

SUNY-Stony Brook. Economics Department
Economics 323: Fall 2011
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Problem Set 3: Suggested Solutions

1.Short Questions. Remember to justify your answers.

- a) A risk-averse individual is offered a choice between a gamble that pays \$1000 with a probability of 25% and \$100 with probability of 75%, or a payment of \$325. Which would he choose?

The \$325 for sure are the choice of a risk averse individual, on expectation the gamble gives the same, so regardless of the exact shape of the utility function the money for sure is better.

- b) What if the payment was \$320?

Here it does depend on the utility function, you do not need to be very risk averse to still prefer the \$320 for sure, but some risk averse person might prefer to play the lottery. Without the utility function we are not sure.

- c) Why might a neighborhood group have a harder time self insuring for flood damage versus fire damage? What if the neighborhood was in southern California?

The idea here is simple, a group where all the owners face the same risk, like flooding, might have little advantage when negotiating as a group. For fire damage is easier, because the insurance company knows it is unlikely that fire will affect everyone at the same time. In Southern Cal. you should know it rains very rarely, but what is more important, there are a lot of wildfires, like the ones going on recently, then they are in a situation for fire insurance very much like the rest of the country for flood insurance.

2. **Verdadero o Falso.** (Again, justify your answers).

a) If Paul is risk-loving and his basketball team has a probability of .6 of winning, then Paul would rather bet \$10 on his team than \$1000. (When Paul bets X, he wins X if his team wins and loses X if his team loses) **True or False.**

As we discussed in class, this is False, given that the Marginal utility is increasing in wealth, Paul prefers to bet \$1000.

b) Will is not risk averse. He is offered a chance to pay \$10 for a lottery ticket that will give him a prize of \$100 with probability .06, a prize of \$50 with probability .09, and no prize with probability .85. If he understands the odds and makes no mistakes in calculation, he will buy the lottery ticket. **True or False.**

True, here the expected value is 10.5, since the individual is either risk neutral or risk lover he will play the lottery. Notice that the risk neutral is happy to play. If the expected value was 10 he would be indifferent, but it is more. Now, the risk lover would be willing to play even if the average payout was below 10 (we do not know how much below 10 since we do not know his Utility Function), therefore the answer is also true for the risk lover.

3. Multiple Choice (Please justify your answers as much as possible. No justification, no credit.)

A) Yuri owns just one ship. The ship is worth \$200 million dollars. If the ship sinks, Yuri loses \$200 million. The probability that it will sink is .02. Yuri's total wealth, including the value of the ship is \$225 million. He is an expected utility maximizer with von Neuman Morgensten utility $U(W)$ equal to the square root of W . What is the maximum amount that Yuri would be willing to pay in order to be fully insured against the risk of losing his ship?

- a) \$4 million
- b) \$ 2 million
- c) \$ 3.84 million
- d) \$ 4.82 million
- e) \$ 5.96 million

Here you had to see that

1) the utility with insurance is $EU = \sqrt{225 - I + 200} = \sqrt{225 - I}$

2) without insurance $EU = 0.02 * \sqrt{25} + 0.98 * \sqrt{225}$

Then we want to find the maximum amount of I that makes the two equal, the solution is $I = 5.96$. e)

Notice that this is difference from the minimum the insurance company will charge us, that is 4 million, assuming the probability of the accident is the price in cents per dollar insured.

B) Harley's current wealth is \$600, but there is a .25 probability that he will lose \$100. Harley is risk averse. He has an opportunity to buy insurance that would restore his \$100 if he loses it.

- a) Harley would be willing to pay a bit more than \$25 for this insurance
- b) Harley would be willing to pay up to \$25 for this insurance
- c) Since Harley is risk averse, he would not be willing to pay anything for this insurance, it is too risky.
- d) Since Harley's utility function is not specified, we cannot tell how much he would be willing to pay for this insurance.
- e) Harley would not be willing to pay more than \$16.66 for this insurance.

Answer is a)

Here you have to compare the result of buying and not buying insurance:

1) buy insurance: $600 - I$

2) do not buy: $0.25 * 500 + 0.75 * 600 = 575$.

The risk averse would be willing to pay more than \$25 for the insurance, how much more will depend on his exact utility function. Notice that a risk neutral agent would not pay more than \$25, and a risk lover would for sure want to pay less than \$25.