Problem 2

Under Normal Distribution With Exponentially Weighted Variance (lambda=0.97)

VaR: 0.09116934
VaR difference from mean: 0.09028951
ES: 0.11410652
ES difference from mean: 0.11322669

Under T distribution

VaR: 0.07647603
VaR difference from mean: 0.0763823
ES: 0.1132179
ES difference from mean: 0.11312418

Under Historical simulation

VaR: 0.0782451
VaR difference from mean: 0.07741549
ES: 0.11724889
ES difference from mean: 0.11641928

We can find that the VaR results under T distribution and Historical simulation are almost identical and less than the results under Normal distribution. The reason is that Normal distribution relatively overestimates the extreme events compared to the other two methods. The ES results are almost the same, with a slightly higher result under Historical simulation.

Problem 3

Portfolio A

VaR95: 5376.540734
VaR99: 8099.519348
ES95: 6987.626902
ES99: 9399.604796

Portfolio B

VaR95: 4456.805781
VaR99: 6522.355790
ES95: 5901.275818
ES99: 8231.527278

Portfolio C

VaR95: 3907.534467
VaR99: 5301.427451
ES95: 4808.073242
ES99: 6067.001752

Total

VaR95: 12941.932377
VaR99: 18392.640963
ES95: 16778.795230
ES99: 22625.211861

Compared to last week's VaR result, we can find that the results under Copula simulation method is much lower. It may because the copula method can smooth out extreme joint dependencies and reduce VaR estimates compared to historical simulation, which directly captures observed extremes.