Midterm #1

9/27/11

Instructions: You have 75 minutes to complete this exam. Part I consists of 9 multiple choice questions, and is worth 27 points, and Part II consists of 3 short-answer questions, and is worth 72 points. You get 1 point for free. Good luck!

Part I: Please answer the following 9 multiple choice questions. Clearly mark your answers; if I cannot tell which answer you intended, you will receive zero points. **Each question is worth 3 points.**

1. An adverse selection problem in the health insurance market would result in

a. Healthy people buying too much insurance

b. Too many sick people buying insurance

c. Excess profits for the insurance firm

d. Customers visiting doctors for unimportant reasons

e. Customers failing to visit the doctor when necessary

f. Both e and c

2. A moral hazard problem in the homeowner's insurance market would result in

a. People buying homeowner's insurance when they don't really need it.

b. Homeowners taking fewer safety precautions, such as buying fire extinguishers

c. Decreased incidence of insurance fraud

d. Decreased robberies and vandalism

e. Greater turnover in the housing market

3. Someone with decreasing marginal utility of wealth is:

a. Risk-averse

b. Risk-neutral

c. Risk-loving

d. Not enough information to tell

4. If all prices double, and the amount of money you have to spend doubles, what happens to the budget line?

a. Parallel shift outwards (to the right)

b. Parallel shift inwards (to the left)

c. The slope will change

d. Both a and c

e. Both b and c

f. There will be no change

5. Monopolies with nonzero marginal costs always price on the _____ part of their demand curves. The monopoly overcharge over marginal cost _____ as demand becomes more elastic.

a. Elastic, decreases

b. Elastic, increases

c. Inelastic, decreases

d. Inelastic, increases

e. Not enough information to tell

6. At its current level of production, a firm's total fixed cost is 10; its total cost is 60 and its average total cost is 30. Which of the following must be true?

a. The firm is producing 3 units of output

b. The firm's average variable cost is 25

c. The firm's total variable cost is 40

d. The firm's average fixed cost is 2

e. The firm is producing 4 units of output

7. If marginal revenue is less than marginal cost, then we know that a small increase in output will

a. Increase total profit

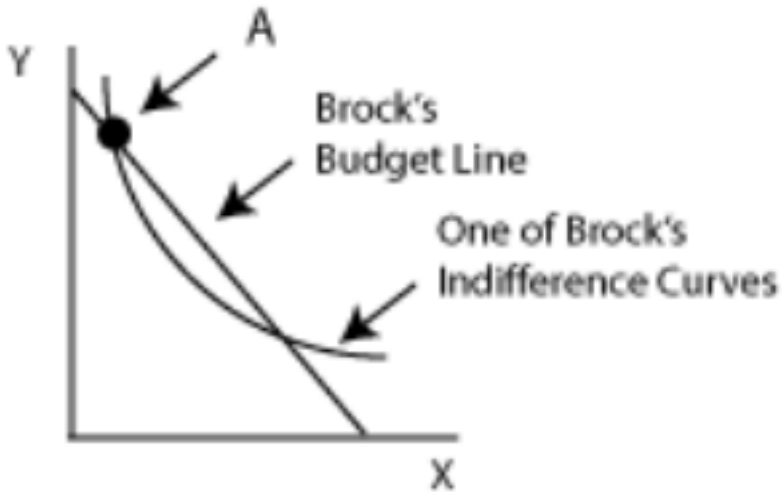
b. Decrease total profit

c. Decrease total revenue

d. Both (b) and (c)

e. None of the above

8. Brock is contemplating consuming Bundle A in the figure below:



Given the information in the figure which of the following must be true?

a. Point A is Brock's optimal bundle since the indifference curve intersects the budget line at Point A.

b. At Point A, the MRS equals the slope of the budget line.

c. Brock is not using all of his income at Point A.

d. Brock can find another point that he can afford such that the new point is on a higher indifference curve than the indifference curve given in the figure.

e. Brock should consume more of Good Y since his MRS exceeds the price ratio at Point A.

9. Chip is offered a lottery ticket giving him nothing 75% of the time but where he wins \$5 25% of the time. The ticket costs \$1. If Chip is risk averse,

a. He will certainly buy the ticket

b. He may or may not buy the ticket

c. He will certainly not buy the ticket

d. He is indifferent over whether or not to buy the ticket

Part II: Answer the following 3 short-answer questions, beginning on the next page. Please fully support your answers by showing work and offering complete explanations of any claims. **Each question is worth 24 points.**

Problem 1 Dee has utility function $u(C, L) = C * L$ where C equals the number of chicken kebobs she eats each week, while L is the number of lamb and beef schwarma meals she eats each week. Dee has \$100 to spend on Mediterranean food each week. The price of a chicken kebob meal is \$5. The price of a lamb and beef schwarma meal is \$10.

a. List three (C, L) bundles that give Dee utility of 10. For each, say whether the bundle is on her budget line, below her budget line, or above her budget line.

(5 points) There are many different acceptable answers. For example, $(C, L) = (10, 1), (5, 2), (2.5, 4)$

b. List three (C, L) bundles that are on Dee's budget line. For each, say what her utility is at that bundle.

(5 points) Again, there are many different acceptable answers. For example, $(C, L) = (20, 0), (12, 4), (2, 9)$. Utility at these three bundles is 0, 48, and 18, respectively.

c. Pick bundle from part b with the highest utility. At that bundle, what is Dee's marginal utility per dollar of a chicken kebob meal? What is her marginal utility per dollar of a lamb and beef schwarma meal?

