Finance 360
Problem Set #10 Solutions

1)  
   a)  Calculate the expected value and standard deviations of the two gambles.

   \[ E(A) = .70(100) + .30(-200) = 10 \]
   \[ SD(A) = \sqrt{.70(100 - 10)^2 + .30(-200 - 10)^2} = 137 \]

   \[ E(A) = .40(325) + .60(-200) = 10 \]
   \[ SD(A) = \sqrt{.40(325 - 10)^2 + .60(-200 - 10)^2} = 257 \]

   b)  Which option would you choose if you were risk loving?  Risk neutral?  Risk averse?  Explain.

       A risk averse person would choose option A (less risk with equal reward).  A risk neutral person would be indifferent and a risk loving person would choose option B.

2)  Explain the difference between moral hazard and adverse selection.  Give an example of each.

   Adverse selection takes place before a contract is signed when information is unobservable by one of the parties involved.  Moral hazard involves one party changing their behavior after the deal has been made.

   For example, a depositor can’t observe the quality of a bank before prior to making a deposit.  Therefore, banks with excellent management and safe investment strategies are not rewarded for their good behavior (adverse selection).  Further, once a deposit is made, a depositor can’t guarantee that those funds will be invested wisely (moral hazard).

3)  Suppose that the probability of getting in an accident is 2%.  The average cost of an accident is $50,000.  Suppose that the average car driver has preferences given by

   \[ U(I) = I^{\frac{1}{3}} \]

   a)  Assuming that this individual earns $100,000 per year in income, calculate his expected utility if he buys no insurance.
\[ U(\$100,000) = 100,000^{\frac{1}{3}} = 46 \]
\[ U(\$50,000) = 50,000^{\frac{1}{3}} = 36 \]
\[ E(utility) = .98(46) + .02(36) = 45 \]

b) Calculate the amount this individual would be willing to pay for a full coverage insurance policy.

What level of income generates 45 units of utility?

\[ I^{\frac{1}{3}} = 45 \rightarrow 45^3 = I = \$91,600 \]

This individual should be willing to pay $100,000 - $91,600 = $8,400.

c) Repeat (a) and (b) for an individual who earns $50,000 per year.

\[ U(\$50,000) = 50,000^{\frac{1}{3}} = 36 \]
\[ U(0) = 0^{\frac{1}{3}} = 0 \]
\[ E(utility) = .98(36) + .02(0) = 35 \]
\[ 35^3 = 43,900 \rightarrow 50,000 - 43,900 = \$6,100 \]

d) How much should the insurance company charge for a policy if it can’t discriminate between the two individuals? What should it charge if it can discriminate?

Note that the cost to the insurance company of a wreck is \( \$50,000 \times 0.02 = \$1000 \). A non-discriminating company should charge $6,100 to get two sales (assuming the same number of rich and poor people). A discriminating company would charge rich people $8400 and poor people $6100 for the same policy.

4) Given the following values

\$1,000, \$2,000, \$3,000, \$4,000, \$5,000.

a) How much would you be willing to pay for a car (assuming that you were risk neutral)?

You should be willing to pay the average (\( = \$3,000 \))

b) What should eventually happen to the price/supply of cars?

Eventually, the only cars sold will be $1000 cars.