    mass1=130.0
    mass2=122.0
if randomnumber >0.583667523324 and randomnumber <=0.59112393491:
    m1=131
    m2=121
    mass1=131.0
    mass2=121.0
if randomnumber >0.59112393491 and randomnumber <=0.596035514574:
    m1=132
    m2=120
    mass1=132.0
    mass2=120.0
if randomnumber >0.596035514574 and randomnumber <=0.622339320173:
    m1=133
    m2=119
    mass1=133.0
    mass2=119.0
if randomnumber >0.622339320173 and randomnumber <=0.638670660181:
    m1=134
    m2=118
    mass1=134.0
    mass2=118.0
if randomnumber >0.638670660181 and randomnumber <=0.651057138205:
    m1=135
    m2=117
    mass1=135.0
    mass2=117.0
if randomnumber >0.651057138205 and randomnumber <=0.653916104092:
    m1=136
    m2=116
    mass1=136.0
    mass2=116.0
if randomnumber >0.653916104092 and randomnumber <=0.654646498322:
    m1=137
    m2=115
    mass1=137.0
    mass2=115.0
if randomnumber >0.654646498322 and randomnumber <=0.654712616359:
    m1=138
    m2=114
    mass1=138.0
    mass2=114.0
if randomnumber >0.654712616359 and randomnumber <=0.654717208343:
    m1=139
    m2=113
    mass1=139.0
    mass2=113.0
if randomnumber >0.654717208343 and randomnumber <=0.654718004709:
    m1=140
    m2=112
    mass1=140.0
    mass2=112.0
if randomnumber >0.654718004709 and randomnumber <=0.654718062276:
    m1=141
```

```
        m2=111
        mass1=141.0
        mass2=111.0
if randomnumber >0.654718062276 and randomnumber <=0.654718065478:
        m1=142
        m2=110
        mass1=142.0
        mass2=110.0
if randomnumber >0.654718065478 and randomnumber <=0.654718065483:
        m1=143
        m2=109
        mass1=143.0
        mass2=109.0
if randomnumber >0.654718065483 and randomnumber <=0.654718065483:
        m1=144
        m2=108
        mass1=144.0
        mass2=108.0
if randomnumber >0.654718065483 and randomnumber <=0.654718065483:
        m1=121
        m2=131
        mass1=121.0
        mass2=131.0
if randomnumber >0.654718065483 and randomnumber <=0.654718065484:
        m1=123
        m2=129
        mass1=123.0
        mass2=129.0
if randomnumber >0.654718065484 and randomnumber <=0.654718065484:
        m1=125
        m2=127
        mass1=125.0
        mass2=127.0
if randomnumber >0.654718065484 and randomnumber <=0.654718065484:
        m1=126
        m2=126
        mass1=126.0
        mass2=126.0
if randomnumber >0.654718065484 and randomnumber <=0.654718065484:
        m1=127
        m2=125
        mass1=127.0
        mass2=125.0
if randomnumber >0.654718065484 and randomnumber <=0.654718583988:
        m1=128
        m2=124
        mass1=128.0
        mass2=124.0
if randomnumber >0.654718583988 and randomnumber <=0.654718583991:
        m1=129
        m2=123
        mass1=129.0
        mass2=123.0
if randomnumber >0.654718583991 and randomnumber <=0.654745079668:
        m1=130
        m2=122
        mass1=130.0
        mass2=122.0
if randomnumber >0.654745079668 and randomnumber <=0.654753026665:
        m1=131
        m2=121
        mass1=131.0
        mass2=121.0
if randomnumber >0.654753026665 and randomnumber <=0.656254301895:
        m1=132
        m2=120
        mass1=132.0
        mass2=120.0
if randomnumber >0.656254301895 and randomnumber <=0.660132616006:
        m1=133
        m2=119
        mass1=133.0
```

```
        mass2=119.0
if randomnumber >0.660132616006 and randomnumber <=0.669950437723:
        m1=134
        m2=118
        mass1=134.0
        mass2=118.0
if randomnumber >0.669950437723 and randomnumber <=0.676640582941:
        m1=135
        m2=117
        mass1=135.0
        mass2=117.0
if randomnumber >0.676640582941 and randomnumber <=0.69297344798:
        m1=136
        m2=116
        mass1=136.0
        mass2=116.0
if randomnumber >0.69297344798 and randomnumber <=0.702245189685:
        m1=137
        m2=115
        mass1=137.0
        mass2=115.0
if randomnumber >0.702245189685 and randomnumber <=0.709428372049:
        m1=138
        m2=114
        mass1=138.0
        mass2=114.0
if randomnumber >0.709428372049 and randomnumber <=0.711229016676:
        m1=139
        m2=113
        mass1=139.0
        mass2=113.0
if randomnumber >0.711229016676 and randomnumber <=0.711564796491:
        m1=140
        m2=112
        mass1=140.0
        mass2=112.0
if randomnumber >0.711564796491 and randomnumber <=0.711604496572:
        m1=141
        m2=111
        mass1=141.0
        mass2=111.0
if randomnumber >0.711604496572 and randomnumber <=0.711618464565:
        m1=142
        m2=110
        mass1=142.0
        mass2=110.0
if randomnumber >0.711618464565 and randomnumber <=0.711618529582:
        m1=143
        m2=109
        mass1=143.0
        mass2=109.0
if randomnumber >0.711618529582 and randomnumber <=0.711618532982:
        m1=144
        m2=108
        mass1=144.0
        mass2=108.0
if randomnumber >0.711618532982 and randomnumber <=0.711618532998:
        m1=145
        m2=107
        mass1=145.0
        mass2=107.0
if randomnumber >0.711618532998 and randomnumber <=0.711618532998:
        m1=146
        m2=106
        mass1=146.0
        mass2=106.0
if randomnumber >0.711618532998 and randomnumber <=0.711618532998:
        m1=124
        m2=128
        mass1=124.0
        mass2=128.0
if randomnumber >0.711618532998 and randomnumber <=0.711618532998:
```

```
        m1=125
        m2=127
        mass1=125.0
        mass2=127.0
if randomnumber >0.711618532998 and randomnumber <=0.711618532998:
        m1=126
        m2=126
        mass1=126.0
        mass2=126.0
if randomnumber >0.711618532998 and randomnumber <=0.711618532998:
        m1=127
        m2=125
        mass1=127.0
        mass2=125.0
if randomnumber >0.711618532998 and randomnumber <=0.711618532998:
        m1=128
        m2=124
        mass1=128.0
        mass2=124.0
if randomnumber >0.711618532998 and randomnumber <=0.711618532998:
        m1=129
        m2=123
        mass1=129.0
        mass2=123.0
if randomnumber >0.711618532998 and randomnumber <=0.711618532998:
        m1=130
        m2=122
        mass1=130.0
        mass2=122.0
if randomnumber >0.711618532998 and randomnumber <=0.711618771916:
        m1=131
        m2=121
        mass1=131.0
        mass2=121.0
if randomnumber >0.711618771916 and randomnumber <=0.711618941362:
        m1=132
        m2=120
        mass1=132.0
        mass2=120.0
if randomnumber >0.711618941362 and randomnumber <=0.711863208987:
        m1=133
        m2=119
        mass1=133.0
        mass2=119.0
if randomnumber >0.711863208987 and randomnumber <=0.713021716931:
        m1=134
        m2=118
        mass1=134.0
        mass2=118.0
if randomnumber >0.713021716931 and randomnumber <=0.718238398983:
        m1=135
        m2=117
        mass1=135.0
        mass2=117.0
if randomnumber >0.718238398983 and randomnumber <=0.722487476576:
        m1=136
        m2=116
        mass1=136.0
        mass2=116.0
if randomnumber >0.722487476576 and randomnumber <=0.743295067436:
        m1=137
        m2=115
        mass1=137.0
        mass2=115.0
if randomnumber >0.743295067436 and randomnumber <=0.765468352548:
        m1=138
        m2=114
        mass1=138.0
        mass2=114.0
if randomnumber >0.765468352548 and randomnumber <=0.78123785953:
        m1=139
        m2=113
```

```
        mass1=139.0
        mass2=113.0
if randomnumber >0.78123785953 and randomnumber <=0.789938843949:
        m1=140
        m2=112
        mass1=140.0
        mass2=112.0
if randomnumber >0.789938843949 and randomnumber <=0.79261264273:
        m1=141
        m2=111
        mass1=141.0
        mass2=111.0
if randomnumber >0.79261264273 and randomnumber <=0.79340890139:
        m1=142
        m2=110
        mass1=142.0
        mass2=110.0
if randomnumber >0.79340890139 and randomnumber <=0.793475343864:
        m1=143
        m2=109
        mass1=143.0
        mass2=109.0
if randomnumber >0.793475343864 and randomnumber <=0.793508565101:
        m1=144
        m2=108
        mass1=144.0
        mass2=108.0
if randomnumber >0.793508565101 and randomnumber <=0.793508885339:
        m1=145
        m2=107
        mass1=145.0
        mass2=107.0
if randomnumber >0.793508885339 and randomnumber <=0.79350889398:
        m1=146
        m2=106
        mass1=146.0
        mass2=106.0
if randomnumber >0.79350889398 and randomnumber <=0.793508893994:
        m1=147
        m2=105
        mass1=147.0
        mass2=105.0
if randomnumber >0.793508893994 and randomnumber <=0.793508893994:
        m1=148
        m2=104
        mass1=148.0
        mass2=104.0
if randomnumber >0.793508893994 and randomnumber <=0.793508893994:
        m1=150
        m2=102
        mass1=150.0
        mass2=102.0
if randomnumber >0.793508893994 and randomnumber <=0.793508893994:
        m1=127
        m2=125
        mass1=127.0
        mass2=125.0
if randomnumber >0.793508893994 and randomnumber <=0.793508893994:
        m1=129
        m2=123
        mass1=129.0
        mass2=123.0
if randomnumber >0.793508893994 and randomnumber <=0.793508894009:
        m1=131
        m2=121
        mass1=131.0
        mass2=121.0
if randomnumber >0.793508894009 and randomnumber <=0.793508895692:
        m1=132
        m2=120
        mass1=132.0
        mass2=120.0
```

```
if randomnumber >0.793508895692 and randomnumber <=0.793509010915:
    m1=133
    m2=119
    mass1=133.0
    mass2=119.0
if randomnumber >0.793509010915 and randomnumber <=0.793512795208:
    m1=134
    m2=118
    mass1=134.0
    mass2=118.0
if randomnumber >0.793512795208 and randomnumber <=0.793550282276:
    m1=135
    m2=117
    mass1=135.0
    mass2=117.0
if randomnumber >0.793550282276 and randomnumber <=0.793861046034:
    m1=136
    m2=116
    mass1=136.0
    mass2=116.0
if randomnumber >0.793861046034 and randomnumber <=0.794136214871:
    m1=137
    m2=115
    mass1=137.0
    mass2=115.0
if randomnumber >0.794136214871 and randomnumber <=0.799225641488:
    m1=138
    m2=114
    mass1=138.0
    mass2=114.0
if randomnumber >0.799225641488 and randomnumber <=0.802574571863:
    m1=139
    m2=113
    mass1=139.0
    mass2=113.0
if randomnumber >0.802574571863 and randomnumber <=0.815433301413:
    m1=140
    m2=112
    mass1=140.0
    mass2=112.0
if randomnumber >0.815433301413 and randomnumber <=0.831627445037:
    m1=141
    m2=111
    mass1=141.0
    mass2=111.0
if randomnumber >0.831627445037 and randomnumber <=0.839515869901:
    m1=142
    m2=110
    mass1=142.0
    mass2=110.0
if randomnumber >0.839515869901 and randomnumber <=0.843355549873:
    m1=143
    m2=109
    mass1=143.0
    mass2=109.0
if randomnumber >0.843355549873 and randomnumber <=0.844246083742:
    m1=144
    m2=108
    mass1=144.0
    mass2=108.0
if randomnumber >0.844246083742 and randomnumber <=0.844404080994:
    m1=145
    m2=107
    mass1=145.0
    mass2=107.0
if randomnumber >0.844404080994 and randomnumber <=0.844416094686:
    m1=146
    m2=106
    mass1=146.0
    mass2=106.0
if randomnumber >0.844416094686 and randomnumber <=0.844416289464:
    m1=147
```

```
        m2=105
        mass1=147.0
        mass2=105.0
if randomnumber >0.844416289464 and randomnumber <=0.844416297993:
        m1=148
        m2=104
        mass1=148.0
        mass2=104.0
if randomnumber >0.844416297993 and randomnumber <=0.844416298052:
        m1=149
        m2=103
        mass1=149.0
        mass2=103.0
if randomnumber >0.844416298052 and randomnumber <=0.844416298055:
        m1=150
        m2=102
        mass1=150.0
        mass2=102.0
if randomnumber >0.844416298055 and randomnumber <=0.844416298055:
        m1=151
        m2=101
        mass1=151.0
        mass2=101.0
if randomnumber >0.844416298055 and randomnumber <=0.844416298055:
        m1=129
        m2=123
        mass1=129.0
        mass2=123.0
if randomnumber >0.844416298055 and randomnumber <=0.844416298055:
        m1=131
        m2=121
        mass1=131.0
        mass2=121.0
if randomnumber >0.844416298055 and randomnumber <=0.844416298055:
        m1=132
        m2=120
        mass1=132.0
        mass2=120.0
if randomnumber >0.844416298055 and randomnumber <=0.844416298063:
        m1=133
        m2=119
        mass1=133.0
        mass2=119.0
if randomnumber >0.844416298063 and randomnumber <=0.844416299203:
        m1=134
        m2=118
        mass1=134.0
        mass2=118.0
if randomnumber >0.844416299203 and randomnumber <=0.844416368111:
        m1=135
        m2=117
        mass1=135.0
        mass2=117.0
if randomnumber >0.844416368111 and randomnumber <=0.84441779767:
        m1=136
        m2=116
        mass1=136.0
        mass2=116.0
if randomnumber >0.84441779767 and randomnumber <=0.844444739543:
        m1=137
        m2=115
        mass1=137.0
        mass2=115.0
if randomnumber >0.844444739543 and randomnumber <=0.844470286312:
        m1=138
        m2=114
        mass1=138.0
        mass2=114.0
if randomnumber >0.844470286312 and randomnumber <=0.845748539756:
        m1=139
        m2=113
        mass1=139.0
```

