ASSIGNMENT 1

The purpose of the computer part of this assignment is to use matrix techniques to calculate different characteristics of a portfolio and to calculate the best portfolio that one can, given the available assets. In reporting your results please give the expected return on the portfolio, the standard deviation and the weights.

1) Consider the variance/covariance matrix of the following 5 securities.

6.62	9.07	10.94	10.78	9.08
9.07	18.231	19.44	18.86	14.35
10.94	19.44	26.16	22.65	17.86
10.78	18.86	22.65	23.22	17.08
9.08	14.35	17.86	17.08	18.27

The first two numbers along the first row are 6.62, the variance of asset 1 and 9.07 the covariance of asset 1 and asset 2.

The mean returns to the securities are: [10.03 10.57 9.44 11.82 9.28]. Where, 10.03 is the mean return to asset 1, 10.57 is the mean return to asset 2 and so forth.

a) Calculate the expected return and standard deviation of an equally–weighted portfolio, that is a portfolio in which each security has the same weight.

b) If you want a return of 15%, what portfolio should you hold?

c) Suppose that you don't want to short sell any asset 3, but still want a return of 15%, what portfolio should you hold?

d) If the risk–free rate is 5% what is the optimal risky portfolio?

e) If you combine the optimal risky portfolio with the risk free rate to get the return of 15%, what are the characteristics of your portfolio? Compare this answer to the one in b).

f) As a sensitivity analysis, recalculate part b) and part d) under the assumption that the covariance of asset 1 and 2 is 10, instead of 9.07.

2) The risk–free rate is 5% and you are told that two possible portfolios are candidates for the optimal risky one. They are portfolio A, with $ER_A = 10\%$ and $\sigma_A = 15\%$ and portfolio B, with $ER_B = 18\%$ and $\sigma_B = 17\%$. Which one can you eliminate and why?

3) Two stocks, L and M are perfectly negatively correlated. L's standard deviation is 0.6 and M's standard deviation is 0.8. Find the portfolio of L and M that will give the lowest possible standard deviation.