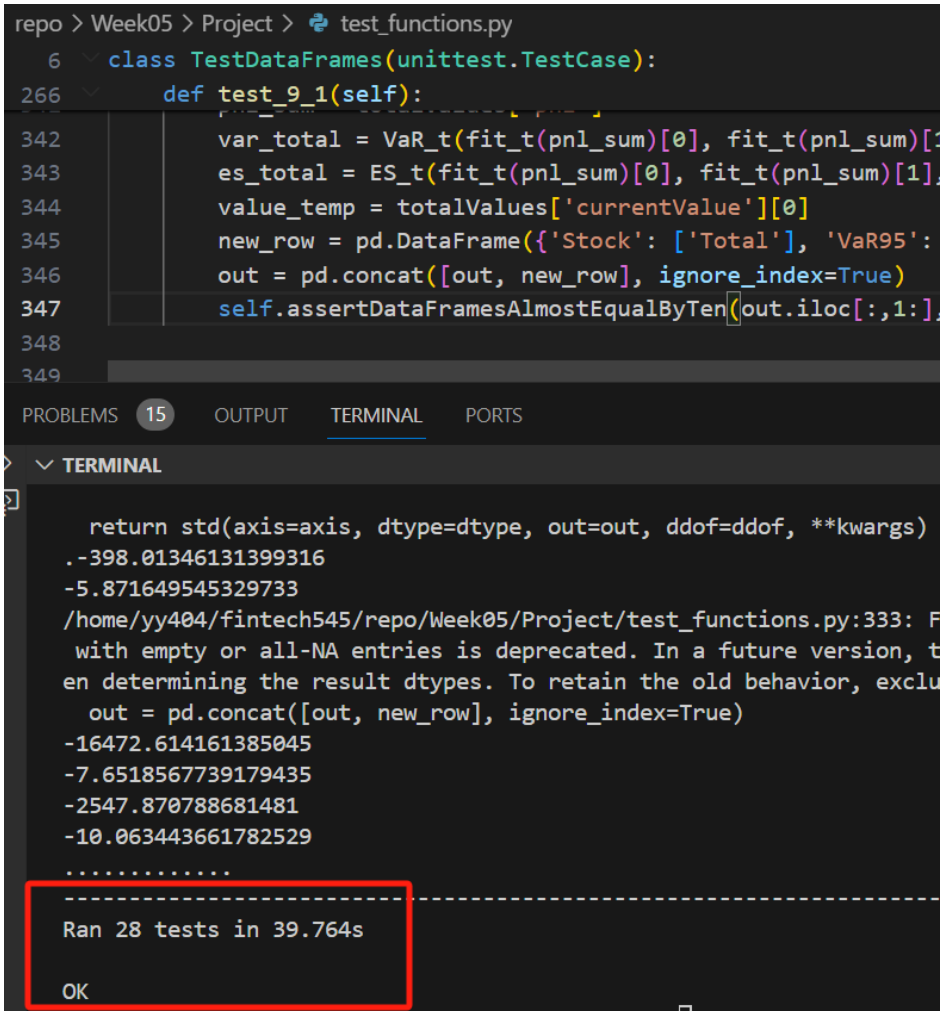
Project Week05 – Yue Yu(yy404)

Problem1

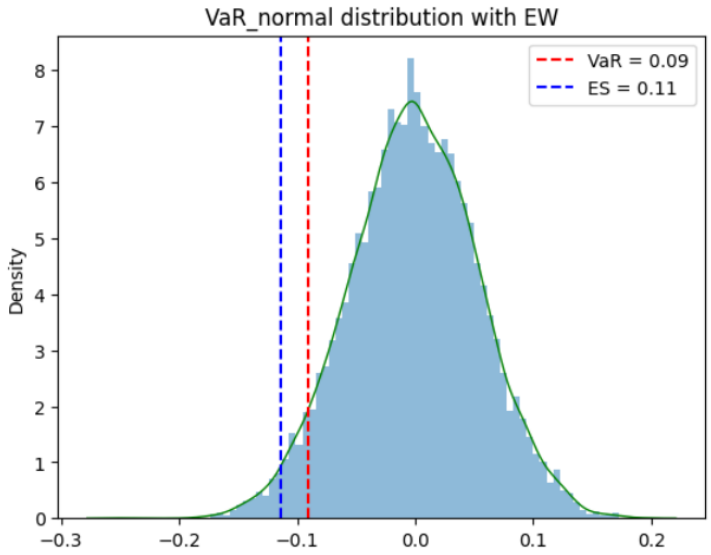
Pass all the tests.