```
        mass2=113.0
if randomnumber >0.845748539756 and randomnumber <=0.854108820767:
        m1=140
        m2=112
        mass1=140.0
        mass2=112.0
if randomnumber >0.854108820767 and randomnumber <=0.864433116852:
        m1=141
        m2=111
        mass1=141.0
        mass2=111.0
if randomnumber >0.864433116852 and randomnumber <=0.881812492627:
        m1=142
        m2=110
        mass1=142.0
        mass2=110.0
if randomnumber >0.881812492627 and randomnumber <=0.898114631098:
        m1=143
        m2=109
        mass1=143.0
        mass2=109.0
if randomnumber >0.898114631098 and randomnumber <=0.910295060377:
        m1=144
        m2=108
        mass1=144.0
        mass2=108.0
if randomnumber >0.910295060377 and randomnumber <=0.914830132273:
        m1=145
        m2=107
        mass1=145.0
        mass2=107.0
if randomnumber >0.914830132273 and randomnumber <=0.916172075565:
        m1=146
        m2=106
        mass1=146.0
        mass2=106.0
if randomnumber >0.916172075565 and randomnumber <=0.916371121026:
        m1=147
        m2=105
        mass1=147.0
        mass2=105.0
if randomnumber >0.916371121026 and randomnumber <=0.916386049224:
        m1=148
        m2=104
        mass1=148.0
        mass2=104.0
if randomnumber >0.916386049224 and randomnumber <=0.916387274824:
        m1=149
        m2=103
        mass1=149.0
        mass2=103.0
if randomnumber >0.916387274824 and randomnumber <=0.916387342603:
        m1=150
        m2=102
        mass1=150.0
        mass2=102.0
if randomnumber >0.916387342603 and randomnumber <=0.91638734652:
        m1=151
        m2=101
        mass1=151.0
        mass2=101.0
if randomnumber >0.91638734652 and randomnumber <=0.916387346551:
        m1=152
        m2=100
        mass1=152.0
        mass2=100.0
if randomnumber >0.916387346551 and randomnumber <=0.916387346551:
        m1=153
        m2=99
        mass1=153.0
        mass2=99.0
if randomnumber >0.916387346551 and randomnumber <=0.916387346551:
```

```
        m1=154
        m2=98
        mass1=154.0
        mass2=98.0
if randomnumber >0.916387346551 and randomnumber <=0.916387346551:
        m1=133
        m2=119
        mass1=133.0
        mass2=119.0
if randomnumber >0.916387346551 and randomnumber <=0.916387346553:
        m1=135
        m2=117
        mass1=135.0
        mass2=117.0
if randomnumber >0.916387346553 and randomnumber <=0.916387362481:
        m1=137
        m2=115
        mass1=137.0
        mass2=115.0
if randomnumber >0.916387362481 and randomnumber <=0.91638771041:
        m1=138
        m2=114
        mass1=138.0
        mass2=114.0
if randomnumber >0.91638771041 and randomnumber <=0.916393522419:
        m1=139
        m2=113
        mass1=139.0
        mass2=113.0
if randomnumber >0.916393522419 and randomnumber <=0.916451117223:
        m1=140
        m2=112
        mass1=140.0
        mass2=112.0
if randomnumber >0.916451117223 and randomnumber <=0.916858527219:
        m1=141
        m2=111
        mass1=141.0
        mass2=111.0
if randomnumber >0.916858527219 and randomnumber <=0.918549115382:
        m1=142
        m2=110
        mass1=142.0
        mass2=110.0
if randomnumber >0.918549115382 and randomnumber <=0.923153299462:
        m1=143
        m2=109
        mass1=143.0
        mass2=109.0
if randomnumber >0.923153299462 and randomnumber <=0.930548291803:
        m1=144
        m2=108
        mass1=144.0
        mass2=108.0
if randomnumber >0.930548291803 and randomnumber <=0.940132439104:
        m1=145
        m2=107
        mass1=145.0
        mass2=107.0
if randomnumber >0.940132439104 and randomnumber <=0.946692030301:
        m1=146
        m2=106
        mass1=146.0
        mass2=106.0
if randomnumber >0.946692030301 and randomnumber <=0.9499718259:
        m1=147
        m2=105
        mass1=147.0
        mass2=105.0
if randomnumber >0.9499718259 and randomnumber <=0.950632978035:
        m1=148
        m2=104
```

```
        mass1=148.0
        mass2=104.0
if randomnumber >0.950632978035 and randomnumber <=0.950838199875:
        m1=149
        m2=103
        mass1=149.0
        mass2=103.0
if randomnumber >0.950838199875 and randomnumber <=0.950867638299:
        m1=150
        m2=102
        mass1=150.0
        mass2=102.0
if randomnumber >0.950867638299 and randomnumber <=0.95087033987:
        m1=151
        m2=101
        mass1=151.0
        mass2=101.0
if randomnumber >0.95087033987 and randomnumber <=0.950870475991:
        m1=152
        m2=100
        mass1=152.0
        mass2=100.0
if randomnumber >0.950870475991 and randomnumber <=0.950870480798:
        m1=153
        m2=99
        mass1=153.0
        mass2=99.0
if randomnumber >0.950870480798 and randomnumber <=0.950870480901:
        m1=154
        m2=98
        mass1=154.0
        mass2=98.0
if randomnumber >0.950870480901 and randomnumber <=0.950870480901:
        m1=155
        m2=97
        mass1=155.0
        mass2=97.0
if randomnumber >0.950870480901 and randomnumber <=0.950870480901:
        m1=156
        m2=96
        mass1=156.0
        mass2=96.0
if randomnumber >0.950870480901 and randomnumber <=0.950870480901:
        m1=135
        m2=117
        mass1=135.0
        mass2=117.0
if randomnumber >0.950870480901 and randomnumber <=0.950870480902:
        m1=137
        m2=115
        mass1=137.0
        mass2=115.0
if randomnumber >0.950870480902 and randomnumber <=0.950870480946:
        m1=138
        m2=114
        mass1=138.0
        mass2=114.0
if randomnumber >0.950870480946 and randomnumber <=0.950870482855:
        m1=139
        m2=113
        mass1=139.0
        mass2=113.0
if randomnumber >0.950870482855 and randomnumber <=0.95087048421:
        m1=140
        m2=112
        mass1=140.0
        mass2=112.0
if randomnumber >0.95087048421 and randomnumber <=0.950871777646:
        m1=141
        m2=111
        mass1=141.0
        mass2=111.0
```

```
if randomnumber >0.950871777646 and randomnumber <=0.950891924785:
    m1=142
    m2=110
    mass1=142.0
    mass2=110.0
if randomnumber >0.950891924785 and randomnumber <=0.951042494567:
    m1=143
    m2=109
    mass1=143.0
    mass2=109.0
if randomnumber >0.951042494567 and randomnumber <=0.951699997923:
    m1=144
    m2=108
    mass1=144.0
    mass2=108.0
if randomnumber >0.951699997923 and randomnumber <=0.954276951534:
    m1=145
    m2=107
    mass1=145.0
    mass2=107.0
if randomnumber >0.954276951534 and randomnumber <=0.96013866557:
    m1=146
    m2=106
    mass1=146.0
    mass2=106.0
if randomnumber >0.96013866557 and randomnumber <=0.967009046959:
    m1=147
    m2=105
    mass1=147.0
    mass2=105.0
if randomnumber >0.967009046959 and randomnumber <=0.972038042778:
    m1=148
    m2=104
    mass1=148.0
    mass2=104.0
if randomnumber >0.972038042778 and randomnumber <=0.975212357008:
    m1=149
    m2=103
    mass1=149.0
    mass2=103.0
if randomnumber >0.975212357008 and randomnumber <=0.976782529787:
    m1=150
    m2=102
    mass1=150.0
    mass2=102.0
if randomnumber >0.976782529787 and randomnumber <=0.977139162435:
    m1=151
    m2=101
    mass1=151.0
    mass2=101.0
if randomnumber >0.977139162435 and randomnumber <=0.977205856596:
    m1=152
    m2=100
    mass1=152.0
    mass2=100.0
if randomnumber >0.977205856596 and randomnumber <=0.97721184935:
    m1=153
    m2=99
    mass1=153.0
    mass2=99.0
if randomnumber >0.97721184935 and randomnumber <=0.9772123334:
    m1=154
    m2=98
    mass1=154.0
    mass2=98.0
if randomnumber >0.9772123334 and randomnumber <=0.977212352942:
    m1=155
    m2=97
    mass1=155.0
    mass2=97.0
if randomnumber >0.977212352942 and randomnumber <=0.977212353637:
    m1=156
```

```
        m2=96
        mass1=156.0
        mass2=96.0
if randomnumber >0.977212353637 and randomnumber <=0.977212353647:
        m1=157
        m2=95
        mass1=157.0
        mass2=95.0
if randomnumber >0.977212353647 and randomnumber <=0.977212353647:
        m1=158
        m2=94
        mass1=158.0
        mass2=94.0
if randomnumber >0.977212353647 and randomnumber <=0.977212353647:
        m1=159
        m2=93
        mass1=159.0
        mass2=93.0
if randomnumber >0.977212353647 and randomnumber <=0.977212353647:
        m1=160
        m2=92
        mass1=160.0
        mass2=92.0
if randomnumber >0.977212353647 and randomnumber <=0.977212353647:
        m1=139
        m2=113
        mass1=139.0
        mass2=113.0
if randomnumber >0.977212353647 and randomnumber <=0.977212353649:
        m1=140
        m2=112
        mass1=140.0
        mass2=112.0
if randomnumber >0.977212353649 and randomnumber <=0.977212353792:
        m1=141
        m2=111
        mass1=141.0
        mass2=111.0
if randomnumber >0.977212353792 and randomnumber <=0.977212359949:
        m1=142
        m2=110
        mass1=142.0
        mass2=110.0
if randomnumber >0.977212359949 and randomnumber <=0.977212363027:
        m1=143
        m2=109
        mass1=143.0
        mass2=109.0
if randomnumber >0.977212363027 and randomnumber <=0.977214428007:
        m1=144
        m2=108
        mass1=144.0
        mass2=108.0
if randomnumber >0.977214428007 and randomnumber <=0.977216286264:
        m1=145
        m2=107
        mass1=145.0
        mass2=107.0
if randomnumber >0.977216286264 and randomnumber <=0.977326268172:
        m1=146
        m2=106
        mass1=146.0
        mass2=106.0
if randomnumber >0.977326268172 and randomnumber <=0.978112207449:
        m1=147
        m2=105
        mass1=147.0
        mass2=105.0
if randomnumber >0.978112207449 and randomnumber <=0.981602361421:
        m1=148
        m2=104
        mass1=148.0
```

```
        mass2=104.0
if randomnumber >0.981602361421 and randomnumber <=0.983347438406:
        m1=149
        m2=103
        mass1=149.0
        mass2=103.0
if randomnumber >0.983347438406 and randomnumber <=0.98622465949:
        m1=150
        m2=102
        mass1=150.0
        mass2=102.0
if randomnumber >0.98622465949 and randomnumber <=0.988326300216:
        m1=151
        m2=101
        mass1=151.0
        mass2=101.0
if randomnumber >0.988326300216 and randomnumber <=0.989232756546:
        m1=152
        m2=100
        mass1=152.0
        mass2=100.0
if randomnumber >0.989232756546 and randomnumber <=0.989511280453:
        m1=153
        m2=99
        mass1=153.0
        mass2=99.0
if randomnumber >0.989511280453 and randomnumber <=0.989566067956:
        m1=154
        m2=98
        mass1=154.0
        mass2=98.0
if randomnumber >0.989566067956 and randomnumber <=0.989574139215:
        m1=155
        m2=97
        mass1=155.0
        mass2=97.0
if randomnumber >0.989574139215 and randomnumber <=0.989574873479:
        m1=156
        m2=96
        mass1=156.0
        mass2=96.0
if randomnumber >0.989574873479 and randomnumber <=0.989574914089:
        m1=157
        m2=95
        mass1=157.0
        mass2=95.0
if randomnumber >0.989574914089 and randomnumber <=0.989574915196:
        m1=158
        m2=94
        mass1=158.0
        mass2=94.0
if randomnumber >0.989574915196 and randomnumber <=0.98957491522:
        m1=159
        m2=93
        mass1=159.0
        mass2=93.0
if randomnumber >0.98957491522 and randomnumber <=0.98957491522:
        m1=160
        m2=92
        mass1=160.0
        mass2=92.0
if randomnumber >0.98957491522 and randomnumber <=0.98957491522:
        m1=161
        m2=91
        mass1=161.0
        mass2=91.0
if randomnumber >0.98957491522 and randomnumber <=0.98957491522:
        m1=162
        m2=90
        mass1=162.0
        mass2=90.0
if randomnumber >0.98957491522 and randomnumber <=0.98957491522:
```

```
    m1=140
    m2=112
    mass1=140.0
    mass2=112.0
if randomnumber >0.98957491522 and randomnumber <=0.98957491522:
    m1=141
    m2=111
    mass1=141.0
    mass2=111.0
if randomnumber >0.98957491522 and randomnumber <=0.98957491522:
    m1=142
    m2=110
    mass1=142.0
    mass2=110.0
if randomnumber >0.98957491522 and randomnumber <=0.989574915236:
    m1=143
    m2=109
    mass1=143.0
    mass2=109.0
if randomnumber >0.989574915236 and randomnumber <=0.98957491601:
    m1=144
    m2=108
    mass1=144.0
    mass2=108.0
if randomnumber >0.98957491601 and randomnumber <=0.989574949504:
    m1=145
    m2=107
    mass1=145.0
    mass2=107.0
if randomnumber >0.989574949504 and randomnumber <=0.989575407573:
    m1=146
    m2=106
    mass1=146.0
    mass2=106.0
if randomnumber >0.989575407573 and randomnumber <=0.989584371258:
    m1=147
    m2=105
    mass1=147.0
    mass2=105.0
if randomnumber >0.989584371258 and randomnumber <=0.989661920821:
    m1=148
    m2=104
    mass1=148.0
    mass2=104.0
if randomnumber >0.989661920821 and randomnumber <=0.989943353586:
    m1=149
    m2=103
    mass1=149.0
    mass2=103.0
if randomnumber >0.989943353586 and randomnumber <=0.990924479993:
    m1=150
    m2=102
    mass1=150.0
    mass2=102.0
if randomnumber >0.990924479993 and randomnumber <=0.992573220153:
    m1=151
    m2=101
    mass1=151.0
    mass2=101.0
if randomnumber >0.992573220153 and randomnumber <=0.994663733795:
    m1=152
    m2=100
    mass1=152.0
    mass2=100.0
if randomnumber >0.994663733795 and randomnumber <=0.996021842424:
    m1=153
    m2=99
    mass1=153.0
    mass2=99.0
if randomnumber >0.996021842424 and randomnumber <=0.996873143437:
    m1=154
    m2=98
```

```
        mass1=154.0
        mass2=98.0
if randomnumber >0.996873143437 and randomnumber <=0.997159620103:
        m1=155
        m2=97
        mass1=155.0
        mass2=97.0
if randomnumber >0.997159620103 and randomnumber <=0.997250059009:
        m1=156
        m2=96
        mass1=156.0
        mass2=96.0
if randomnumber >0.997250059009 and randomnumber <=0.997262383356:
        m1=157
        m2=95
        mass1=157.0
        mass2=95.0
if randomnumber >0.997262383356 and randomnumber <=0.99726362031:
        m1=158
        m2=94
        mass1=158.0
        mass2=94.0
if randomnumber >0.99726362031 and randomnumber <=0.997263687523:
        m1=159
        m2=93
        mass1=159.0
        mass2=93.0
if randomnumber >0.997263687523 and randomnumber <=0.997263690381:
        m1=160
        m2=92
        mass1=160.0
        mass2=92.0
if randomnumber >0.997263690381 and randomnumber <=0.997263690445:
        m1=161
        m2=91
        mass1=161.0
        mass2=91.0
if randomnumber >0.997263690445 and randomnumber <=0.997263690446:
        m1=162
        m2=90
        mass1=162.0
        mass2=90.0
if randomnumber >0.997263690446 and randomnumber <=0.997263690446:
        m1=163
        m2=89
        mass1=163.0
        mass2=89.0
if randomnumber >0.997263690446 and randomnumber <=0.997263690446:
        m1=164
        m2=88
        mass1=164.0
        mass2=88.0
if randomnumber >0.997263690446 and randomnumber <=0.997263690446:
        m1=141
        m2=111
        mass1=141.0
        mass2=111.0
if randomnumber >0.997263690446 and randomnumber <=0.997263690446:
        m1=143
        m2=109
        mass1=143.0
        mass2=109.0
if randomnumber >0.997263690446 and randomnumber <=0.997263690446:
        m1=144
        m2=108
        mass1=144.0
        mass2=108.0
if randomnumber >0.997263690446 and randomnumber <=0.997263690447:
        m1=145
        m2=107
        mass1=145.0
        mass2=107.0
```

