Problem set 6

"due" 12/14/09

Problem 1 By next year, the stock you own has a 25% probability of being worth \$400 and a 75% probability of being worth \$200. What are the expected value and the variance?

Problem 2 Lisa just inherited a vineyard from a distant relative. In good years (no rain or frost), she earns \$10,000 from the vineyard. In bad years, she earns only \$2,500. She estimates that the probability of a good year is 60%.

a. Calculate the expected value and variance of Lisa's income from the vineyard.

b. Suppose Lisa has utility function $u(w) = \sqrt{w}$, where w is her wealth. Assume she has 0 initial wealth. Ethan, a grape buyer, offers to lease the vineyard from Lisa for \$6,500 next year, so that Lisa would get \$6,500 regardless of whether it was a good year or a bad year. Will Lisa accept this offer?

c. Why might Ethan make such an offer? Give three reasons, and explain each. One of these reasons should refer to his attitude toward risk.

Problem 3 Larry owns a house worth \$100,000. There is a 10% chance it will burn down, in which case it will be worth \$20,000. There is a 90% chance it will not burn down and continue to be worth \$100,000. Larry's utility function is $u(w) = \sqrt{w}$, where w is how much his house is worth.

a. Suppose Eagle Insurance offers Larry \$1 worth of insurance for 10 cents. That is, Larry can transfer wealth to the state of the world in which the house burns down from the state in which it does not at the rate 10:1. How much insurance will Larry purchase?

b. Is Eagle's price for \$1 of insurance likely to be higher or lower than that of part a? Why? Will Larry buy more or less insurance than in part a?

Problem 4 Suppose that two investments have the same three payoffs, but the probabilities associated with each payoff differs, as follows:

payoff	**Probability (investment A)**	**Probability (investment B)**
\$300	.10	.30
\$250	.80	.40
\$200	.10	.30

a. Find the expected return and standard deviation of each investment.

b. Jill has the utility function $u(w) = 5w$, where w is the investment's payoff (assume she has initial wealth 0). Which investment does she prefer?

c. Ken has the utility function $u(w) = 5\sqrt{w}$. Which investment will he choose?

d. Delores has the utility function $u(w) = 5w^2$. Which will she choose?

Problem 5 Suppose that, for a certain model of used car, 25% of owners value their car at \$20,000, 25% at \$15,000, 25% at \$10,000, and 25% at \$5,000. Suppose that buyers value this particular used car at 1.2 times its value to its owner. Owners know how much they value their car, but this is private information; to buyers, all cars look the same.

a. If all four types of used car are traded, what is the highest price a buyer would be willing to pay for a used car? At this price, which owners would be willing to sell?

b. Now suppose the owners with the $20,000 cars do not participate in the used car market, but all other owners do. Now what is the maximum price a buyer is willing to pay for a used car? Now which sellers are willing to participate in the market?

c. Argue that adverse selection causes this market to partially unravel, such that only the worst used cars are traded in any equilibrium.