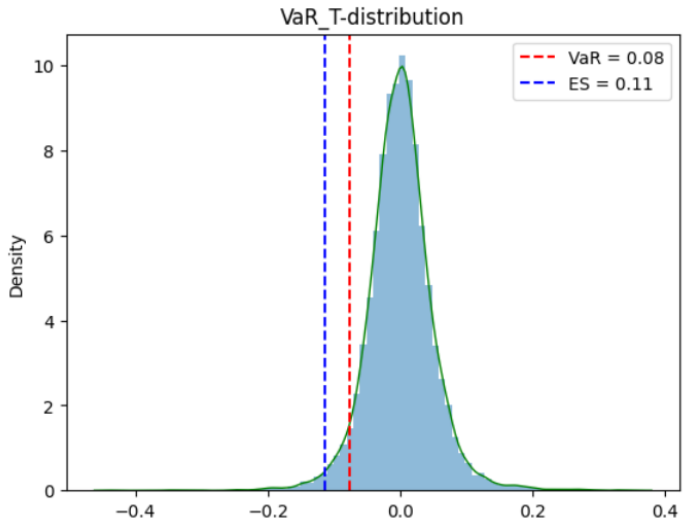


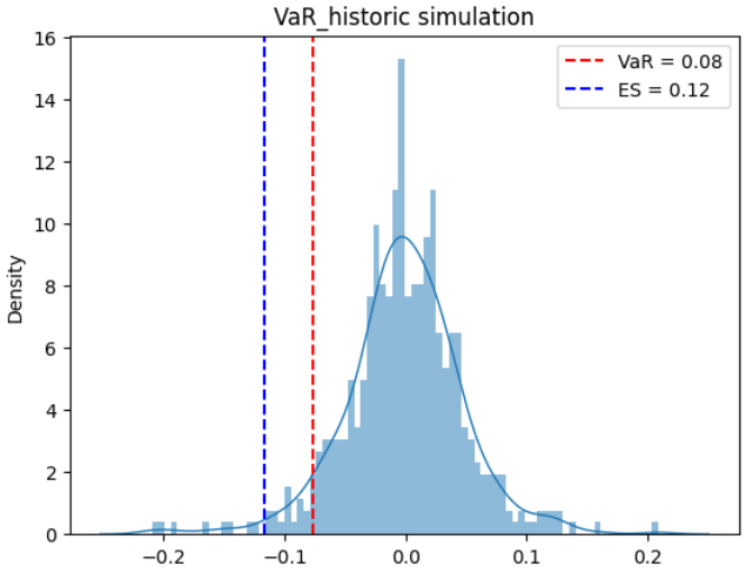
Problem2

Using the data in problem1.csv, the VaR and ES are calculated by 3 fitting methods as following:

	VaR	ES
Normal distribution with EW	0.0911693	0.1141065
MLE + t distribution	0.0764756	0.1132179
Historic Simulation	0.0759807	0.1167766