```
if randomnumber >0.997263690447 and randomnumber <=0.997263690492:
     m1=146
     m2=106
     mass1=146.0
     mass2=106.0
if randomnumber >0.997263690492 and randomnumber <=0.997263694158:
     m1=147
     m2=105
     mass1=147.0
     mass2=105.0
if randomnumber >0.997263694158 and randomnumber <=0.997263726691:
     m1=148
     m2=104
     mass1=148.0
     mass2=104.0
if randomnumber >0.997263726691 and randomnumber <=0.997263752108:
     m1=149
     m2=103
     mass1=149.0
     mass2=103.0
if randomnumber >0.997263752108 and randomnumber <=0.997270247557:
     m1=150
     m2=102
     mass1=150.0
     mass2=102.0
if randomnumber >0.997270247557 and randomnumber <=0.997331078818:
     m1=151
     m2=101
     mass1=151.0
     mass2=101.0
if randomnumber >0.997331078818 and randomnumber <=0.997519999762:
     m1=152
     m2=100
     mass1=152.0
     mass2=100.0
if randomnumber >0.997519999762 and randomnumber <=0.99758297341:
     m1=153
     m2=99
     mass1=153.0
     mass2=99.0
if randomnumber >0.99758297341 and randomnumber <=0.998090610193:
     m1=154
     m2=98
     mass1=154.0
     mass2=98.0
if randomnumber >0.998090610193 and randomnumber <=0.998344428584:
     m1=155
     m2=97
     mass1=155.0
     mass2=97.0
if randomnumber >0.998344428584 and randomnumber <=0.998695379077:
     m1=156
     m2=96
     mass1=156.0
     mass2=96.0
if randomnumber >0.998695379077 and randomnumber <=0.998850190707:
     m1=157
     m2=95
     mass1=157.0
     mass2=95.0
if randomnumber >0.998850190707 and randomnumber <=0.998886265731:
     m1=158
     m2=94
     mass1=158.0
     mass2=94.0
if randomnumber >0.998886265731 and randomnumber <=0.99889316215:
     m1=159
     m2=93
     mass1=159.0
     mass2=93.0
if randomnumber >0.99889316215 and randomnumber <=0.998893873821:
     m1=160
```

```
        m2=92
        mass1=160.0
        mass2=92.0
if randomnumber >0.998893873821 and randomnumber <=0.998893932562:
        m1=161
        m2=91
        mass1=161.0
        mass2=91.0
if randomnumber >0.998893932562 and randomnumber <=0.998893934912:
        m1=162
        m2=90
        mass1=162.0
        mass2=90.0
if randomnumber >0.998893934912 and randomnumber <=0.998893934979:
        m1=163
        m2=89
        mass1=163.0
        mass2=89.0
if randomnumber >0.998893934979 and randomnumber <=0.99889393498:
        m1=164
        m2=88
        mass1=164.0
        mass2=88.0
if randomnumber >0.99889393498 and randomnumber <=0.99889393498:
        m1=165
        m2=87
        mass1=165.0
        mass2=87.0
if randomnumber >0.99889393498 and randomnumber <=0.99889393498:
        m1=166
        m2=86
        mass1=166.0
        mass2=86.0
if randomnumber >0.99889393498 and randomnumber <=0.99889393498:
        m1=167
        m2=85
        mass1=167.0
        mass2=85.0
if randomnumber >0.99889393498 and randomnumber <=0.99889393498:
        m1=143
        m2=109
        mass1=143.0
        mass2=109.0
if randomnumber >0.99889393498 and randomnumber <=0.99889393498:
        m1=144
        m2=108
        mass1=144.0
        mass2=108.0
if randomnumber >0.99889393498 and randomnumber <=0.99889393498:
        m1=145
        m2=107
        mass1=145.0
        mass2=107.0
if randomnumber >0.99889393498 and randomnumber <=0.99889393498:
        m1=146
        m2=106
        mass1=146.0
        mass2=106.0
if randomnumber >0.99889393498 and randomnumber <=0.99889393498:
        m1=147
        m2=105
        mass1=147.0
        mass2=105.0
if randomnumber >0.99889393498 and randomnumber <=0.998893934991:
        m1=148
        m2=104
        mass1=148.0
        mass2=104.0
if randomnumber >0.998893934991 and randomnumber <=0.998893935453:
        m1=149
        m2=103
        mass1=149.0
```

```
        mass2=103.0
if randomnumber >0.998893935453 and randomnumber <=0.9988939498:
        m1=150
        m2=102
        mass1=150.0
        mass2=102.0
if randomnumber >0.9988939498 and randomnumber <=0.998894167255:
        m1=151
        m2=101
        mass1=151.0
        mass2=101.0
if randomnumber >0.998894167255 and randomnumber <=0.998896595981:
        m1=152
        m2=100
        mass1=152.0
        mass2=100.0
if randomnumber >0.998896595981 and randomnumber <=0.998908541895:
        m1=153
        m2=99
        mass1=153.0
        mass2=99.0
if randomnumber >0.998908541895 and randomnumber <=0.998961499359:
        m1=154
        m2=98
        mass1=154.0
        mass2=98.0
if randomnumber >0.998961499359 and randomnumber <=0.999081664525:
        m1=155
        m2=97
        mass1=155.0
        mass2=97.0
if randomnumber >0.999081664525 and randomnumber <=0.999333342789:
        m1=156
        m2=96
        mass1=156.0
        mass2=96.0
if randomnumber >0.999333342789 and randomnumber <=0.999565291659:
        m1=157
        m2=95
        mass1=157.0
        mass2=95.0
if randomnumber >0.999565291659 and randomnumber <=0.999730783595:
        m1=158
        m2=94
        mass1=158.0
        mass2=94.0
if randomnumber >0.999730783595 and randomnumber <=0.999799262608:
        m1=159
        m2=93
        mass1=159.0
        mass2=93.0
if randomnumber >0.999799262608 and randomnumber <=0.999821810203:
        m1=160
        m2=92
        mass1=160.0
        mass2=92.0
if randomnumber >0.999821810203 and randomnumber <=0.999826215795:
        m1=161
        m2=91
        mass1=161.0
        mass2=91.0
if randomnumber >0.999826215795 and randomnumber <=0.999826842746:
        m1=162
        m2=90
        mass1=162.0
        mass2=90.0
if randomnumber >0.999826842746 and randomnumber <=0.99982688765:
        m1=163
        m2=89
        mass1=163.0
        mass2=89.0
if randomnumber >0.99982688765 and randomnumber <=0.999826890005:
```

```
            m1=164
            m2=88
            mass1=164.0
            mass2=88.0
if randomnumber >0.999826890005 and randomnumber <=0.999826890084:
            m1=165
            m2=87
            mass1=165.0
            mass2=87.0
if randomnumber >0.999826890084 and randomnumber <=0.999826890086:
            m1=166
            m2=86
            mass1=166.0
            mass2=86.0
if randomnumber >0.999826890086 and randomnumber <=0.999826890086:
            m1=167
            m2=85
            mass1=167.0
            mass2=85.0
if randomnumber >0.999826890086 and randomnumber <=0.999826890086:
            m1=168
            m2=84
            mass1=168.0
            mass2=84.0
if randomnumber >0.999826890086 and randomnumber <=0.999826890086:
            m1=169
            m2=83
            mass1=169.0
            mass2=83.0
if randomnumber >0.999826890086 and randomnumber <=0.999826890086:
            m1=170
            m2=82
            mass1=170.0
            mass2=82.0
if randomnumber >0.999826890086 and randomnumber <=0.999826890086:
            m1=147
            m2=105
            mass1=147.0
            mass2=105.0
if randomnumber >0.999826890086 and randomnumber <=0.999826890086:
            m1=149
            m2=103
            mass1=149.0
            mass2=103.0
if randomnumber >0.999826890086 and randomnumber <=0.999826890112:
            m1=151
            m2=101
            mass1=151.0
            mass2=101.0
if randomnumber >0.999826890112 and randomnumber <=0.999826890879:
            m1=152
            m2=100
            mass1=152.0
            mass2=100.0
if randomnumber >0.999826890879 and randomnumber <=0.999826891135:
            m1=153
            m2=99
            mass1=153.0
            mass2=99.0
if randomnumber >0.999826891135 and randomnumber <=0.999827049284:
            m1=154
            m2=98
            mass1=154.0
            mass2=98.0
if randomnumber >0.999827049284 and randomnumber <=0.999827128359:
            m1=155
            m2=97
            mass1=155.0
            mass2=97.0
if randomnumber >0.999827128359 and randomnumber <=0.99983378196:
            m1=156
            m2=96
```

```
    mass1=156.0
    mass2=96.0
if randomnumber >0.99983378196 and randomnumber <=0.999853313438:
    m1=157
    m2=95
    mass1=157.0
    mass2=95.0
if randomnumber >0.999853313438 and randomnumber <=0.999883700714:
    m1=158
    m2=94
    mass1=158.0
    mass2=94.0
if randomnumber >0.999883700714 and randomnumber <=0.999922345698:
    m1=159
    m2=93
    mass1=159.0
    mass2=93.0
if randomnumber >0.999922345698 and randomnumber <=0.999948270901:
    m1=160
    m2=92
    mass1=160.0
    mass2=92.0
if randomnumber >0.999948270901 and randomnumber <=0.999963899483:
    m1=161
    m2=91
    mass1=161.0
    mass2=91.0
if randomnumber >0.999963899483 and randomnumber <=0.999968773875:
    m1=162
    m2=90
    mass1=162.0
    mass2=90.0
if randomnumber >0.999968773875 and randomnumber <=0.999969943049:
    m1=163
    m2=89
    mass1=163.0
    mass2=89.0
if randomnumber >0.999969943049 and randomnumber <=0.999970085384:
    m1=164
    m2=88
    mass1=164.0
    mass2=88.0
if randomnumber >0.999970085384 and randomnumber <=0.999970102554:
    m1=165
    m2=87
    mass1=165.0
    mass2=87.0
if randomnumber >0.999970102554 and randomnumber <=0.999970103904:
    m1=166
    m2=86
    mass1=166.0
    mass2=86.0
if randomnumber >0.999970103904 and randomnumber <=0.999970103943:
    m1=167
    m2=85
    mass1=167.0
    mass2=85.0
if randomnumber >0.999970103943 and randomnumber <=0.999970103944:
    m1=168
    m2=84
    mass1=168.0
    mass2=84.0
if randomnumber >0.999970103944 and randomnumber <=0.999970103944:
    m1=169
    m2=83
    mass1=169.0
    mass2=83.0
if randomnumber >0.999970103944 and randomnumber <=0.999970103944:
    m1=170
    m2=82
    mass1=170.0
    mass2=82.0
```

```
if randomnumber >0.999970103944 and randomnumber <=0.999970103944:
    m1=171
    m2=81
    mass1=171.0
    mass2=81.0
if randomnumber >0.999970103944 and randomnumber <=0.999970103944:
    m1=147
    m2=105
    mass1=147.0
    mass2=105.0
if randomnumber >0.999970103944 and randomnumber <=0.999970103944:
    m1=149
    m2=103
    mass1=149.0
    mass2=103.0
if randomnumber >0.999970103944 and randomnumber <=0.999970103944:
    m1=151
    m2=101
    mass1=151.0
    mass2=101.0
if randomnumber >0.999970103944 and randomnumber <=0.999970103944:
    m1=152
    m2=100
    mass1=152.0
    mass2=100.0
if randomnumber >0.999970103944 and randomnumber <=0.999970103945:
    m1=153
    m2=99
    mass1=153.0
    mass2=99.0
if randomnumber >0.999970103945 and randomnumber <=0.999970103997:
    m1=154
    m2=98
    mass1=154.0
    mass2=98.0
if randomnumber >0.999970103997 and randomnumber <=0.999970104935:
    m1=155
    m2=97
    mass1=155.0
    mass2=97.0
if randomnumber >0.999970104935 and randomnumber <=0.999970127189:
    m1=156
    m2=96
    mass1=156.0
    mass2=96.0
if randomnumber >0.999970127189 and randomnumber <=0.999970290986:
    m1=157
    m2=95
    mass1=157.0
    mass2=95.0
if randomnumber >0.999970290986 and randomnumber <=0.999971149511:
    m1=158
    m2=94
    mass1=158.0
    mass2=94.0
if randomnumber >0.999971149511 and randomnumber <=0.999973708142:
    m1=159
    m2=93
    mass1=159.0
    mass2=93.0
if randomnumber >0.999973708142 and randomnumber <=0.999979169948:
    m1=160
    m2=92
    mass1=160.0
    mass2=92.0
if randomnumber >0.999979169948 and randomnumber <=0.999986258409:
    m1=161
    m2=91
    mass1=161.0
    mass2=91.0
if randomnumber >0.999986258409 and randomnumber <=0.999993002382:
    m1=162
```

```
        m2=90
        mass1=162.0
        mass2=90.0
if randomnumber >0.999993002382 and randomnumber <=0.999996385654:
        m1=163
        m2=89
        mass1=163.0
        mass2=89.0
if randomnumber >0.999996385654 and randomnumber <=0.999997639552:
        m1=164
        m2=88
        mass1=164.0
        mass2=88.0
if randomnumber >0.999997639552 and randomnumber <=0.999997976184:
        m1=165
        m2=87
        mass1=165.0
        mass2=87.0
if randomnumber >0.999997976184 and randomnumber <=0.999998065991:
        m1=166
        m2=86
        mass1=166.0
        mass2=86.0
if randomnumber >0.999998065991 and randomnumber <=0.999998072091:
        m1=167
        m2=85
        mass1=167.0
        mass2=85.0
if randomnumber >0.999998072091 and randomnumber <=0.999998072486:
        m1=168
        m2=84
        mass1=168.0
        mass2=84.0
if randomnumber >0.999998072486 and randomnumber <=0.999998072504:
        m1=169
        m2=83
        mass1=169.0
        mass2=83.0
if randomnumber >0.999998072504 and randomnumber <=0.999998072505:
        m1=170
        m2=82
        mass1=170.0
        mass2=82.0
if randomnumber >0.999998072505 and randomnumber <=0.999998072505:
        m1=171
        m2=81
        mass1=171.0
        mass2=81.0
if randomnumber >0.999998072505 and randomnumber <=0.999998072505:
        m1=172
        m2=80
        mass1=172.0
        mass2=80.0
if randomnumber >0.999998072505 and randomnumber <=0.999998072505:
        m1=151
        m2=101
        mass1=151.0
        mass2=101.0
if randomnumber >0.999998072505 and randomnumber <=0.999998072505:
        m1=153
        m2=99
        mass1=153.0
        mass2=99.0
if randomnumber >0.999998072505 and randomnumber <=0.999998072505:
        m1=155
        m2=97
        mass1=155.0
        mass2=97.0
if randomnumber >0.999998072505 and randomnumber <=0.999998072506:
        m1=156
        m2=96
        mass1=156.0
```

