Problem Set 2 for Economics 180.367:
Investments and Portfolio Management
Due at the beginning of class on September 23.

Note: Point totals are shown at the beginning of each question. It is important to show your work.

1. (20 points) Go to Ken French's data library at

http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

and download the data on 12 industry-weighted portfolios: nondurables, durables, manufacturing, energy, chemicals, business equipment, telecommunications, utilities, shops, health, finance, and others, spanning the period July 1926-July 2011. Please use monthly data, value-weighted.

Assume that the Treasury bill return (risk-free rate) is 0.22 percent per month.

Compute the mean return for each of the 12 portfolios (monthly) along with the variance-covariance matrix of returns and the Sharpe ratios of the 12 portfolios.

2. (5 points). Which of these 12 risky asset portfolios has the greatest expected return? If you had to form a CAL using only one out of the 12 risky portfolios, which one would you pick and why?

3. (10 points). Use Solver to find the portfolio of these 12 risky portfolios that has the minimum standard deviation. Report the weights in the portfolio (which may be negative) and the mean and standard deviation of the portfolio return. In your answer show the matrix algebra formula for portfolio standard deviation, mention any constraints you used, and report the portfolio weights, and the mean and standard deviation of the minimum variance portfolio.

4. (15 points). Use Solver to find the portfolio weights, mean and standard deviation of the tangency portfolio. In answering, show the expression that you maximized and any constraints.

5. (10 points). Solve for 5 other points on the efficient frontier. These points should have standard deviation of 4, 5, 6, 7, and 8 percent. Plot the efficient frontier.

6. (10 pts) Define the optimal Capital Allocation Line (CAL), and then solve for the optimal capital allocation line in slope intercept form.

Sue runs a mutual fund that earns a monthly expected return of 1.8 percent and a monthly standard deviation of 8 percent. You are an investment adviser. Answer the following questions about Sue's portfolio.

7. (15 pts) Suppose that the clients can invest only in the 12 risky portfolios. Based on the information that is provided, are there any investors that should invest in Sue's portfolio instead

of the 12 stock portfolios? Use a graphical analysis with indifference curves to justify your answer.

8. (15 pts) Suppose that your clients can invest in the 12 risky stock portfolios and in the risk-free asset. Based on this information, are there any investors that should invest in Sue's portfolio and the risk-free asset instead of the 12 risky stock portfolios and the risk-free asset? Use graphical analysis with indifference curves to justify your answer.