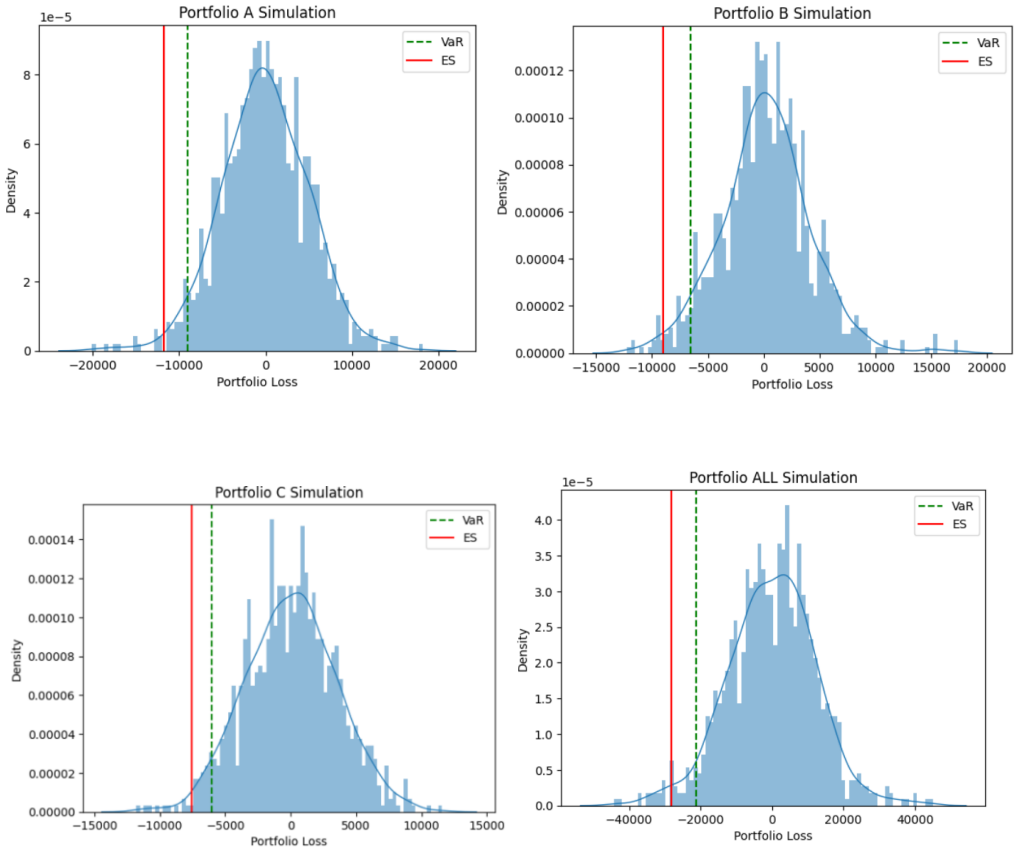
We can see that the VaR under the Normal Distribution with EW is noticeably the largest,

while the VaR under MLE-fitted t distribution and Historical Simulation are approximately similar. However, the ES estimates for these three fitting methods are very close. I believe this is because the Normal Distribution is more concentrated in the center, whereas the t Distribution has thicker tails. Moreover, from the graphical perspective, the t Distribution aligns better with Historical Simulation, and one could argue it is closer to real-world conditions.

Problem3

By fitting Generalized T model to portfolio A and B, and Normal distribution to portfolio ES, the VaR and ES as following:

Portfolio	VaR	ES
A	9022.89	11752.09
B	6886.91	8962.14
C	6217.31	7568.13
Total	21333.03	28153.62



By comparing the VaR from Copula with the methods last week, we can see the VaR is completely different, which due to the different portfolios and returns. I adventure a guess:

this simulation results are closer to the simulation results of the Historic simulation. Copula is suitable for portfolios with complex correlation structures due to their ability to handle non-linear dependencies and extreme situations.

Delta Normal is simpler but may overlook important risk factors, potentially resulting in less accurate risk management.

Portfolio	Copula	Delta Normal	Monte Carlo	Historic
A	9022.89	15426.97	14014.13	17933.41
B	6886.91	8082.57	7474.11	10983.46
C	6217.31	18163.29	16285.41	21409.75
Total	21333.03	38941.38	35642.05	49544.19