```
        mass2=96.0
if randomnumber >0.999998072506 and randomnumber <=0.999998072506:
        m1=157
        m2=95
        mass1=157.0
        mass2=95.0
if randomnumber >0.999998072506 and randomnumber <=0.999998073133:
        m1=158
        m2=94
        mass1=158.0
        mass2=94.0
if randomnumber >0.999998073133 and randomnumber <=0.999998073196:
        m1=159
        m2=93
        mass1=159.0
        mass2=93.0
if randomnumber >0.999998073196 and randomnumber <=0.999998108667:
        m1=160
        m2=92
        mass1=160.0
        mass2=92.0
if randomnumber >0.999998108667 and randomnumber <=0.99999826964:
        m1=161
        m2=91
        mass1=161.0
        mass2=91.0
if randomnumber >0.99999826964 and randomnumber <=0.999998622087:
        m1=162
        m2=90
        mass1=162.0
        mass2=90.0
if randomnumber >0.999998622087 and randomnumber <=0.999998798311:
        m1=163
        m2=89
        mass1=163.0
        mass2=89.0
if randomnumber >0.999998798311 and randomnumber <=0.999999236046:
        m1=164
        m2=88
        mass1=164.0
        mass2=88.0
if randomnumber >0.999999236046 and randomnumber <=0.999999593577:
        m1=165
        m2=87
        mass1=165.0
        mass2=87.0
if randomnumber >0.999999593577 and randomnumber <=0.999999794088:
        m1=166
        m2=86
        mass1=166.0
        mass2=86.0
if randomnumber >0.999999794088 and randomnumber <=0.999999836167:
        m1=167
        m2=85
        mass1=167.0
        mass2=85.0
if randomnumber >0.999999836167 and randomnumber <=0.999999842323:
        m1=168
        m2=84
        mass1=168.0
        mass2=84.0
if randomnumber >0.999999842323 and randomnumber <=0.999999843318:
        m1=169
        m2=83
        mass1=169.0
        mass2=83.0
if randomnumber >0.999999843318 and randomnumber <=0.999999843376:
        m1=170
        m2=82
        mass1=170.0
        mass2=82.0
if randomnumber >0.999999843376 and randomnumber <=0.999999843382:
```

```
        m1=171
        m2=81
        mass1=171.0
        mass2=81.0
if randomnumber >0.999999843382 and randomnumber <=0.999999843382:
        m1=172
        m2=80
        mass1=172.0
        mass2=80.0
if randomnumber >0.999999843382 and randomnumber <=0.999999843382:
        m1=155
        m2=97
        mass1=155.0
        mass2=97.0
if randomnumber >0.999999843382 and randomnumber <=0.999999843382:
        m1=156
        m2=96
        mass1=156.0
        mass2=96.0
if randomnumber >0.999999843382 and randomnumber <=0.999999843382:
        m1=157
        m2=95
        mass1=157.0
        mass2=95.0
if randomnumber >0.999999843382 and randomnumber <=0.999999843382:
        m1=158
        m2=94
        mass1=158.0
        mass2=94.0
if randomnumber >0.999999843382 and randomnumber <=0.999999843384:
        m1=159
        m2=93
        mass1=159.0
        mass2=93.0
if randomnumber >0.999999843384 and randomnumber <=0.99999984341:
        m1=160
        m2=92
        mass1=160.0
        mass2=92.0
if randomnumber >0.99999984341 and randomnumber <=0.999999843723:
        m1=161
        m2=91
        mass1=161.0
        mass2=91.0
if randomnumber >0.999999843723 and randomnumber <=0.999999846202:
        m1=162
        m2=90
        mass1=162.0
        mass2=90.0
if randomnumber >0.999999846202 and randomnumber <=0.99999985603:
        m1=163
        m2=89
        mass1=163.0
        mass2=89.0
if randomnumber >0.99999985603 and randomnumber <=0.999999881334:
        m1=164
        m2=88
        mass1=164.0
        mass2=88.0
if randomnumber >0.999999881334 and randomnumber <=0.999999928327:
        m1=165
        m2=87
        mass1=165.0
        mass2=87.0
if randomnumber >0.999999928327 and randomnumber <=0.999999934427:
        m1=166
        m2=86
        mass1=166.0
        mass2=86.0
if randomnumber >0.999999934427 and randomnumber <=0.999999970462:
        m1=167
        m2=85
```

```
    mass1=167.0
    mass2=85.0
if randomnumber >0.999999970462 and randomnumber <=0.999999986447:
    m1=168
    m2=84
    mass1=168.0
    mass2=84.0
if randomnumber >0.999999986447 and randomnumber <=0.999999991931:
    m1=169
    m2=83
    mass1=169.0
    mass2=83.0
if randomnumber >0.999999991931 and randomnumber <=0.999999992931:
    m1=170
    m2=82
    mass1=170.0
    mass2=82.0
if randomnumber >0.999999992931 and randomnumber <=0.999999993181:
    m1=171
    m2=81
    mass1=171.0
    mass2=81.0
if randomnumber >0.999999993181 and randomnumber <=0.999999993213:
    m1=172
    m2=80
    mass1=172.0
    mass2=80.0
if randomnumber >0.999999993213 and randomnumber <=0.999999993213:
    m1=159
    m2=93
    mass1=159.0
    mass2=93.0
if randomnumber >0.999999993213 and randomnumber <=0.999999993213:
    m1=161
    m2=91
    mass1=161.0
    mass2=91.0
if randomnumber >0.999999993213 and randomnumber <=0.999999993213:
    m1=162
    m2=90
    mass1=162.0
    mass2=90.0
if randomnumber >0.999999993213 and randomnumber <=0.999999993214:
    m1=163
    m2=89
    mass1=163.0
    mass2=89.0
if randomnumber >0.999999993214 and randomnumber <=0.999999993243:
    m1=164
    m2=88
    mass1=164.0
    mass2=88.0
if randomnumber >0.999999993243 and randomnumber <=0.999999993271:
    m1=165
    m2=87
    mass1=165.0
    mass2=87.0
if randomnumber >0.999999993271 and randomnumber <=0.999999994335:
    m1=166
    m2=86
    mass1=166.0
    mass2=86.0
if randomnumber >0.999999994335 and randomnumber <=0.999999995081:
    m1=167
    m2=85
    mass1=167.0
    mass2=85.0
if randomnumber >0.999999995081 and randomnumber <=0.999999996724:
    m1=168
    m2=84
    mass1=168.0
    mass2=84.0
```

```
if randomnumber >0.999999996724 and randomnumber <=0.999999998486:
    m1=169
    m2=83
    mass1=169.0
    mass2=83.0
if randomnumber >0.999999998486 and randomnumber <=0.999999999145:
    m1=170
    m2=82
    mass1=170.0
    mass2=82.0
if randomnumber >0.999999999145 and randomnumber <=0.999999999474:
    m1=171
    m2=81
    mass1=171.0
    mass2=81.0
if randomnumber >0.999999999474 and randomnumber <=0.99999999961:
    m1=172
    m2=80
    mass1=172.0
    mass2=80.0
if randomnumber >0.99999999961 and randomnumber <=0.99999999961:
    m1=161
    m2=91
    mass1=161.0
    mass2=91.0
if randomnumber >0.99999999961 and randomnumber <=0.99999999961:
    m1=162
    m2=90
    mass1=162.0
    mass2=90.0
if randomnumber >0.99999999961 and randomnumber <=0.99999999961:
    m1=163
    m2=89
    mass1=163.0
    mass2=89.0
if randomnumber >0.99999999961 and randomnumber <=0.99999999961:
    m1=164
    m2=88
    mass1=164.0
    mass2=88.0
if randomnumber >0.99999999961 and randomnumber <=0.999999999611:
    m1=165
    m2=87
    mass1=165.0
    mass2=87.0
if randomnumber >0.999999999611 and randomnumber <=0.999999999612:
    m1=166
    m2=86
    mass1=166.0
    mass2=86.0
if randomnumber >0.999999999612 and randomnumber <=0.999999999619:
    m1=167
    m2=85
    mass1=167.0
    mass2=85.0
if randomnumber >0.999999999619 and randomnumber <=0.99999999962:
    m1=168
    m2=84
    mass1=168.0
    mass2=84.0
if randomnumber >0.99999999962 and randomnumber <=0.999999999683:
    m1=169
    m2=83
    mass1=169.0
    mass2=83.0
if randomnumber >0.999999999683 and randomnumber <=0.999999999759:
    m1=170
    m2=82
    mass1=170.0
    mass2=82.0
if randomnumber >0.999999999759 and randomnumber <=0.999999999887:
    m1=171
```

```
        m2=81
        mass1=171.0
        mass2=81.0
if randomnumber >0.999999999887 and randomnumber <=0.999999999995:
        m1=172
        m2=80
        mass1=172.0
        mass2=80.0
if randomnumber >0.999999999995 and randomnumber <=0.999999999995:
        m1=165
        m2=87
        mass1=165.0
        mass2=87.0
if randomnumber >0.999999999995 and randomnumber <=0.999999999995:
        m1=166
        m2=86
        mass1=166.0
        mass2=86.0
if randomnumber >0.999999999995 and randomnumber <=0.999999999995:
        m1=167
        m2=85
        mass1=167.0
        mass2=85.0
if randomnumber >0.999999999995 and randomnumber <=0.999999999995:
        m1=168
        m2=84
        mass1=168.0
        mass2=84.0
if randomnumber >0.999999999995 and randomnumber <=0.999999999995:
        m1=169
        m2=83
        mass1=169.0
        mass2=83.0
if randomnumber >0.999999999995 and randomnumber <=0.999999999995:
        m1=170
        m2=82
        mass1=170.0
        mass2=82.0
if randomnumber >0.999999999995 and randomnumber <=0.999999999997:
        m1=171
        m2=81
        mass1=171.0
        mass2=81.0
if randomnumber >0.999999999997 and randomnumber <=1.0:
        m1=172
        m2=80
        mass1=172.0
        mass2=80.0
if randomnumber >1.0 and randomnumber <=1.0:
        m1=166
        m2=86
        mass1=166.0
        mass2=86.0
if randomnumber >1.0 and randomnumber <=1.0:
        m1=167
        m2=85
        mass1=167.0
        mass2=85.0
if randomnumber >1.0 and randomnumber <=1.0:
        m1=168
        m2=84
        mass1=168.0
        mass2=84.0
if randomnumber >1.0 and randomnumber <=1.0:
        m1=169
        m2=83
        mass1=169.0
        mass2=83.0
if randomnumber >1.0 and randomnumber <=1.0:
        m1=170
        m2=82
        mass1=170.0
```

```
        mass2=82.0
    if randomnumber >1.0 and randomnumber <=1.0:
        m1=171
        m2=81
        mass1=171.0
        mass2=81.0
    if randomnumber >1.0 and randomnumber <=1.0:
        m1=172
        m2=80
        mass1=172.0
        mass2=80.0
    if randomnumber >1.0 and randomnumber <=1.0:
        m1=169
        m2=83
        mass1=169.0
        mass2=83.0
    if randomnumber >1.0 and randomnumber <=1.0:
        m1=171
        m2=81
        mass1=171.0
        mass2=81.0
    def trange112127(x):
        return ((((91.5-100)/(127-112))*x)+(91.5-(((91.5-100)/(127-112))*127))
# How much kinetic energy does each fragment have? (m equals A, not mass)
# Which interpolation to use? for m1
    if m1 <= 81:
        Av1=104.26
    if m1 == 82:
        Av1=101.73
    if m1 == 83:
        Av1=101.50
    if m1 == 84:
        Av1=104.09
    if m1 == 85:
        Av1=104.15
    if m1 == 86:
        Av1=103.52
    if m1 == 87:
        Av1=102.37
    if m1 == 88:
        Av1=103.34
    if m1 == 89:
        Av1=104.04
    if m1 == 90:
        Av1=103.52
    if m1 == 91:
        Av1=104.27
    if m1 == 92:
        Av1=103.87
    if m1 == 93:
        Av1=104.56
    if m1 == 94:
        Av1=103.98
    if m1 == 95:
        Av1=104.16
    if m1 == 96:
        Av1=104.21
    if m1 == 97:
        Av1=104.16
    if m1 == 98:
        Av1=103.99
    if m1 == 99:
        Av1=104.22
    if m1 == 100:
        Av1=104.39
    if m1 == 101:
        Av1=104.45
    if m1 == 102:
        Av1=104.16
    if m1 == 103:
        Av1=103.99
    if m1 == 104:
```

```
        Av1=104.28
if m1 == 105:
        Av1=103.99
if m1 == 106:
        Av1=103.94
if m1 == 107:
        Av1=103.65
if m1 == 108:
        Av1=102.21
if m1 == 109:
        Av1=101.47
if m1 == 110:
        Av1=100.49
if m1 == 111:
        Av1=98.83
if m1 == 112:
        Av1=96.70
if m1 > 112 and m1 <= 127:
        Av1=trange112127(m1)
if m1 == 128:
        Av1=84.25
if m1 == 129:
        Av1=84.59
if m1 == 130:
        Av1=84.94
if m1 == 131:
        Av1=84.08
if m1 == 132:
        Av1=83.22
if m1 == 133:
        Av1=83.05
if m1 == 134:
        Av1=81.96
if m1 == 135:
        Av1=80.69
if m1 == 136:
        Av1=79.66
if m1 == 137:
        Av1=78.05
if m1 == 138:
        Av1=76.84
if m1 == 139:
        Av1=75.75
if m1 == 140:
        Av1=74.43
if m1 == 141:
        Av1=73.11
if m1 == 142:
        Av1=71.56
if m1 == 143:
        Av1=70.53
if m1 == 144:
        Av1=69.44
if m1 == 145:
        Av1=68.17
if m1 == 146:
        Av1=66.97
if m1 == 147:
        Av1=66.11
if m1 == 148:
        Av1=64.44
if m1 == 149:
        Av1=63.52
if m1 == 150:
        Av1=62.15
if m1 == 151:
        Av1=61.28
if m1 == 152:
        Av1=59.79
if m1 == 153:
        Av1=58.18
if m1 == 154:
```

