

## Week 5 Project

### Problem 1:

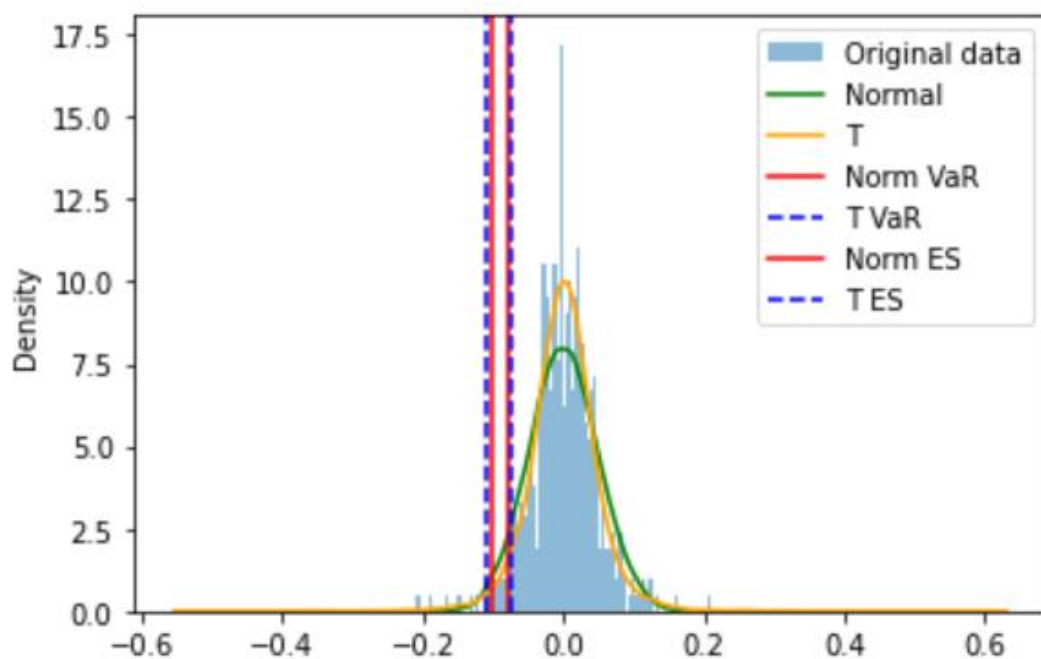
Here are the results:

VaR for normal distribution: 0.08003369985009008

ES for normal distribution: 0.1000574279812469

VaR for generalized T distribution: 0.07732507931066372

ES for generalized T distribution: 0.11388728460804388

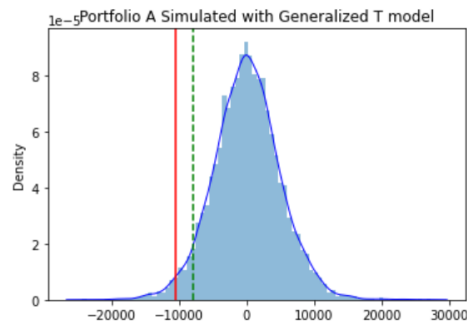


The ES and VaR values for the two distributions are close. The VaR for normal distribution is slightly larger than the VaR for generalized T distribution. This shows that generalized T distribution indicates a lower level of risk. The ES for normal distribution is slightly smaller than the ES of generalized T distribution. This shows that if the loss exceeds the VaR level and follow a generalized T distribution, the expected losses would be higher compared to the normal distribution.

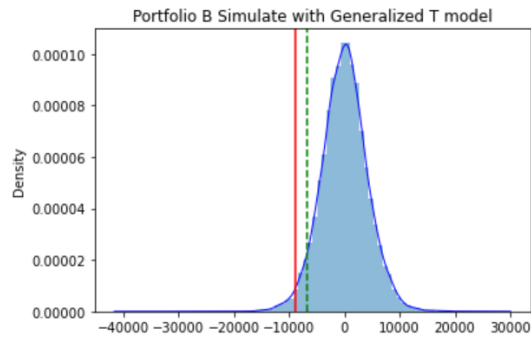
### Problem 2:

The functions in the library riskmgmt come from the previous assignments. They are tested by the csv files in the previous projects. Some other testcases are in week5problem3.ipynb.

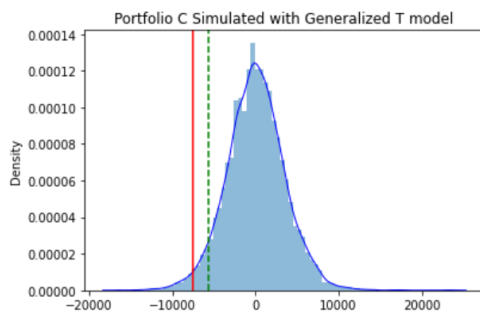
### Problem 3:



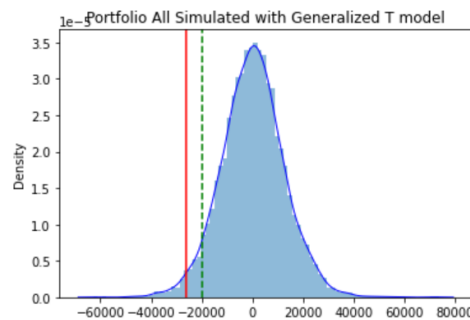
For Portfolio A,  
Current price is 299950.05907389  
VaR is 7924.45440194544  
ES is 10469.504082020962



For Portfolio B,  
Current price is 294385.59081765  
VaR is 6693.390954966373  
ES is 8795.628312739558



For Portfolio C,  
Current price is 270042.8305277  
VaR is 5653.332579016406  
ES is 7439.533622014646



For Portfolio All,  
Current price is 864378.48041924  
VaR is 19820.953528746715  
ES is 26274.35367291905

For portfolio A:

VaR for generalized T distribution: 7924.45

VaR for delta normal: 5670.20

VaR for historical simulation: 7109.30

For portfolio B:

VaR for generalized T distribution: 6693.39

VaR for delta normal: 4494.60

VaR for historical simulation: 7273.70

For portfolio C:

VaR for generalized T distribution: 5653.33

VaR for delta normal: 3786.59

VaR for historical simulation: 5310.07

Compare the results from problem 3 from week 4, we found that for the three portfolios, the VaR for using delta normal is the smallest, the VaR for using generalized T distribution is the largest. It shows that in this situation, generalized T distribution fit better for the data.