(5 points) The correct answer for your exam depends on your answer to b. For the three points I chose for b, bundle $(12, 4)$ has the highest utility, 48. To calculate the marginal utility of each good, calculate $u(13, 4) = 52$ and $u(12, 5) = 60$. Then, marginal utility per dollar from chicken kebobs is .8, while marginal utility per dollar from a lamb and beef schwarma meal is 1.2.

d. At the point in part c, is Dee maximizing her utility? If not, say whether or not Dee should consume more C or more L.

(5 points) Since Dee has different marginal utility per dollar from each good, she is *not* maximizing her utility. She should spend more money on the good with the higher marginal utility per dollar (lamb and beef schwarma meals), even if it means spending less money on chicken kebob meals.

e. What is the economic intuition behind the condition $\frac{MU_X}{p_X} = \frac{MU_Y}{p_Y}$?

(4 points) This says the marginal benefit of consuming more of either good (extra utility) is equal to the marginal cost, the foregone enjoyment from consumption of the other good. To afford more of the X good, you must substitute away from the Y good, which is worth doing if the marginal utility per dollar of the Y good is less than that of the X good. Therefore, if the marginal utilitiy per dollar is not equal across both goods, you can increase your utility by switching money spent on the low $\frac{MU}{p}$ good to the high $\frac{MU}{p}$ good, and so you can only be maximizing your utility if $\frac{MU_X}{p_X} = \frac{MU_Y}{p_Y}$.

Problem 2 Betty's only wealth is a house worth \$500,000. There is a 1% chance that it will catch on fire at some point in the next year, causing \$100,000 in damages. Betty's utility function over wealth is $5 * \sqrt{W}$.

a. Suppose Betty can pay \$$p$ to fireproof her house (i.e. installing fire extinguishers and smoke alarms), which will lower the probability the house burns to 0.1%. What is the maximum price p Betty would be willing to pay for fireproofing? (hint: if Betty pays a price of p for fireproofing, her utility is $5\sqrt{W-p}$.)

(10 points) If Betty does not fireproof, her utility is $.99 * 5 * \sqrt{500,000} + .01 * 5 * \sqrt{400,000}$, while if she does fireproof, her utility if $.999 * 5 * \sqrt{500,000 - p} + .001 * \sqrt{400,000 - p}$. She will choose whichever is higher. Her utility is higher with fireproofing so long as p is low enough; the maximum p for which she'd be willing to pay for fireproofing is where

$$.99 * 5 * \sqrt{500,000} + .01 * 5 * \sqrt{400,000} = .999 * 5 * \sqrt{500,000 - p} + .001 * 5 * \sqrt{400,000 - p}$$

Identifying this equation is sufficient to answer the question. As it turns out, the solution is given by $p = \$949.59$.

b. Now suppose that Betty has a fire insurance policy on her house, which costs \$1,000. If the house burns, she has to pay only a deductible of \$1,000; the insurance company pays for all of the damages. Now how much is Betty willing to pay for fireproofing?

(10 points) Her utility if she does not fireproof if $.99 * 5 * \sqrt{499,000} + .01 * 5 * \sqrt{498,000}$. Her utility if she does fireproof is $.999 * 5 * \sqrt{499,000 - p} + .001 * 5 * \sqrt{498,000 - p}$. As in part a, the maximum she would pay to fireproof is then given by the equation

$$.99 * 5 * \sqrt{499,000} + .01 * 5 * \sqrt{498,000} = .999 * 5 * \sqrt{499,000 - p} + .001 * 5 * \sqrt{498,000 - p}$$

Again, identifying this equation is entirely sufficient to answer the question. As it turns out, $p = \$9.01$.

c. Is Betty's willingness to pay for fireproofing higher with or without insurance? What economic phenomenon does your answer illustrate?

(4 points) If Betty has insurance, her loss from a fire is only \$1,000, while if she does not have insurance, her loss is \$100,000. Clearly, then, she has more to gain from fireproofing her house if she does not have the insurance policy. The notion that insurance may deter homeowners from taking precautions like fireproofing is called *moral hazard*.

Problem 3 A firm has total cost function $c(q) = 50 + \frac{1}{4}q^2$, and marginal cost function $MC = \frac{1}{2}q$.

a. Suppose the firm's output is sold in a perfectly competitive market, where the price is \$20. What quantity will the firm produce?

(8 points) A competitive firm sets $p = MC$. Here, this means $20 = \frac{1}{2}q$, or $q = 40$.

b. Suppose that all of this firm's competitors have identical costs, and that entry and exit is not costly. Will the long-run price in this market fall, rise, or stay the same?

(8 points) The firm earns a profit of $40 * 20 - 50 - \frac{1}{4} * 20^2 = 650$. Since profits are positive, there will be entry in the long-run, which will drive down price.

c. Now suppose the firm has the same costs, but is a monopolist, with demand curve $P = 36 - \frac{1}{8}q$. What profit can the firm earn as a monopolist?

(8 points) A monopolist sets $MR = MC$, where $MR = 36 - \frac{1}{4}q$. Therefore, $q = 48$. It will charge a price of \$30, and so its profit is $30 * 48 - 50 - \frac{1}{4} * 48^2 = \$814$.