```
        Av1=57.78
    if m1 == 155:
        Av1=57.15
    if m1 == 156:
        Av1=56.00
    if m1 == 157:
        Av1=53.88
    if m1 == 158:
        Av1=52.90
    if m1 == 159:
        Av1=53.53
    if m1 > 159:
        Av1=53.53
    Sd1=Av1**.5
# end linear interpolation definitions for m1
# Which interpolation to use? m2
    if m2 <= 81:
        Av2=104.26
    if m2 == 82:
        Av2=101.73
    if m2 == 83:
        Av2=101.50
    if m2 == 84:
        Av2=104.09
    if m2 == 85:
        Av2=104.15
    if m2 == 86:
        Av2=103.52
    if m2 == 87:
        Av2=102.37
    if m2 == 88:
        Av2=103.34
    if m2 == 89:
        Av2=104.04
    if m2 == 90:
        Av2=103.52
    if m2 == 91:
        Av2=104.27
    if m2 == 92:
        Av2=103.87
    if m2 == 93:
        Av2=104.56
    if m2 == 94:
        Av2=103.98
    if m2 == 95:
        Av2=104.16
    if m2 == 96:
        Av2=104.21
    if m2 == 97:
        Av2=104.16
    if m2 == 98:
        Av2=103.99
    if m2 == 99:
        Av2=104.22
    if m2 == 100:
        Av2=104.39
    if m2 == 101:
        Av2=104.45
    if m2 == 102:
        Av2=104.16
    if m2 == 103:
        Av2=103.99
    if m2 == 104:
        Av2=104.28
    if m2 == 105:
        Av2=103.99
    if m2 == 106:
        Av2=103.94
    if m2 == 107:
        Av2=103.65
    if m2 == 108:
        Av2=102.21
```

```
if m2 == 109:
    Av2=101.47
if m2 == 110:
    Av2=100.49
if m2 == 111:
    Av2=98.83
if m2 == 112:
    Av2=96.70
if m2 > 112 and m2 <= 127:
    Av2=trange112127(m2)
if m2 == 128:
    Av2=84.25
if m2 == 129:
    Av2=84.59
if m2 == 130:
    Av2=84.94
if m2 == 131:
    Av2=84.08
if m2 == 132:
    Av2=83.22
if m2 == 133:
    Av2=83.05
if m2 == 134:
    Av2=81.96
if m2 == 135:
    Av2=80.69
if m2 == 136:
    Av2=79.66
if m2 == 137:
    Av2=78.05
if m2 == 138:
    Av2=76.84
if m2 == 139:
    Av2=75.75
if m2 == 140:
    Av2=74.43
if m2 == 141:
    Av2=73.11
if m2 == 142:
    Av2=71.56
if m2 == 143:
    Av2=70.53
if m2 == 144:
    Av2=69.44
if m2 == 145:
    Av2=68.17
if m2 == 146:
    Av2=66.97
if m2 == 147:
    Av2=66.11
if m2 == 148:
    Av2=64.44
if m2 == 149:
    Av2=63.52
if m2 == 150:
    Av2=62.15
if m2 == 151:
    Av2=61.28
if m2 == 152:
    Av2=59.79
if m2 == 153:
    Av2=58.18
if m2 == 154:
    Av2=57.78
if m2 == 155:
    Av2=57.15
if m2 == 156:
    Av2=56.00
if m2 == 157:
    Av2=53.88
if m2 == 158:
    Av2=52.90
```

```
        if m2 == 159:
            Av2=53.53
        if m2 > 159:
            Av2=53.53
        Sd2=Av2**.5
# end linear interpolation definitions for m2
        Em1=random.gauss(Av1,Sd1)
        Em2=random.gauss(Av2,Sd2)
# How much velocity does each fragment have?
# Energy in MeV, mass in amu
        vf1=((2*Em1*1.60217646*(10**-13))/(mass1*1.66053886*(10**-27)))**.5
        vf2=((2*Em2*1.60217646*(10**-13))/(mass2*1.66053886*(10**-27)))**.5
# How many neutrons are released off of each fragment?
# Use a Gaussian distribution with mean=vaverage and sigma=sqrt of mean
        def numnrange80102(x):
            return (((1.4-0)/(102-80))*x)+(1.4-(((1.4-0)/(102-80))*102))
        def numnrange102113(x):
            return (((2.9-1.4)/(113-102))*x)+(2.9-(((2.9-1.4)/(113-102))*113))
        def numnrange113121(x):
            return (((1.7-2.9)/(121-113))*x)+(1.7-(((1.7-2.9)/(121-113))*121))
        def numnrange121127(x):
            return (((0.2-1.7)/(127-121))*x)+(0.2-(((0.2-1.7)/(127-121))*127))
        def numnrange127130(x):
            return (((0-0.2)/(130-127))*x)+(0-(((0-0.2)/(130-127))*130))
        def numnrange130153(x):
            return (((2.1-0)/(153-130))*x)+(2.1-(((2.1-0)/(153-130))*153))
        def numnrange153159(x):
            return (((2.4-2.1)/(159-153))*x)+(2.4-(((2.4-2.1)/(159-153))*153))
        if m1 <= 80:
            numn1=0
        if m1 > 80 and m1 <= 102:
            numn1=numnrange80102(m1)
        if m1 > 102 and m1 <= 113:
            numn1=numnrange102113(m1)
        if m1 > 113 and m1 <= 121:
            numn1=numnrange113121(m1)
        if m1 > 121 and m1 <= 127:
            numn1=numnrange121127(m1)
        if m1 > 127 and m1 <= 130:
            numn1=numnrange127130(m1)
        if m1 > 130 and m1 <= 153:
            numn1=numnrange130153(m1)
        if m1 >= 159:
            numn1=numnrange153159(m1)
        if m2 <= 82:
            numn2=numnrange7382(m2)
        if m2 <= 80:
            numn2=0
        if m2 > 80 and m2 <= 102:
            numn2=numnrange80102(m2)
        if m2 > 102 and m2 <= 113:
            numn2=numnrange102113(m2)
        if m2 > 113 and m2 <= 121:
            numn2=numnrange113121(m2)
        if m2 > 121 and m2 <= 127:
            numn2=numnrange121127(m2)
        if m2 > 127 and m2 <= 130:
            numn2=numnrange127130(m2)
        if m2 > 130 and m2 <= 153:
            numn2=numnrange130153(m2)
        if m2 >= 159:
            numn2=numnrange153159(m2)
        nm1=int(round(numn1))
        nm2=int(round(numn2))
# *What are the velocities of the neutrons that are emitted? Watt spectrum?
        nvelfrag1=[]
        for n1count in range(0,nm1):
            nvelfrag1.append(0)
        pos1=0
        for i in range(0,nm1):
            r=random.random()
            pount=1
```

```
        for n in range(1,len(Wattcumuprob)):
            if r < 0.000324276:
                Wsample1=0.01
                break;
            if r > Wattcumuprob[pount] and r < Wattcumuprob[pount+1]:
                Wsample1=(2*Wattenergy[pount+1]*1.602*(10**(-13))/(1.6749273*(10**(-27))))**.5
                break;
            pount=pount+1
        nvelfrag1.pop(pos1)
        nvelfrag1.insert(pos1,Wsample1)
        pos1=pos1+1
    nvelfrag2=[]
    for n2count in range(0,nm2):
        nvelfrag2.append(0)
    pos2=0
    for i in range(0,nm2):
        r=random.random()
        pount=1
        for n in range(1,len(Wattcumuprob)):
            if r < 0.000324276:
                Wsample2=0.01
                break;
            if r > Wattcumuprob[pount] and r < Wattcumuprob[pount+1]:
                Wsample2=(2*Wattenergy[pount+1]*1.602*(10**(-13))/(1.6749273*(10**(-27))))**.5
                break;
            pount=pount+1
        nvelfrag2.pop(pos2)
        nvelfrag2.insert(pos2,Wsample2)
        pos2=pos2+1
# What direction cosine does the neutron go? (relative to direction of travel of fragment), assume isotropic
    ndirfrag1=[]
    for n1count in range(0,nm1):
        dir1=random.uniform(0, 360)
        pos1=0
        ndirfrag1.insert(pos1,dir1)
        pos1=pos1+1
    ndirfrag2=[]
    for n2count in range(0,nm2):
        dir2=random.uniform(0, 360)
        pos2=0
        ndirfrag2.insert(pos2,dir2)
        pos2=pos2+1
# NEW: What are angles of the neutrons detected in lab frame of refrence rel to frag direction of travel?
# What are the velocities of the neutrons detected in the lab frame of reference relative to the frag direction of travel?
    countn1=0
    i=0
    j=0
    nvellength1=len(nvelfrag1)
    vn1labarray=[]
    vn2labarray=[]
    vn1labdetectprob=[]
    vn2labdetectprob=[]
    for i in range(0,nvellength1):
        Vn1lab=((vf1**2)+(2*vf1*nvelfrag1[countn1]*math.cos(math.radians(ndirfrag1[countn1])))+(nvelfrag1[countn1]**2))**.5
        vn1labarray.append(Vn1lab)
# find E that corresponds to vn1lab then find corresponding efficiency for E
        En1lab=(Vn1lab**2)*(1.6749273*(10**-27))/(2*1.602*(10**-13))
        for x in range (0, len(energyE)):
            if En1lab < 1:
                probdetect=0
                break;
            if En1lab > energyE[x] and En1lab < energyE[x+1]:
                probdetect=efficiencyE[x]
                break;
            if En1lab >= 25:
                probdetect=0
                break;
        vn1labdetectprob.append(probdetect)
        countn1=countn1+1
    countn2=0
    nvellength2=len(nvelfrag2)
    for j in range(0,nvellength2):
```

```
                Vn2lab=((vf2**2)+(2*vf2*nvelfrag2[countn2]*math.cos(math.radians(ndirfrag2[countn2])))+(nvelfrag2[countn2]**2))**.5
                vn2labarray.append(Vn2lab)
                En2lab=(Vn2lab**2)*(1.6749273*(10**-27))/(2*1.602*(10**-13))
                for y in range (0, len(energyE)):
                        if En2lab < 1:
                                probdetect=0
                                break;
                        if En2lab > energyE[y] and En2lab < energyE[y+1]:
                                probdetect=efficiencyE[y]
                                break;
                        if En2lab >= 25:
                                probdetect=0
                                break;
                vn2labdetectprob.append(probdetect)
                countn2=countn2+1
# What are the angles, in the lab frame of reference between neutrons and fragment direction of travel?
        i=0
        nlabanglearrayf1=[]
        for varn1 in range(0,nm1):
                num1=nvelfrag1[i]*(math.sin(math.radians(ndirfrag1[i])))
                den1=vf1+(nvelfrag1[i]*(math.cos(math.radians(ndirfrag1[i]))))
                if den1==0:
                        break; break;
                nlabangle1=math.degrees(math.atan(num1/den1))
                nlabanglearrayf1.append(nlabangle1)
                i=i+1
        j=0
        nvellength2=len(vn2labarray)
        nlabanglearrayf2=[]
        for varn2 in range(0,nvellength2):
                dont=0
                num2=nvelfrag2[j]*(math.sin(math.radians(ndirfrag2[j])))
                den2=vf2+(nvelfrag2[j]*(math.cos(math.radians(ndirfrag2[j]))))
                if den2==0:
                        break; break;
                nlabangle2=math.degrees(math.atan(num2/den2))
                nlabanglearrayf2.append(nlabangle2)
                j=j+1
# What are the angles, in the lab frame of reference between neutrons?
# same fragment
# * vn1labdetectprob=[] vn2labdetectprob=[]
        probdet=[]
        diffsamearray=[]
        i=0
        diffsamearrayf1=[]
        for uy in range(0,nm1):
                j=i+1
                for uyy in range(j,nm1):
                        diffsamef1 = math.fabs(nlabanglearrayf1[i]-nlabanglearrayf1[j])
                        probf1=(vn1labdetectprob[uy]*vn1labdetectprob[uyy])
                        probdet.append(probf1)
                        diffsamearrayf1.append(diffsamef1)
                        diffsamearray.append(diffsamef1)
                        j=j+1
                i=i+1
        i=0
        nvellength2=len(vn2labarray)
        diffsamearrayf2=[]
        for varn2 in range(0,nm2):
                j=i+1
                for varn22 in range(j,nm2):
                        diffsamef2 = math.fabs(nlabanglearrayf2[i]-nlabanglearrayf2[j])
                        probf2=(vn2labdetectprob[varn2]*vn2labdetectprob[varn22])
                        probdet.append(probf2)
                        diffsamearrayf2.append(diffsamef2)
                        diffsamearray.append(diffsamef2)
                        j=j+1
                i=i+1
# opposite fragments
        i=0
        diffsamearrayf12=[]
        for varn12 in range(0,nvellength1):
```

```
        j=0
         for varn1212 in range(j,nvellength2):
              df2n2 =(nlabanglearrayf2[j])-180
              diffsamef12 = math.fabs(df2n2+nlabanglearrayf1[i])
              if diffsamef12 > 180:
                   diffsamef12=360-diffsamef12

              probf12=(vn1labdetectprob[varn12]*vn2labdetectprob[varn1212])
#              probdet.append(probf12)
              diffsamearrayf12.append(diffsamef12)
#              diffsamearray.append(diffsamef12)
              j=j+1
         i=i+1
# Tally frequencies for each of angles and dump into output file
     i=0
     anglearraylength=len(diffsamearray)
     for i in range(0,anglearraylength):
         if diffsamearray[i] < 1:
              bin0=bin0+(probdet[i])
         if diffsamearray[i] >=1 and diffsamearray[i] <2 :
              bin1=bin1+(probdet[i])
         if diffsamearray[i] >=2 and diffsamearray[i] <3 :
              bin2=bin2+(probdet[i])
         if diffsamearray[i] >=3 and diffsamearray[i] <4 :
              bin3=bin3+(probdet[i])
         if diffsamearray[i] >=4 and diffsamearray[i] <5 :
              bin4=bin4+(probdet[i])
         if diffsamearray[i] >=5 and diffsamearray[i] <6 :
              bin5=bin5+(probdet[i])
         if diffsamearray[i] >=6 and diffsamearray[i] <7 :
              bin6=bin6+(probdet[i])
         if diffsamearray[i] >=7 and diffsamearray[i] <8 :
              bin7=bin7+(probdet[i])
         if diffsamearray[i] >=8 and diffsamearray[i] <9 :
              bin8=bin8+(probdet[i])
         if diffsamearray[i] >=9 and diffsamearray[i] <10 :
              bin9=bin9+(probdet[i])
         if diffsamearray[i] >=10 and diffsamearray[i] <11 :
              bin10=bin10+(probdet[i])
         if diffsamearray[i] >=11 and diffsamearray[i] <12 :
              bin11=bin11+(probdet[i])
         if diffsamearray[i] >=12 and diffsamearray[i] <13 :
              bin12=bin12+(probdet[i])
         if diffsamearray[i] >=13 and diffsamearray[i] <14 :
              bin13=bin13+(probdet[i])
         if diffsamearray[i] >=14 and diffsamearray[i] <15 :
              bin14=bin14+(probdet[i])
         if diffsamearray[i] >=15 and diffsamearray[i] <16 :
              bin15=bin15+(probdet[i])
         if diffsamearray[i] >=16 and diffsamearray[i] <17 :
              bin16=bin16+(probdet[i])
         if diffsamearray[i] >=17 and diffsamearray[i] <18 :
              bin17=bin17+(probdet[i])
         if diffsamearray[i] >=18 and diffsamearray[i] <19 :
              bin18=bin18+(probdet[i])
         if diffsamearray[i] >=19 and diffsamearray[i] <20 :
              bin19=bin19+(probdet[i])
         if diffsamearray[i] >=20 and diffsamearray[i] <21 :
              bin20=bin20+(probdet[i])
         if diffsamearray[i] >=21 and diffsamearray[i] <22 :
              bin21=bin21+(probdet[i])
         if diffsamearray[i] >=22 and diffsamearray[i] <23 :
              bin22=bin22+(probdet[i])
         if diffsamearray[i] >=23 and diffsamearray[i] <24 :
              bin23=bin23+(probdet[i])
         if diffsamearray[i] >=24 and diffsamearray[i] <25 :
              bin24=bin24+(probdet[i])
         if diffsamearray[i] >=25 and diffsamearray[i] <26 :
              bin25=bin25+(probdet[i])
         if diffsamearray[i] >=26 and diffsamearray[i] <27 :
              bin26=bin26+(probdet[i])
         if diffsamearray[i] >=27 and diffsamearray[i] <28 :
```

