Download the monthly data 48 Industry Portfolios from Ken French's website at http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html. Use data from the last 5 years and perform the following analysis.

PART A

1) Graph the "mean-variance locus" (without the risk-free asset) of the 48 industry portfolios. Specify each industry portfolio in the chart.

2) Graph the "mean-variance locus" (with the risk-free asset) of these 48 industry portfolios. Specify each industry portfolio in the chart. Explain how the mean-variance locus has changed with the risk-free asset.

3) Describe the tangent portfolio and its characteristics such as its mean and variance and the weights of each asset.

4) Graph the "mean-variance locus" (without the risk-free asset) with the short-sale constraints on each industry portfolio. Specify each industry portfolio in the chart.

5) Graph the "mean-variance locus" (with the risk-free asset) with the short-sale constraints on each industry portfolio. Specify each industry portfolio in the chart. Explain how the mean-variance locus has changed with the risk-free asset.

6) Describe the tangent portfolio and its characteristics such as its mean and variance and the weights of each asset.

PART B

1) Resample (with replacement) from your original data and create a new bootstrapped sample of 60 months. Repeat this 100 times, i.e. create 1000 bootstrapped samples and perform the analysis in 1-6 in part A to demonstrate the effect of estimation uncertainty on the mean-variance efficient locus and tangent portfolios computed in 1-6.

2) You want to invest in up to 3 portfolios from the original list of 5 industry portfolios. Repeat the same calculations in 1-6 with this constraint on the maximum number of assets. Present and discuss these results.

3) The investment policy requires a maximum number of 5 assets. You now want to find the 5 industries among the 48 industries that maximize the Sharpe ratio with and without short selling constraints. Propose and implement methods to identify industries and their weight.

4) Implement the MAXSER approach to portfolio allocation for the 48 industry portfolios. Explain in detail your approach and empirical choices and compare your results in Part A.