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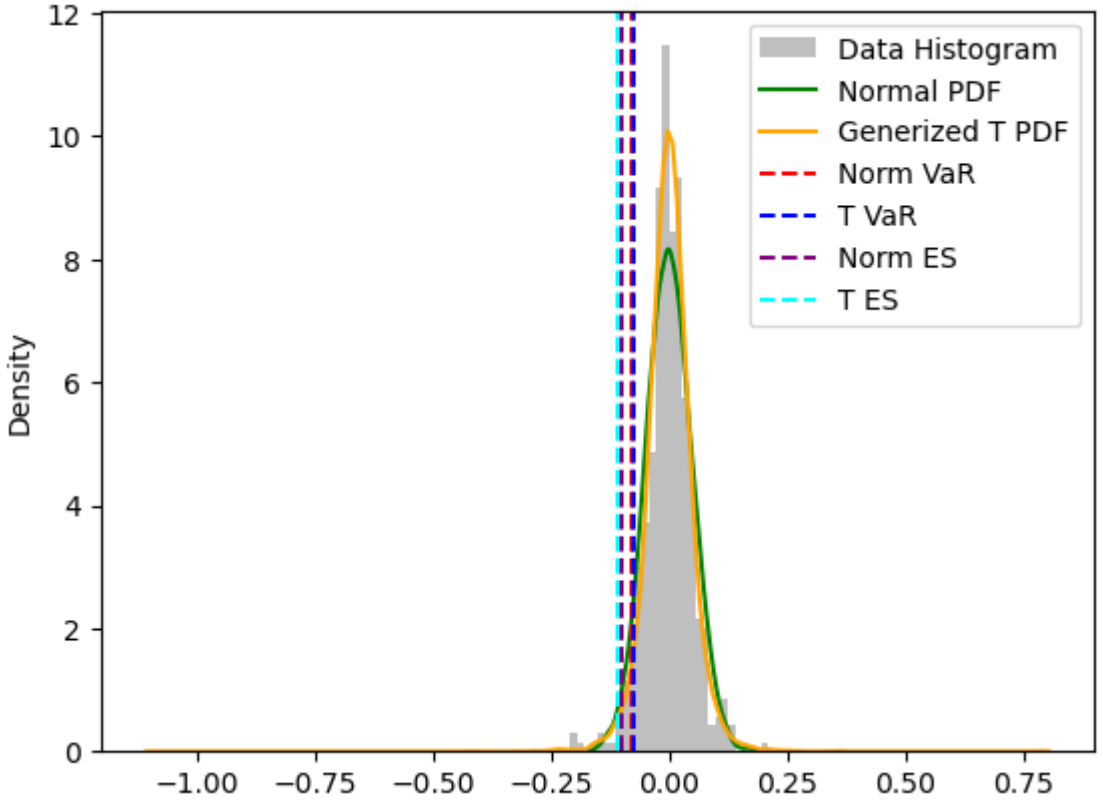
Week05 Project

Problem 1:

The results of the VaR and ER are:

```
VaR for normal distribution: 0.08036471536552107
ES for normal distribution: 0.10145463599911116
VaR for generalized T distribution: 0.07485449134527764
ES for generalized T distribution: 0.11114132651018806
```

And the graph is shown below:



Based on the graphs, we can see that the two models obtained close ES and VaR values, which suggests that the two models have similar results in terms of risk estimation for the data. In addition, the VaR of the normal distribution is slightly larger than the VaR of the generalized T distribution, which indicates that the generalized T distribution indicates a lower level of risk. The ES of the normal distribution is slightly smaller than the ES of the generalized T. This suggests that if the losses exceed the VaR level and follow the generalized T distribution, then the expected losses will be higher than the normal distribution.

Problem 2

The library I generated is under risk_management.py. However, due to a version conflict between the Python version I am currently using and the Python version used in the Jupyter notebook file, I had to adopt an alternative method to test my code. I validated the correctness of the code in the library by replacing it with the project code I had previously

written and verifying that it produced the expected results. I plan to address the Python version conflict issue later and aim to validate it through unit test.

Problem 3

The result is shown below:

```
For Portfolio A,
Current price is 1089316.1599400002
VaR is 21101.514264274967
ES is 28829.938783690228

For Portfolio B,
Current price is 574542.40515
VaR is 12117.686581360986
ES is 16642.984106046635

For Portfolio C,
Current price is 1387409.50752
VaR is 27345.034633758874
ES is 35952.76088108954

For Portfolio Total,
Current price is 3051268.07261
VaR is 57318.66575212944
ES is 76444.78913781076
```

When comparing the results obtained in problem 3 from week 4, we observed that for all three portfolios, the smallest VaR was calculated when using the delta normal method, while the largest VaR was obtained when using the generalized T distribution. This observation may suggest that the delta normal method is less sensitive when it comes to predicting risk. Therefore, when we aim to have a more pessimistic outlook on future risk, choosing the generalized T distribution for data fitting would be a preferable option.