```
        bin27=bin27+(probdet[i])
if diffsamearray[i] >=28 and diffsamearray[i] <29 :
        bin28=bin28+(probdet[i])
if diffsamearray[i] >=29 and diffsamearray[i] <30 :
        bin29=bin29+(probdet[i])
if diffsamearray[i] >=30 and diffsamearray[i] <31 :
        bin30=bin30+(probdet[i])
if diffsamearray[i] >=31 and diffsamearray[i] <32 :
        bin31=bin31+(probdet[i])
if diffsamearray[i] >=32 and diffsamearray[i] <33 :
        bin32=bin32+(probdet[i])
if diffsamearray[i] >=33 and diffsamearray[i] <34 :
        bin33=bin33+(probdet[i])
if diffsamearray[i] >=34 and diffsamearray[i] <35 :
        bin34=bin34+(probdet[i])
if diffsamearray[i] >=35 and diffsamearray[i] <36 :
        bin35=bin35+(probdet[i])
if diffsamearray[i] >=36 and diffsamearray[i] <37 :
        bin36=bin36+(probdet[i])
if diffsamearray[i] >=37 and diffsamearray[i] <38 :
        bin37=bin37+(probdet[i])
if diffsamearray[i] >=38 and diffsamearray[i] <39 :
        bin38=bin38+(probdet[i])
if diffsamearray[i] >=39 and diffsamearray[i] <40 :
        bin39=bin39+(probdet[i])
if diffsamearray[i] >=40 and diffsamearray[i] <41 :
        bin40=bin40+(probdet[i])
if diffsamearray[i] >=41 and diffsamearray[i] <42 :
        bin41=bin41+(probdet[i])
if diffsamearray[i] >=42 and diffsamearray[i] <43 :
        bin42=bin42+(probdet[i])
if diffsamearray[i] >=43 and diffsamearray[i] <44 :
        bin43=bin43+(probdet[i])
if diffsamearray[i] >=44 and diffsamearray[i] <45 :
        bin44=bin44+(probdet[i])
if diffsamearray[i] >=45 and diffsamearray[i] <46 :
        bin45=bin45+(probdet[i])
if diffsamearray[i] >=46 and diffsamearray[i] <47 :
        bin46=bin46+(probdet[i])
if diffsamearray[i] >=47 and diffsamearray[i] <48 :
        bin47=bin47+(probdet[i])
if diffsamearray[i] >=48 and diffsamearray[i] <49 :
        bin48=bin48+(probdet[i])
if diffsamearray[i] >=49 and diffsamearray[i] <50 :
        bin49=bin49+(probdet[i])
if diffsamearray[i] >=50 and diffsamearray[i] <51 :
        bin50=bin50+(probdet[i])
if diffsamearray[i] >=51 and diffsamearray[i] <52 :
        bin51=bin51+(probdet[i])
if diffsamearray[i] >=52 and diffsamearray[i] <53 :
        bin52=bin52+(probdet[i])
if diffsamearray[i] >=53 and diffsamearray[i] <54 :
        bin53=bin53+(probdet[i])
if diffsamearray[i] >=54 and diffsamearray[i] <55 :
        bin54=bin54+(probdet[i])
if diffsamearray[i] >=55 and diffsamearray[i] <56 :
        bin55=bin55+(probdet[i])
if diffsamearray[i] >=56 and diffsamearray[i] <57 :
        bin56=bin56+(probdet[i])
if diffsamearray[i] >=57 and diffsamearray[i] <58 :
        bin57=bin57+(probdet[i])
if diffsamearray[i] >=58 and diffsamearray[i] <59 :
        bin58=bin58+(probdet[i])
if diffsamearray[i] >=59 and diffsamearray[i] <60 :
        bin59=bin59+(probdet[i])
if diffsamearray[i] >=60 and diffsamearray[i] <61 :
        bin60=bin60+(probdet[i])
if diffsamearray[i] >=61 and diffsamearray[i] <62 :
        bin61=bin61+(probdet[i])
if diffsamearray[i] >=62 and diffsamearray[i] <63 :
        bin62=bin62+(probdet[i])
if diffsamearray[i] >=63 and diffsamearray[i] <64 :
```

```
        bin63=bin63+(probdet[i])
if diffsamearray[i] >=64 and diffsamearray[i] <65 :
        bin64=bin64+(probdet[i])
if diffsamearray[i] >=65 and diffsamearray[i] <66 :
        bin65=bin65+(probdet[i])
if diffsamearray[i] >=66 and diffsamearray[i] <67 :
        bin66=bin66+(probdet[i])
if diffsamearray[i] >=67 and diffsamearray[i] <68 :
        bin67=bin67+(probdet[i])
if diffsamearray[i] >=68 and diffsamearray[i] <69 :
        bin68=bin68+(probdet[i])
if diffsamearray[i] >=69 and diffsamearray[i] <70 :
        bin69=bin69+(probdet[i])
if diffsamearray[i] >=70 and diffsamearray[i] <71 :
        bin70=bin70+(probdet[i])
if diffsamearray[i] >=71 and diffsamearray[i] <72 :
        bin71=bin71+(probdet[i])
if diffsamearray[i] >=72 and diffsamearray[i] <73 :
        bin72=bin72+(probdet[i])
if diffsamearray[i] >=73 and diffsamearray[i] <74 :
        bin73=bin73+(probdet[i])
if diffsamearray[i] >=74 and diffsamearray[i] <75 :
        bin74=bin74+(probdet[i])
if diffsamearray[i] >=75 and diffsamearray[i] <76 :
        bin75=bin75+(probdet[i])
if diffsamearray[i] >=76 and diffsamearray[i] <77 :
        bin76=bin76+(probdet[i])
if diffsamearray[i] >=77 and diffsamearray[i] <78 :
        bin77=bin77+(probdet[i])
if diffsamearray[i] >=78 and diffsamearray[i] <79 :
        bin78=bin78+(probdet[i])
if diffsamearray[i] >=79 and diffsamearray[i] <80 :
        bin79=bin79+(probdet[i])
if diffsamearray[i] >=80 and diffsamearray[i] <81 :
        bin80=bin80+(probdet[i])
if diffsamearray[i] >=81 and diffsamearray[i] <82 :
        bin81=bin81+(probdet[i])
if diffsamearray[i] >=82 and diffsamearray[i] <83 :
        bin82=bin82+(probdet[i])
if diffsamearray[i] >=83 and diffsamearray[i] <84 :
        bin83=bin83+(probdet[i])
if diffsamearray[i] >=84 and diffsamearray[i] <85 :
        bin84=bin84+(probdet[i])
if diffsamearray[i] >=85 and diffsamearray[i] <86 :
        bin85=bin85+(probdet[i])
if diffsamearray[i] >=86 and diffsamearray[i] <87 :
        bin86=bin86+(probdet[i])
if diffsamearray[i] >=87 and diffsamearray[i] <88 :
        bin87=bin87+(probdet[i])
if diffsamearray[i] >=88 and diffsamearray[i] <89 :
        bin88=bin88+(probdet[i])
if diffsamearray[i] >=89 and diffsamearray[i] <90 :
        bin89=bin89+(probdet[i])
if diffsamearray[i] >=90 and diffsamearray[i] <91 :
        bin90=bin90+(probdet[i])
if diffsamearray[i] >=91 and diffsamearray[i] <92 :
        bin91=bin91+(probdet[i])
if diffsamearray[i] >=92 and diffsamearray[i] <93 :
        bin92=bin92+(probdet[i])
if diffsamearray[i] >=93 and diffsamearray[i] <94 :
        bin93=bin93+(probdet[i])
if diffsamearray[i] >=94 and diffsamearray[i] <95 :
        bin94=bin94+(probdet[i])
if diffsamearray[i] >=95 and diffsamearray[i] <96 :
        bin95=bin95+(probdet[i])
if diffsamearray[i] >=96 and diffsamearray[i] <97 :
        bin96=bin96+(probdet[i])
if diffsamearray[i] >=97 and diffsamearray[i] <98 :
        bin97=bin97+(probdet[i])
if diffsamearray[i] >=98 and diffsamearray[i] <99 :
        bin98=bin98+(probdet[i])
if diffsamearray[i] >=99 and diffsamearray[i] <100 :
```

