

Additional Problems for the Final Review

Risk and Uncertainty

1. Alex purchased a brand new sports car, and she needs to insure the car. She has determined that the probability of having an accident is five percent per year. The sports car is worth \$50,000 if it is undamaged, and it is worth \$30,000 after the “average” wreck.

- a. What will Alex’s premium be if she is able to buy full insurance at the actuarially fair price? (The premium is the annual premium.)
- b. Alex’s expected utility is determined by the following expression:

$$U(\pi_1, \pi_2, c_1, c_2) = \pi_1 \cdot V(c_1) + \pi_2 \cdot V(c_2)$$

$$\text{and } V(c_i) = \ln c_i \quad i = 1, 2$$

Would she purchase a 20,000 insurance policy for \$1500 per year?
Why or why not?

2. Bob is risk neutral when it comes to playing the lottery. A lotto ticket costs \$1, and the jackpot if he wins is never less than \$6,000,000. If the odds of buying a winning ticket are one in 100,000,000, then how large must the jackpot be before it makes sense for Bob to buy a lottery ticket?
3. Lou purchased a raffle ticket from the local school. The raffle ticket pays him nothing if he loses, but it pays him \$500 if he wins. The school sold 500 raffle tickets. Lou’s expected utility is determined by the following expression:

$$U(\pi_1, \pi_2, c_1, c_2) = \pi_1 \cdot V(c_1) + \pi_2 \cdot V(c_2)$$

$$\text{and } V(c_i) = c_i^3 \quad i = 1, 2$$

- a. Graph Lou’s “V” function. On the graph, identify the expected value of the raffle. Also, identify the utility of the expected value, the utility of holding a losing ticket, and utility of holding a winning ticket.
- b. If Lou were to sell his raffle ticket, then how much would he need to receive in order to being willing to sell it?

Market Failures

1. The market for steel is described by the following equations:

$$\text{Marginal Social Benefit: } P = 100 - Q$$

$$\text{Marginal Private Cost: } P = 10 + Q$$

$$\text{Marginal External Cost: } MEC = 20$$

- a. Find the expression for the Marginal Social Cost of producing steel.
- b. Find the market equilibrium for steel. Calculate the amount of deadweight loss/economic inefficiency associated with this market equilibrium.
- c. Find the socially optimal equilibrium.
- d. How large of a tax would the government have to impose on the makers of steel in order to induce these firms to produce the socially optimal level of output?
- e. Now, redo parts a through d if the marginal external cost is given by the following expression: $MEC = 3Q$

General Equilibrium

1. Friday and Robinson Crusoe have been deserted on a desert island. They are able to gather fruit – bananas and coconuts – but they are unable to produce any other goods. After Friday and R.C. collect all of the fruit on the island they are left with the following endowments:

Friday – 10 Bananas, 80 Coconuts

Robinson Crusoe – 40 Bananas, 20 Coconuts

- a) Construct the Edgeworth Box for this economy. Place bananas on the horizontal edges of the box, and coconuts on the vertical edges of the box. Label the endowment point.
- b) Friday's utility function is $U = BC$
R.C.'s utility function is $U = BC$

Use these utility functions to graph each individual's indifference curve that runs through the endowment. Label the lens.

- c) Find the competitive equilibrium. (You should find the equilibrium price ratio, and the quantity demanded of each fruit for each individual. You do not need to derive the demand functions. You may simply write them down based on your knowledge of Cobb-Douglas utility functions.)

2. Do problem #1 again, but this time use the following utility functions:

$$\text{Friday - } U = B^2C$$

$$\text{R.C. - } U = BC^2$$

Assume that the endowments remain the same.