

## Problem set 2

due on 2/17/2011

1. You have two pieces of jewelry, each worth \$1000, that you want to mail to your sister. You can either mail them separately in two packages or together in one package. For any package, the probability that it will be lost in the mail is 0.01. Your utility function is  $U(W) = \sqrt{W}$ , where  $W$  is the value of the jewelry that your sister ends up receiving.
  - a. What is the expected value of the jewelry received if you mail the pieces separately? Together?
  - b. What is your expected utility if you mail the pieces separately? Together?
  - c. Suppose that you have wealth of  $W = 500$  before sending the jewelry. If each package costs  $x$  to mail, write down an equation characterizing the highest value of  $x$  for which you would send the jewelry in two packages. You do not need to solve the equation.
2. Suppose that most people will not speed if the expected fine is at least \$500. The actual fine for speeding is \$800. How high must the probability of being caught be in order to discourage speeding?
3. Anderson and Bothko are neighbors. Each owns a car valued at \$20,000. Anderson's wealth, including the value of his car, is \$100,000. Bothko's wealth, including the value of his car, is \$30,000. Each has utility function  $u(w) = \sqrt{w}$ , where  $w$  denotes total wealth. If a car is parked on the street, there is a probability .5 that the car will be stolen. If a car is parked in a garage, it will not be stolen.
  - a. What is the largest amount Alice would be willing to pay for the garage?
  - b. What is the largest amount Bob would be willing to pay for the garage?
4. A driver faces a 2% probability that his car will be in an accident and will be worth nothing. Consider three drivers with cars that have value \$10,000. Abdulla's utility function over the value of his car  $W$  is  $u(W) = \ln(1+W)$ . Bedriya's utility function is  $u(W) = 100 + 0.5W$ . Ciera's utility function is  $U(W) = W^2$ .
  - a. What is the actuarially fair insurance premium? (That is, how much insurance could a driver buy for \$1, if the price is actuarially fair?)
  - b. How much is Abdulla willing to pay for insurance? (That is, what is his risk premium?)
  - c. How much is Bedriya willing to pay for insurance?
  - d. How much is Ciera willing to pay for insurance?
  - e. Which of these three people is the least likely to take on risk? Which is the most likely? How do you know?
5. Lisa just inherited a vineyard from a distant relative. In good years (no rain or frost), she earns \$20,000 from the vineyard. In bad years, she earns only \$5,000. She estimates that the probability of a good year is 70%.
  - 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  $\$X$  next year, so that Lisa would get  $\$X$  regardless of whether it was a good year or a bad year. For what values of  $X$  would Lisa accept Ethan's offer?

- c. Why might the vineyard be worth more to Ethan than to Lisa (i.e. why would he make such an offer)? Give three reasons, and explain each. One of these reasons should refer to his attitude toward risk.
6. Explain the difference between a positive and a negative network externality, and give an example of each (distinct from any examples that may have been given in class). Explain why you think your example has a network externality.
7. The local swimming pool charges nonmembers \$10 per visit. If you join the pool, you can swim for \$5 per visit, but you have to pay an annual fee of \$F.
- a. Suppose you have an income of \$100. Draw an indifference curve diagram to graphically determine the value of F such that you are indifferent between joining and not joining. Put number of swimming pool visits on the horizontal axis and dollars spent on all other goods on the vertical axis.
- b. Suppose the pool charged you exactly that F. Would you go to the pool more or fewer times as a member than as a nonmember?