```
            bin99=bin99+(probdet[i])
if diffsamearray[i] >=100 and diffsamearray[i] <101 :
            bin100=bin100+(probdet[i])
if diffsamearray[i] >=101 and diffsamearray[i] <102 :
            bin101=bin101+(probdet[i])
if diffsamearray[i] >=102 and diffsamearray[i] <103 :
            bin102=bin102+(probdet[i])
if diffsamearray[i] >=103 and diffsamearray[i] <104 :
            bin103=bin103+(probdet[i])
if diffsamearray[i] >=104 and diffsamearray[i] <105 :
            bin104=bin104+(probdet[i])
if diffsamearray[i] >=105 and diffsamearray[i] <106 :
            bin105=bin105+(probdet[i])
if diffsamearray[i] >=106 and diffsamearray[i] <107 :
            bin106=bin106+(probdet[i])
if diffsamearray[i] >=107 and diffsamearray[i] <108 :
            bin107=bin107+(probdet[i])
if diffsamearray[i] >=108 and diffsamearray[i] <109 :
            bin108=bin108+(probdet[i])
if diffsamearray[i] >=109 and diffsamearray[i] <110 :
            bin109=bin109+(probdet[i])
if diffsamearray[i] >=110 and diffsamearray[i] <111 :
            bin110=bin110+(probdet[i])
if diffsamearray[i] >=111 and diffsamearray[i] <112 :
            bin111=bin111+(probdet[i])
if diffsamearray[i] >=112 and diffsamearray[i] <113 :
            bin112=bin112+(probdet[i])
if diffsamearray[i] >=113 and diffsamearray[i] <114 :
            bin113=bin113+(probdet[i])
if diffsamearray[i] >=114 and diffsamearray[i] <115 :
            bin114=bin114+(probdet[i])
if diffsamearray[i] >=115 and diffsamearray[i] <116 :
            bin115=bin115+(probdet[i])
if diffsamearray[i] >=116 and diffsamearray[i] <117 :
            bin116=bin116+(probdet[i])
if diffsamearray[i] >=117 and diffsamearray[i] <118 :
            bin117=bin117+(probdet[i])
if diffsamearray[i] >=118 and diffsamearray[i] <119 :
            bin118=bin118+(probdet[i])
if diffsamearray[i] >=119 and diffsamearray[i] <120 :
            bin119=bin119+(probdet[i])
if diffsamearray[i] >=120 and diffsamearray[i] <121 :
            bin120=bin120+(probdet[i])
if diffsamearray[i] >=121 and diffsamearray[i] <122 :
            bin121=bin121+(probdet[i])
if diffsamearray[i] >=122 and diffsamearray[i] <123 :
            bin122=bin122+(probdet[i])
if diffsamearray[i] >=123 and diffsamearray[i] <124 :
            bin123=bin123+(probdet[i])
if diffsamearray[i] >=124 and diffsamearray[i] <125 :
            bin124=bin124+(probdet[i])
if diffsamearray[i] >=125 and diffsamearray[i] <126 :
            bin125=bin125+(probdet[i])
if diffsamearray[i] >=126 and diffsamearray[i] <127 :
            bin126=bin126+(probdet[i])
if diffsamearray[i] >=127 and diffsamearray[i] <128 :
            bin127=bin127+(probdet[i])
if diffsamearray[i] >=128 and diffsamearray[i] <129 :
            bin128=bin128+(probdet[i])
if diffsamearray[i] >=129 and diffsamearray[i] <130 :
            bin129=bin129+(probdet[i])
if diffsamearray[i] >=130 and diffsamearray[i] <131 :
            bin130=bin130+(probdet[i])
if diffsamearray[i] >=131 and diffsamearray[i] <132 :
            bin131=bin131+(probdet[i])
if diffsamearray[i] >=132 and diffsamearray[i] <133 :
            bin132=bin132+(probdet[i])
if diffsamearray[i] >=133 and diffsamearray[i] <134 :
            bin133=bin133+(probdet[i])
if diffsamearray[i] >=134 and diffsamearray[i] <135 :
            bin134=bin134+(probdet[i])
if diffsamearray[i] >=135 and diffsamearray[i] <136 :
```

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        bin135=bin135+(probdet[i])
if diffsamearray[i] >=136 and diffsamearray[i] <137 :
        bin136=bin136+(probdet[i])
if diffsamearray[i] >=137 and diffsamearray[i] <138 :
        bin137=bin137+(probdet[i])
if diffsamearray[i] >=138 and diffsamearray[i] <139 :
        bin138=bin138+(probdet[i])
if diffsamearray[i] >=139 and diffsamearray[i] <140 :
        bin139=bin139+(probdet[i])
if diffsamearray[i] >=140 and diffsamearray[i] <141 :
        bin140=bin140+(probdet[i])
if diffsamearray[i] >=141 and diffsamearray[i] <142 :
        bin141=bin141+(probdet[i])
if diffsamearray[i] >=142 and diffsamearray[i] <143 :
        bin142=bin142+(probdet[i])
if diffsamearray[i] >=143 and diffsamearray[i] <144 :
        bin143=bin143+(probdet[i])
if diffsamearray[i] >=144 and diffsamearray[i] <145 :
        bin144=bin144+(probdet[i])
if diffsamearray[i] >=145 and diffsamearray[i] <146 :
        bin145=bin145+(probdet[i])
if diffsamearray[i] >=146 and diffsamearray[i] <147 :
        bin146=bin146+(probdet[i])
if diffsamearray[i] >=147 and diffsamearray[i] <148 :
        bin147=bin147+(probdet[i])
if diffsamearray[i] >=148 and diffsamearray[i] <149 :
        bin148=bin148+(probdet[i])
if diffsamearray[i] >=149 and diffsamearray[i] <150 :
        bin149=bin149+(probdet[i])
if diffsamearray[i] >=150 and diffsamearray[i] <151 :
        bin150=bin150+(probdet[i])
if diffsamearray[i] >=151 and diffsamearray[i] <152 :
        bin151=bin151+(probdet[i])
if diffsamearray[i] >=152 and diffsamearray[i] <153 :
        bin152=bin152+(probdet[i])
if diffsamearray[i] >=153 and diffsamearray[i] <154 :
        bin153=bin153+(probdet[i])
if diffsamearray[i] >=154 and diffsamearray[i] <155 :
        bin154=bin154+(probdet[i])
if diffsamearray[i] >=155 and diffsamearray[i] <156 :
        bin155=bin155+(probdet[i])
if diffsamearray[i] >=156 and diffsamearray[i] <157 :
        bin156=bin156+(probdet[i])
if diffsamearray[i] >=157 and diffsamearray[i] <158 :
        bin157=bin157+(probdet[i])
if diffsamearray[i] >=158 and diffsamearray[i] <159 :
        bin158=bin158+(probdet[i])
if diffsamearray[i] >=159 and diffsamearray[i] <160 :
        bin159=bin159+(probdet[i])
if diffsamearray[i] >=160 and diffsamearray[i] <161 :
        bin160=bin160+(probdet[i])
if diffsamearray[i] >=161 and diffsamearray[i] <162 :
        bin161=bin161+(probdet[i])
if diffsamearray[i] >=162 and diffsamearray[i] <163 :
        bin162=bin162+(probdet[i])
if diffsamearray[i] >=163 and diffsamearray[i] <164 :
        bin163=bin163+(probdet[i])
if diffsamearray[i] >=164 and diffsamearray[i] <165 :
        bin164=bin164+(probdet[i])
if diffsamearray[i] >=165 and diffsamearray[i] <166 :
        bin165=bin165+(probdet[i])
if diffsamearray[i] >=166 and diffsamearray[i] <167 :
        bin166=bin166+(probdet[i])
if diffsamearray[i] >=167 and diffsamearray[i] <168 :
        bin167=bin167+(probdet[i])
if diffsamearray[i] >=168 and diffsamearray[i] <169 :
        bin168=bin168+(probdet[i])
if diffsamearray[i] >=169 and diffsamearray[i] <170 :
        bin169=bin169+(probdet[i])
if diffsamearray[i] >=170 and diffsamearray[i] <171 :
        bin170=bin170+(probdet[i])
if diffsamearray[i] >=171 and diffsamearray[i] <172 :
```

```
        bin171=bin171+(probdet[i])
if diffsamearray[i] >=172 and diffsamearray[i] <173 :
        bin172=bin172+(probdet[i])
if diffsamearray[i] >=173 and diffsamearray[i] <174 :
        bin173=bin173+(probdet[i])
if diffsamearray[i] >=174 and diffsamearray[i] <175 :
        bin174=bin174+(probdet[i])
if diffsamearray[i] >=175 and diffsamearray[i] <176 :
        bin175=bin175+(probdet[i])
if diffsamearray[i] >=176 and diffsamearray[i] <177 :
        bin176=bin176+(probdet[i])
if diffsamearray[i] >=177 and diffsamearray[i] <178 :
        bin177=bin177+(probdet[i])
if diffsamearray[i] >=178 and diffsamearray[i] <179 :
        bin178=bin178+(probdet[i])
if diffsamearray[i] >=179 and diffsamearray[i] <180 :
        bin179=bin179+(probdet[i])
if diffsamearray[i] >=180 and diffsamearray[i] <181 :
        bin180=bin180+(probdet[i])
if diffsamearray[i] >=181 and diffsamearray[i] <182 :
        bin181=bin181+(probdet[i])
if diffsamearray[i] >=182 and diffsamearray[i] <183 :
        bin182=bin182+(probdet[i])
if diffsamearray[i] >=183 and diffsamearray[i] <184 :
        bin183=bin183+(probdet[i])
if diffsamearray[i] >=184 and diffsamearray[i] <185 :
        bin184=bin184+(probdet[i])
if diffsamearray[i] >=185 and diffsamearray[i] <186 :
        bin185=bin185+(probdet[i])
if diffsamearray[i] >=186 and diffsamearray[i] <187 :
        bin186=bin186+(probdet[i])
if diffsamearray[i] >=187 and diffsamearray[i] <188 :
        bin187=bin187+(probdet[i])
if diffsamearray[i] >=188 and diffsamearray[i] <189 :
        bin188=bin188+(probdet[i])
if diffsamearray[i] >=189 and diffsamearray[i] <180 :
        bin189=bin189+(probdet[i])
if diffsamearray[i] >=190 and diffsamearray[i] <191 :
        bin190=bin190+(probdet[i])
if diffsamearray[i] >=191 and diffsamearray[i] <192 :
        bin191=bin191+(probdet[i])
if diffsamearray[i] >=192 and diffsamearray[i] <193 :
        bin192=bin192+(probdet[i])
if diffsamearray[i] >=193 and diffsamearray[i] <194 :
        bin193=bin193+(probdet[i])
if diffsamearray[i] >=194 and diffsamearray[i] <195 :
        bin194=bin194+(probdet[i])
if diffsamearray[i] >=195 and diffsamearray[i] <196 :
        bin195=bin195+(probdet[i])
if diffsamearray[i] >=196 and diffsamearray[i] <197 :
        bin196=bin196+(probdet[i])
if diffsamearray[i] >=197 and diffsamearray[i] <198 :
        bin197=bin197+(probdet[i])
if diffsamearray[i] >=198 and diffsamearray[i] <199 :
        bin198=bin198+(probdet[i])
if diffsamearray[i] >=199 and diffsamearray[i] <200 :
        bin199=bin199+(probdet[i])
if diffsamearray[i] >=200 and diffsamearray[i] <201 :
        bin200=bin200+(probdet[i])
if diffsamearray[i] >=201 and diffsamearray[i] <202 :
        bin201=bin201+(probdet[i])
if diffsamearray[i] >=202 and diffsamearray[i] <203 :
        bin202=bin202+(probdet[i])
if diffsamearray[i] >=203 and diffsamearray[i] <204 :
        bin203=bin203+(probdet[i])
if diffsamearray[i] >=204 and diffsamearray[i] <205 :
        bin204=bin204+(probdet[i])
if diffsamearray[i] >=205 and diffsamearray[i] <206 :
        bin205=bin205+(probdet[i])
if diffsamearray[i] >=206 and diffsamearray[i] <207 :
        bin206=bin206+(probdet[i])
if diffsamearray[i] >=207 and diffsamearray[i] <208 :
```

```
        bin207=bin207+(probdet[i])
if diffsamearray[i] >=208 and diffsamearray[i] <209 :
        bin208=bin208+(probdet[i])
if diffsamearray[i] >=209 and diffsamearray[i] <210 :
        bin209=bin209+(probdet[i])
if diffsamearray[i] >=210 and diffsamearray[i] <211 :
        bin210=bin210+(probdet[i])
if diffsamearray[i] >=211 and diffsamearray[i] <212 :
        bin211=bin211+(probdet[i])
if diffsamearray[i] >=212 and diffsamearray[i] <213 :
        bin212=bin212+(probdet[i])
if diffsamearray[i] >=213 and diffsamearray[i] <214 :
        bin213=bin213+(probdet[i])
if diffsamearray[i] >=214 and diffsamearray[i] <215 :
        bin214=bin214+(probdet[i])
if diffsamearray[i] >=215 and diffsamearray[i] <216 :
        bin215=bin215+(probdet[i])
if diffsamearray[i] >=216 and diffsamearray[i] <217 :
        bin216=bin216+(probdet[i])
if diffsamearray[i] >=217 and diffsamearray[i] <218 :
        bin217=bin217+(probdet[i])
if diffsamearray[i] >=218 and diffsamearray[i] <219 :
        bin218=bin218+(probdet[i])
if diffsamearray[i] >=219 and diffsamearray[i] <220 :
        bin219=bin219+(probdet[i])
if diffsamearray[i] >=220 and diffsamearray[i] <221 :
        bin220=bin220+(probdet[i])
if diffsamearray[i] >=221 and diffsamearray[i] <222 :
        bin221=bin221+(probdet[i])
if diffsamearray[i] >=222 and diffsamearray[i] <223 :
        bin222=bin222+(probdet[i])
if diffsamearray[i] >=223 and diffsamearray[i] <224 :
        bin223=bin223+(probdet[i])
if diffsamearray[i] >=224 and diffsamearray[i] <225 :
        bin224=bin224+(probdet[i])
if diffsamearray[i] >=225 and diffsamearray[i] <226 :
        bin225=bin225+(probdet[i])
if diffsamearray[i] >=226 and diffsamearray[i] <227 :
        bin226=bin226+(probdet[i])
if diffsamearray[i] >=227 and diffsamearray[i] <228 :
        bin227=bin227+(probdet[i])
if diffsamearray[i] >=228 and diffsamearray[i] <229 :
        bin228=bin228+(probdet[i])
if diffsamearray[i] >=229 and diffsamearray[i] <230 :
        bin229=bin229+(probdet[i])
if diffsamearray[i] >=230 and diffsamearray[i] <231 :
        bin230=bin230+(probdet[i])
if diffsamearray[i] >=231 and diffsamearray[i] <232 :
        bin231=bin231+(probdet[i])
if diffsamearray[i] >=232 and diffsamearray[i] <233 :
        bin232=bin232+(probdet[i])
if diffsamearray[i] >=233 and diffsamearray[i] <234 :
        bin233=bin233+(probdet[i])
if diffsamearray[i] >=234 and diffsamearray[i] <235 :
        bin234=bin234+(probdet[i])
if diffsamearray[i] >=235 and diffsamearray[i] <236 :
        bin235=bin235+(probdet[i])
if diffsamearray[i] >=236 and diffsamearray[i] <237 :
        bin236=bin236+(probdet[i])
if diffsamearray[i] >=237 and diffsamearray[i] <238 :
        bin237=bin237+(probdet[i])
if diffsamearray[i] >=238 and diffsamearray[i] <239 :
        bin238=bin238+(probdet[i])
if diffsamearray[i] >=239 and diffsamearray[i] <240 :
        bin239=bin239+(probdet[i])
if diffsamearray[i] >=240 and diffsamearray[i] <241 :
        bin240=bin240+(probdet[i])
if diffsamearray[i] >=241 and diffsamearray[i] <242 :
        bin241=bin241+(probdet[i])
if diffsamearray[i] >=242 and diffsamearray[i] <243 :
        bin242=bin242+(probdet[i])
if diffsamearray[i] >=243 and diffsamearray[i] <244 :
```

```
        bin243=bin243+(probdet[i])
if diffsamearray[i] >=244 and diffsamearray[i] <245 :
        bin244=bin244+(probdet[i])
if diffsamearray[i] >=245 and diffsamearray[i] <246 :
        bin245=bin245+(probdet[i])
if diffsamearray[i] >=246 and diffsamearray[i] <247 :
        bin246=bin246+(probdet[i])
if diffsamearray[i] >=247 and diffsamearray[i] <248 :
        bin247=bin247+(probdet[i])
if diffsamearray[i] >=248 and diffsamearray[i] <249 :
        bin248=bin248+(probdet[i])
if diffsamearray[i] >=249 and diffsamearray[i] <250 :
        bin249=bin249+(probdet[i])
if diffsamearray[i] >=250 and diffsamearray[i] <251 :
        bin250=bin250+(probdet[i])
if diffsamearray[i] >=251 and diffsamearray[i] <252 :
        bin251=bin251+(probdet[i])
if diffsamearray[i] >=252 and diffsamearray[i] <253 :
        bin252=bin252+(probdet[i])
if diffsamearray[i] >=253 and diffsamearray[i] <254 :
        bin253=bin253+(probdet[i])
if diffsamearray[i] >=254 and diffsamearray[i] <255 :
        bin254=bin254+(probdet[i])
if diffsamearray[i] >=255 and diffsamearray[i] <256 :
        bin255=bin255+(probdet[i])
if diffsamearray[i] >=256 and diffsamearray[i] <257 :
        bin256=bin256+(probdet[i])
if diffsamearray[i] >=257 and diffsamearray[i] <258 :
        bin257=bin257+(probdet[i])
if diffsamearray[i] >=258 and diffsamearray[i] <259 :
        bin258=bin258+(probdet[i])
if diffsamearray[i] >=259 and diffsamearray[i] <260 :
        bin259=bin259+(probdet[i])
if diffsamearray[i] >=260 and diffsamearray[i] <261 :
        bin260=bin260+(probdet[i])
if diffsamearray[i] >=261 and diffsamearray[i] <262 :
        bin261=bin261+(probdet[i])
if diffsamearray[i] >=262 and diffsamearray[i] <263 :
        bin262=bin262+(probdet[i])
if diffsamearray[i] >=263 and diffsamearray[i] <264 :
        bin263=bin263+(probdet[i])
if diffsamearray[i] >=264 and diffsamearray[i] <265 :
