Problem 1 (30pts)

A corporation is about to invest in two projects whose random payoffs are described by the following table, where the ?'s are numbers I ask you to discover below.

S	s_1	s_2	s_3
p	0.25	0.50	0.25
X	90	100	110
Y	?	?	?

1. Find three possible values for the missing numbers so that Y has a correlation of 0.5 with X <u>and</u> a variance of 50.

2. The corporation wants to split its investment funds across the two projects so as to make the variance of the resulting payoff as small as possible. What is the variance of the resulting portfolio?

Problem 2 (30pts)

Run a 3-factor Fama-French regression for a corporation of your choice for which 5 years of adjusted return data are available. Name and describe the corporation in one sentence. Then report the corporation's alpha and three betas. Which of those are significant? (Report the statistic you are using to make that determination.)

Problem 3 (20pts)

Consider the following probability space and random variables.

S	s_1	s_2	s_3
p	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$
r_m	0.30	0.20	0.10
r_F	0.15	0.15	0.15

Here, r_m is the return on the market portfolio, r_F is the risk-free return. Assume that CAPM holds exactly. Consider an asset whose return r_i has covariance 0.02 with r_m. What is the expected value of r_i?

Problem 4 (20pts)

Consider a financial economy with three assets. The (percentage terms) expected returns of assets 1, 2, and 3 are $(11, 20, 12)$, respectively. The variance-covariance matrix of these returns (also in percentage terms) is:

$$\begin{bmatrix} 300 & 150 & 0 \\ 150 & 1000 & 0 \\ 0 & 0 & 200 \end{bmatrix}.$$

1. Assume that the investor splits her wealth equally across the three assets. What is the expected return of this portfolio and what is the variance of this return?

2. Which portfolio has the highest variance in this economy, assuming no short sales?