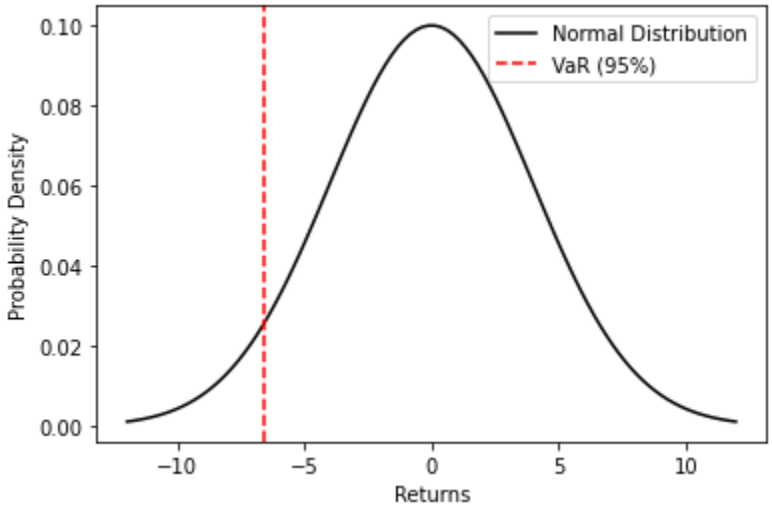
For problem 1 I was having trouble producing a working simulation and thus could not produce a full answer. I know that the Classical Brownian is typically flat but Geometric can tend to have a slightly larger standard deviation than arithmetic

Problem 2

For problem 2, the following var values are the results of their respective calculations. The output for calculating along with the calculations include graphs for VaR. When calculating VaR, I'm multiplied by 100 as professor did during class.

1. For Normal Distribution, distribution the original bar value I got was 6.54. Below is the graph for the Normal Distribution.



2. When calculating the normalized exponentially weighted variance with a lambda of .94, it produces an array of values. Becauae VaR is a minimum loss on a normal bad day, I decided to find the minimum value which was 2.88. This was most logically sound approach because the output coincides with the idea of being exponentially weighted which in turn could reduce possibility of more volatile data to come into play since the calculation front weights data which seem to have little movement
3. For MLE I got a very small number of .22 which seems very stragely low. But also at the same time it makes sense because the model is utilizing t distribution which will diminish the effects of outliers.
4. The ARIMA model produced a value of 6.544 very close to number 1 answer since being autoregressive will be dependent on previous iterations of itself giving a value close to answer 1.
5. The Result of 5.59 is close to the answer of 6.54 from number 1 but its lower than number 1 since historical VaR suffers from recency bias. And as of recent META's Stock has not been that volatile.

Problem 3

For number 3 when calculating the $VaR for the three portfolios:

Portfolio A VaR$: $5670.20

Portfolio B VaR$: $4494.60

Portfolio C VaR$: $3786.59

While at first these seem high, when you look deeper at the assets in for instance Portfolio A, it has very high Beta names that are volatile such as AMD,GOOGL and other tech stocks. So this is generally within reason. Below are the VaRret that was produced from my model.

Portfolio A VaRret: 205.54

Portfolio B VaRret: 14.90

Portfolio C VaRret: 413.43

When I decided to rerun the simulation I went with the Monte Carlo VaR since it is truly random and should eliminate most biases. as you can see the dollar var is significantly more pronounce and can be argued to be more realistic then delta var since delta var is linear. Monte Carlo being truly random w we'll bring in some of those extremes to make the picture for VaR much more realistic.

Portfolio Portfolio A VaR ($): 44929.54

Portfolio Portfolio A VaR (return): -0.1498

Portfolio Portfolio B VaR ($): 21550.09

Portfolio Portfolio B VaR (return): -0.0732

Portfolio Portfolio C VaR ($): 39058.04

Portfolio Portfolio C VaR (return): -0.1446