        bin264=bin264+(probdet[i])
if diffsamearray[i] >=265 and diffsamearray[i] <266 :
        bin265=bin265+(probdet[i])
if diffsamearray[i] >=266 and diffsamearray[i] <267 :
        bin266=bin266+(probdet[i])
if diffsamearray[i] >=267 and diffsamearray[i] <268 :
        bin267=bin267+(probdet[i])
if diffsamearray[i] >=268 and diffsamearray[i] <269 :
        bin268=bin268+(probdet[i])
if diffsamearray[i] >=269 and diffsamearray[i] <270 :
        bin269=bin269+(probdet[i])
if diffsamearray[i] >=270 and diffsamearray[i] <271 :
        bin270=bin270+(probdet[i])
if diffsamearray[i] >=271 and diffsamearray[i] <272 :
        bin271=bin271+(probdet[i])
if diffsamearray[i] >=272 and diffsamearray[i] <273 :
        bin272=bin272+(probdet[i])
if diffsamearray[i] >=273 and diffsamearray[i] <274 :
        bin273=bin273+(probdet[i])
if diffsamearray[i] >=274 and diffsamearray[i] <275 :
        bin274=bin274+(probdet[i])
if diffsamearray[i] >=275 and diffsamearray[i] <276 :
        bin275=bin275+(probdet[i])
if diffsamearray[i] >=276 and diffsamearray[i] <277 :
        bin276=bin276+(probdet[i])
if diffsamearray[i] >=277 and diffsamearray[i] <278 :
        bin277=bin277+(probdet[i])
if diffsamearray[i] >=278 and diffsamearray[i] <279 :
        bin278=bin278+(probdet[i])
if diffsamearray[i] >=279 and diffsamearray[i] <280 :
```

```
        bin279=bin279+(probdet[i])
if diffsamearray[i] >=280 and diffsamearray[i] <281 :
        bin280=bin280+(probdet[i])
if diffsamearray[i] >=281 and diffsamearray[i] <282 :
        bin281=bin281+(probdet[i])
if diffsamearray[i] >=282 and diffsamearray[i] <283 :
        bin282=bin282+(probdet[i])
if diffsamearray[i] >=283 and diffsamearray[i] <284 :
        bin283=bin283+(probdet[i])
if diffsamearray[i] >=284 and diffsamearray[i] <285 :
        bin284=bin284+(probdet[i])
if diffsamearray[i] >=285 and diffsamearray[i] <286 :
        bin285=bin285+(probdet[i])
if diffsamearray[i] >=286 and diffsamearray[i] <287 :
        bin286=bin286+(probdet[i])
if diffsamearray[i] >=287 and diffsamearray[i] <288 :
        bin287=bin287+(probdet[i])
if diffsamearray[i] >=288 and diffsamearray[i] <289 :
        bin288=bin288+(probdet[i])
if diffsamearray[i] >=289 and diffsamearray[i] <280 :
        bin289=bin289+(probdet[i])
if diffsamearray[i] >=290 and diffsamearray[i] <291 :
        bin290=bin290+(probdet[i])
if diffsamearray[i] >=291 and diffsamearray[i] <292 :
        bin291=bin291+(probdet[i])
if diffsamearray[i] >=292 and diffsamearray[i] <293 :
        bin292=bin292+(probdet[i])
if diffsamearray[i] >=293 and diffsamearray[i] <294 :
        bin293=bin293+(probdet[i])
if diffsamearray[i] >=294 and diffsamearray[i] <295 :
        bin294=bin294+(probdet[i])
if diffsamearray[i] >=295 and diffsamearray[i] <296 :
        bin295=bin295+(probdet[i])
if diffsamearray[i] >=296 and diffsamearray[i] <297 :
        bin296=bin296+(probdet[i])
if diffsamearray[i] >=297 and diffsamearray[i] <298 :
        bin297=bin297+(probdet[i])
if diffsamearray[i] >=298 and diffsamearray[i] <299 :
        bin298=bin298+(probdet[i])
if diffsamearray[i] >=299 and diffsamearray[i] <300 :
        bin299=bin299+(probdet[i])
if diffsamearray[i] >=300 and diffsamearray[i] <301 :
        bin300=bin300+(probdet[i])
if diffsamearray[i] >=301 and diffsamearray[i] <302 :
        bin301=bin301+(probdet[i])
if diffsamearray[i] >=302 and diffsamearray[i] <303 :
        bin302=bin302+(probdet[i])
if diffsamearray[i] >=303 and diffsamearray[i] <304 :
        bin303=bin303+(probdet[i])
if diffsamearray[i] >=304 and diffsamearray[i] <305 :
        bin304=bin304+(probdet[i])
if diffsamearray[i] >=305 and diffsamearray[i] <306 :
        bin305=bin305+(probdet[i])
if diffsamearray[i] >=306 and diffsamearray[i] <307 :
        bin306=bin306+(probdet[i])
if diffsamearray[i] >=307 and diffsamearray[i] <308 :
        bin307=bin307+(probdet[i])
if diffsamearray[i] >=308 and diffsamearray[i] <309 :
        bin308=bin308+(probdet[i])
if diffsamearray[i] >=309 and diffsamearray[i] <310 :
        bin309=bin309+(probdet[i])
if diffsamearray[i] >=310 and diffsamearray[i] <311 :
        bin310=bin310+(probdet[i])
if diffsamearray[i] >=311 and diffsamearray[i] <312 :
        bin311=bin311+(probdet[i])
if diffsamearray[i] >=312 and diffsamearray[i] <313 :
        bin312=bin312+(probdet[i])
if diffsamearray[i] >=313 and diffsamearray[i] <314 :
        bin313=bin313+(probdet[i])
if diffsamearray[i] >=314 and diffsamearray[i] <315 :
        bin314=bin314+(probdet[i])
if diffsamearray[i] >=315 and diffsamearray[i] <316 :
```

```
        bin315=bin315+(probdet[i])
if diffsamearray[i] >=316 and diffsamearray[i] <317 :
        bin316=bin316+(probdet[i])
if diffsamearray[i] >=317 and diffsamearray[i] <318 :
        bin317=bin317+(probdet[i])
if diffsamearray[i] >=318 and diffsamearray[i] <319 :
        bin318=bin318+(probdet[i])
if diffsamearray[i] >=319 and diffsamearray[i] <320 :
        bin319=bin319+(probdet[i])
if diffsamearray[i] >=320 and diffsamearray[i] <321 :
        bin320=bin320+(probdet[i])
if diffsamearray[i] >=321 and diffsamearray[i] <322 :
        bin321=bin321+(probdet[i])
if diffsamearray[i] >=322 and diffsamearray[i] <323 :
        bin322=bin322+(probdet[i])
if diffsamearray[i] >=323 and diffsamearray[i] <324 :
        bin323=bin323+(probdet[i])
if diffsamearray[i] >=324 and diffsamearray[i] <325 :
        bin324=bin324+(probdet[i])
if diffsamearray[i] >=325 and diffsamearray[i] <326 :
        bin325=bin325+(probdet[i])
if diffsamearray[i] >=326 and diffsamearray[i] <327 :
        bin326=bin326+(probdet[i])
if diffsamearray[i] >=327 and diffsamearray[i] <328 :
        bin327=bin327+(probdet[i])
if diffsamearray[i] >=328 and diffsamearray[i] <329 :
        bin328=bin328+(probdet[i])
if diffsamearray[i] >=329 and diffsamearray[i] <330 :
        bin329=bin329+(probdet[i])
if diffsamearray[i] >=330 and diffsamearray[i] <331 :
        bin330=bin330+(probdet[i])
if diffsamearray[i] >=331 and diffsamearray[i] <332 :
        bin331=bin331+(probdet[i])
if diffsamearray[i] >=332 and diffsamearray[i] <333 :
        bin332=bin332+(probdet[i])
if diffsamearray[i] >=333 and diffsamearray[i] <334 :
        bin333=bin333+(probdet[i])
if diffsamearray[i] >=334 and diffsamearray[i] <335 :
        bin334=bin334+(probdet[i])
if diffsamearray[i] >=335 and diffsamearray[i] <336 :
        bin335=bin335+(probdet[i])
if diffsamearray[i] >=336 and diffsamearray[i] <337 :
        bin336=bin336+(probdet[i])
if diffsamearray[i] >=337 and diffsamearray[i] <338 :
        bin337=bin337+(probdet[i])
if diffsamearray[i] >=338 and diffsamearray[i] <339 :
        bin338=bin338+(probdet[i])
if diffsamearray[i] >=339 and diffsamearray[i] <340 :
        bin339=bin339+(probdet[i])
if diffsamearray[i] >=340 and diffsamearray[i] <341 :
        bin340=bin340+(probdet[i])
if diffsamearray[i] >=341 and diffsamearray[i] <342 :
        bin341=bin341+(probdet[i])
if diffsamearray[i] >=342 and diffsamearray[i] <343 :
        bin342=bin342+(probdet[i])
if diffsamearray[i] >=343 and diffsamearray[i] <344 :
        bin343=bin343+(probdet[i])
if diffsamearray[i] >=344 and diffsamearray[i] <345 :
        bin344=bin344+(probdet[i])
if diffsamearray[i] >=345 and diffsamearray[i] <346 :
        bin345=bin345+(probdet[i])
if diffsamearray[i] >=346 and diffsamearray[i] <347 :
        bin346=bin346+(probdet[i])
if diffsamearray[i] >=347 and diffsamearray[i] <348 :
        bin347=bin347+(probdet[i])
if diffsamearray[i] >=348 and diffsamearray[i] <349 :
        bin348=bin348+(probdet[i])
if diffsamearray[i] >=349 and diffsamearray[i] <350 :
        bin349=bin349+(probdet[i])
if diffsamearray[i] >=350 and diffsamearray[i] <351 :
        bin350=bin350+(probdet[i])
if diffsamearray[i] >=351 and diffsamearray[i] <352 :
```

```
                    bin351=bin351+(probdet[i])
            if diffsamearray[i] >=352 and diffsamearray[i] <353 :
                    bin352=bin352+(probdet[i])
            if diffsamearray[i] >=353 and diffsamearray[i] <354 :
                    bin353=bin353+(probdet[i])
            if diffsamearray[i] >=354 and diffsamearray[i] <355 :
                    bin354=bin354+(probdet[i])
            if diffsamearray[i] >=355 and diffsamearray[i] <356 :
                    bin355=bin355+(probdet[i])
            if diffsamearray[i] >=356 and diffsamearray[i] <357 :
                    bin356=bin356+(probdet[i])
            if diffsamearray[i] >=357 and diffsamearray[i] <358 :
                    bin357=bin357+(probdet[i])
            if diffsamearray[i] >=358 and diffsamearray[i] <359 :
                    bin358=bin358+(probdet[i])
            if diffsamearray[i] >=359 and diffsamearray[i] <360 :
                    bin359=bin359+(probdet[i])
            if diffsamearray[i] >=360 and diffsamearray[i] <361 :
                    bin360=bin360+(probdet[i])
count=count+1
angbins=open("Puangbins.txt","a")
angbins.write('\n'+str(bin0))
angbins.write('\n'+str(bin1))
angbins.write('\n'+str(bin2))
angbins.write('\n'+str(bin3))
angbins.write('\n'+str(bin4))
angbins.write('\n'+str(bin5))
angbins.write('\n'+str(bin6))
angbins.write('\n'+str(bin7))
angbins.write('\n'+str(bin8))
angbins.write('\n'+str(bin9))
angbins.write('\n'+str(bin10))
angbins.write('\n'+str(bin11))
angbins.write('\n'+str(bin12))
angbins.write('\n'+str(bin13))
angbins.write('\n'+str(bin14))
angbins.write('\n'+str(bin15))
angbins.write('\n'+str(bin16))
angbins.write('\n'+str(bin17))
angbins.write('\n'+str(bin18))
angbins.write('\n'+str(bin19))
angbins.write('\n'+str(bin20))
angbins.write('\n'+str(bin21))
angbins.write('\n'+str(bin22))
angbins.write('\n'+str(bin23))
angbins.write('\n'+str(bin24))
angbins.write('\n'+str(bin25))
angbins.write('\n'+str(bin26))
angbins.write('\n'+str(bin27))
angbins.write('\n'+str(bin28))
angbins.write('\n'+str(bin29))
angbins.write('\n'+str(bin30))
angbins.write('\n'+str(bin31))
angbins.write('\n'+str(bin22))
angbins.write('\n'+str(bin33))
angbins.write('\n'+str(bin34))
angbins.write('\n'+str(bin35))
angbins.write('\n'+str(bin36))
angbins.write('\n'+str(bin37))
angbins.write('\n'+str(bin38))
angbins.write('\n'+str(bin39))
angbins.write('\n'+str(bin40))
angbins.write('\n'+str(bin41))
angbins.write('\n'+str(bin42))
angbins.write('\n'+str(bin43))
angbins.write('\n'+str(bin44))
angbins.write('\n'+str(bin45))
angbins.write('\n'+str(bin46))
angbins.write('\n'+str(bin47))
angbins.write('\n'+str(bin48))
angbins.write('\n'+str(bin49))
angbins.write('\n'+str(bin50))
```

```
angbins.write('\n'+str(bin51))
angbins.write('\n'+str(bin52))
angbins.write('\n'+str(bin53))
angbins.write('\n'+str(bin54))
angbins.write('\n'+str(bin55))
angbins.write('\n'+str(bin56))
angbins.write('\n'+str(bin57))
angbins.write('\n'+str(bin58))
angbins.write('\n'+str(bin59))
angbins.write('\n'+str(bin60))
angbins.write('\n'+str(bin61))
angbins.write('\n'+str(bin62))
angbins.write('\n'+str(bin63))
angbins.write('\n'+str(bin64))
angbins.write('\n'+str(bin65))
angbins.write('\n'+str(bin66))
angbins.write('\n'+str(bin67))
angbins.write('\n'+str(bin68))
angbins.write('\n'+str(bin69))
angbins.write('\n'+str(bin70))
angbins.write('\n'+str(bin71))
angbins.write('\n'+str(bin72))
angbins.write('\n'+str(bin73))
angbins.write('\n'+str(bin74))
angbins.write('\n'+str(bin75))
angbins.write('\n'+str(bin76))
angbins.write('\n'+str(bin77))
angbins.write('\n'+str(bin78))
angbins.write('\n'+str(bin79))
angbins.write('\n'+str(bin80))
angbins.write('\n'+str(bin81))
angbins.write('\n'+str(bin82))
angbins.write('\n'+str(bin83))
angbins.write('\n'+str(bin84))
angbins.write('\n'+str(bin85))
angbins.write('\n'+str(bin86))
angbins.write('\n'+str(bin87))
angbins.write('\n'+str(bin88))
angbins.write('\n'+str(bin89))
angbins.write('\n'+str(bin90))
angbins.write('\n'+str(bin91))
angbins.write('\n'+str(bin92))
angbins.write('\n'+str(bin93))
angbins.write('\n'+str(bin94))
angbins.write('\n'+str(bin95))
angbins.write('\n'+str(bin96))
angbins.write('\n'+str(bin97))
angbins.write('\n'+str(bin98))
angbins.write('\n'+str(bin99))
angbins.write('\n'+str(bin100))
angbins.write('\n'+str(bin101))
angbins.write('\n'+str(bin102))
angbins.write('\n'+str(bin103))
angbins.write('\n'+str(bin104))
angbins.write('\n'+str(bin105))
angbins.write('\n'+str(bin106))
angbins.write('\n'+str(bin107))
angbins.write('\n'+str(bin108))
angbins.write('\n'+str(bin109))
angbins.write('\n'+str(bin110))
angbins.write('\n'+str(bin111))
angbins.write('\n'+str(bin112))
angbins.write('\n'+str(bin113))
angbins.write('\n'+str(bin114))
angbins.write('\n'+str(bin115))
angbins.write('\n'+str(bin116))
angbins.write('\n'+str(bin117))
angbins.write('\n'+str(bin118))
angbins.write('\n'+str(bin119))
angbins.write('\n'+str(bin120))
angbins.write('\n'+str(bin121))
angbins.write('\n'+str(bin122))
```

```
angbins.write('\n'+str(bin123))
angbins.write('\n'+str(bin124))
angbins.write('\n'+str(bin125))
angbins.write('\n'+str(bin126))
angbins.write('\n'+str(bin127))
angbins.write('\n'+str(bin128))
angbins.write('\n'+str(bin129))
angbins.write('\n'+str(bin130))
angbins.write('\n'+str(bin131))
angbins.write('\n'+str(bin132))
angbins.write('\n'+str(bin133))
angbins.write('\n'+str(bin134))
angbins.write('\n'+str(bin135))
angbins.write('\n'+str(bin136))
angbins.write('\n'+str(bin137))
angbins.write('\n'+str(bin138))
angbins.write('\n'+str(bin139))
angbins.write('\n'+str(bin140))
angbins.write('\n'+str(bin141))
angbins.write('\n'+str(bin142))
angbins.write('\n'+str(bin143))
angbins.write('\n'+str(bin144))
angbins.write('\n'+str(bin145))
angbins.write('\n'+str(bin146))
angbins.write('\n'+str(bin147))
angbins.write('\n'+str(bin148))
angbins.write('\n'+str(bin149))
angbins.write('\n'+str(bin150))
angbins.write('\n'+str(bin151))
angbins.write('\n'+str(bin152))
angbins.write('\n'+str(bin153))
angbins.write('\n'+str(bin154))
angbins.write('\n'+str(bin155))
angbins.write('\n'+str(bin156))
angbins.write('\n'+str(bin157))
angbins.write('\n'+str(bin158))
angbins.write('\n'+str(bin159))
angbins.write('\n'+str(bin160))
angbins.write('\n'+str(bin161))
angbins.write('\n'+str(bin162))
angbins.write('\n'+str(bin163))
angbins.write('\n'+str(bin164))
angbins.write('\n'+str(bin165))
angbins.write('\n'+str(bin166))
angbins.write('\n'+str(bin167))
angbins.write('\n'+str(bin168))
angbins.write('\n'+str(bin169))
angbins.write('\n'+str(bin170))
angbins.write('\n'+str(bin171))
angbins.write('\n'+str(bin172))
angbins.write('\n'+str(bin173))
angbins.write('\n'+str(bin174))
angbins.write('\n'+str(bin175))
angbins.write('\n'+str(bin176))
angbins.write('\n'+str(bin177))
angbins.write('\n'+str(bin178))
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angbins.write('\n'+str(bin358))
angbins.write('\n'+str(bin359))
angbins.write('\n'+str(bin360))
angbins.close()
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Wattenergy.txt

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VITA

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