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Professor Robert Shiller

Econ 252 - Financial Markets Spring 2011 Professor Robert Shiller

Problem Set 1

Question 1

A lottery sells 1 million tickets.

One of those tickets wins the grand prize of \$1 million, 100 tickets win 1st place prizes of \$10,000, and 10,000 tickets win prizes of \$1.

- (a) What is the expected value of winnings from a single lottery ticket?
- (b) What is the variance of the winnings from a single lottery ticket?
- (c) If lottery tickets cost \$4, should you buy one? Why? What if they cost \$1?

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Question 2

Consider three bonds, each promising to pay \$100 in 10 years.

The first bond is a U.S. bond (think about it as a U.S. Treasury bond) that always pays.

The other two are state bonds for New York and California, which may pay the full \$100 dollars, or may renegotiate and only pay \$80, or may default and only pay \$20 in bankruptcy. The corresponding probabilities of these events occurring are:

	CA pays \$100	CA pays \$80	CA pays \$20
NY pays \$100	.3	.15	.05
NY pays \$80	.1	.1	.1
NY pays \$20	.05	.05	.1

- (a) What is the expected payment of each of the three bonds in 10 years?
- (b) What is the variance of the payments in 10 years of each of the three bonds?
- (c) What is the standard deviation of the payments in 10 years of each of the three bonds?
- (d) What is the covariance of the payments in 10 years of the New York bond and the California bond?
- (e) What's the correlation of the payments in 10 years of the New York bond and the California bond?
- (f) What's the expectation and variance of the payments in 10 years for a portfolio made up of 1/3 of the U.S. bond, 1/3 of the NY bond and 1/3 of the CA bond?

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Question 3

Consider the following two assets:

- Asset A's expected return is 10% and return standard deviation is 20%.
- Asset B's expected return is 5% and return standard deviation is 15%.

The correlation between assets A and B is 0.5.

The table below indicates the expected return and the return standard deviation for portfolios that put weight w on asset A and weight 1-w on asset B.

Weight	Expected Return	Return Standard Deviation
w=0.75		
w=0.50		
w=0.25		

- (a) Complete the above table.
- (b) Instead of a correlation of 0.5 between assets A and B, consider a correlation of -0.5 and re-compute the above table.