Week 4 project
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Problem1:

Using a random function to random 10000 returns, then plug three return formulas. The result calculated by the Numpy package is very similar to the expectation calculated by functions .

	mean	sd
Classical Brownian Motion	100.000319	0.098970
Arithmetic Return System	100.031893	9.897047
Geometric Brownian Motion	100.523568	9.990007

	mean	sd
Classical Brownian Motion	100.000000	0.100000
Arithmetic Return System	100.000000	10.000000
Geometric Brownian Motion	100.501252	10.075303

Problem2:

Using a return function to calculate return of META, then remove mean from the data. Set the confidence level of each model as 95%, we got those VaR out. We can see that Normal distribution's VaR is very similar to AR(1)'s. VaR based on historical model and MLE fitted into T distribution can be more similar to normal distribution than MLE.

	VAR
Normal distribution	0.065469
EWV lambda = 0.94	0.091385
MLE with T distribution	0.073142
AR(1)	0.065749
Historical	0.055907

Problem3:

This is the VaR based on EWV with lambda = 0.94. We can see that total VaR is much larger than these three portfolios combined. So, I can fairly say that this distribution is non-elliptical.

```
                          VaR
Portfolio A    5603.790196
Portfolio B    4371.694340
Portfolio C    3748.704341
total        311238.346331
A+B+C = 13724.188876412196 and total is: 311238.34633069794
```

I chose the AR(1) model to calculate another VaR. The total portfolio's VaR is smaller than those three combined. The data becomes elliptical by applying the AR(1) model. The reason why I chose AR(1) is that it has the function of autocorrelation which can find the relationship between a given value in the series and the previous value.Thus, It can be more accurate.

```
                VAR
A       8004.338436
B       6560.836056
C       5647.895278
total  19889.905815
A+B+C = 20213.069770475195 and total is: 19889.905815313316
```