

**Problem Set I for Economics 180.367:
Investments and Portfolio Management
Due at the beginning of class on September 16.**

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

1. (4 pts) Using simple compounding, a risk-free asset will produce a net return of 2 percent this year, and a net return of 2.5 percent per year over the following two years. Based on this information, if I invested \$ 100 in the risk-free asset on January 1, 2008, then how much money will it have grown to after a period of 3 years.

2. (4 pts) Provide an answer to question 1, if continuous compounding is used instead of simple compounding. Show your work.

3. (15 pts) Use Bloomberg to look up the yield to maturity on the Treasury bill maturing on August 11, 2005 as of May 31, 2005. The face value of the bill is \$10,000. The number of days between the purchase date and maturity date is 72. Compute the price that an investor would pay for this bill.

4. XYZ corporation has a current stock price of \$ 50. Over the next year its price will rise 10% with probability 0.6, and it will fall 5% with probability 0.4. In addition it will pay a dividend of \$ 1 at the end of the next year.

(a) (8 pts) Compute the mean and variance of the net holding period return on XYZ over the next year.

(b) (8 pts) If Bob Smith invests his wealth \$ 10,000 in the stock of XYZ, compute Bob's expected wealth at the end of one year and the standard deviation of his wealth.

(c) (8 pts) Suppose Bob has utility function:

$$U(W) = W^{1/3}$$

Compute Bob's expected utility if he pursues the above investment strategy, and the certainty equivalent of the wealth that he receives by following the above investment strategy.

(d) (4 pts) Suppose the risk-free rate is 2% with simple compounding. If Bob invests all of his wealth in the risk-free asset for 1 year, will he achieve a higher expected utility than if he invested all of his wealth in XYZ for 1 year. Show your work.

5. Idaho foods is a potato producer, and Excelsa is a producer of luxury cars. The returns of these companies over the next year depend on whether economic growth is strong, moderate, or weak. The returns over the next year, in the various states, are given in the table below.

Probability Distribution of Gross Returns

State	Probability	Idaho Foods	Excela
Weak Growth	0.4	1.1	0.9
Moderate Growth	0.4	1.05	0.95
Strong Expansion	0.2	0.98	1.2

(a) (10 pts) Based on the table, compute the mean, variance, covariance, and correlation of the returns on Idaho foods and Excela. Show your work.

(b) (8 pts) Based on your answers to 5a, suppose that Cassandra Jenrette invests 30 percent of her wealth in Idaho foods, and she invests 70 percent of her wealth in Excela. Based on this information, compute the mean return on her portfolio, and the standard deviation of the return on her portfolio. Use simple algebra to compute your answers. Show the formulas that you use.

(c) (15 pts) Provide the same answers to the previous question, but this time, express your answers using matrix algebra. In your answer, show the vector of portfolio weights, the vector of mean returns, and the variance covariance matrix of the returns on the two assets. Finally, show the formulas that you would use to compute the answer. Note: you don't have to compute the answers again.

(d) (8 pts) Compute the covariance between the return on Cassandra's portfolio and a portfolio consisting only of Idaho foods. (Hint: the second portfolio has a weight of 1 on Idaho foods, and 0 on Excela). Show your work.

(e) (8 pts) Bob Jenrette is more risk averse than Cassandra. Assume the net riskfree rate of return with simple compounding is 1 percent per year. Suppose Bob invests 60 percent of his wealth in Cassandra's portfolio and 40 percent in the risk-free asset. Then compute the mean and standard deviation of the return of Bob's portfolio. Also, compute the proportion of Bob's wealth that he invests in Idaho foods, and Excela.