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## Economics 111: Intermediate Microeconomics S2b

Spring 2009

Midterm 1

You have 1 hour and 20 minutes. Only clarifying questions are allowed. Do not cheat. Do not panic. Enjoy the exam. (There were two versions of this midterm differing on small details)

Questions 1 to 6 are multiple choice. Circle the correct answer. (5 points each correct answer).

1. The law of demand says that:

- a. an inferior good must also be giffen.
- b. an inferior good must also be ordinary.
- c. a giffen good must also be ordinary.
- d. a normal good must also be giffen.
- e. none of the above. ✓

2. Suppose a consumer has preferences between two goods,  $x$  and  $y$ , that are perfect substitutes. Imagine that an increase in the price of good  $x$  resulted in a decrease in the consumption of that good from 4 units to 1 and no change in the consumption of good  $y$ . The following is true about the effect of the price change on good  $x$ :

- a. Total effect=-3, but not enough information to distinguish the other effects.
- b. Total effect=-3, substitution effect=-1, income effect=-2
- c. Total effect=-3, substitution effect=0, income effect=-3 ✓
- d. Total effect=-3, substitution effect=-2, income effect=-1
- e. Total effect=-3, substitution effect=-3, income effect=0

3. The MRS (the absolute value of the slope of the indifference curve) of the following utility function  $U = x_1^2 + x_2^2$  is:

- a.  $MRS = \frac{x_2}{x_1}$ .
- b.  $MRS = 2\sqrt{x_2}$ .
- c.  $MRS = \frac{1}{2} \frac{1}{x_2}$ .
- d.  $MRS = \sqrt{\frac{x_2}{x_1}}$ .
- e.  $MRS = \frac{x_1}{x_2}$ . ✓

4. If a consumer has the utility function  $U = \sqrt{x_1} + \sqrt{x_2}$ , and income of  $m = 10$  and faces prices  $p_1 = p_2 = 1$ , her optimal consumption bundle is:

- a.  $x_1^* = 10$  and  $x_2^* = 0$ .
- b.  $x_1^* = 0$  and  $x_2^* = 10$ .
- c.  $x_1^* = 5$  and  $x_2^* = 5$ . ✓
- d.  $x_1^* = 10$  and  $x_2^* = 10$ .
- e. none of the above.

5. María may consume three goods and has utility function  $U = x_1 + x_2 + x_3$ , income  $m = 12$  and faces prices  $p_1 = 1, p_2 = p_3 = 2$ . Her optimal consumption bundle is:

- a.  $x_1^* = 12$ , and  $x_2^* = 0$  and  $x_3^* = 0$ . ✓
- b.  $x_1^* = 0$ , and  $x_2^* = 12$  and  $x_3^* = 0$ .
- c.  $x_1^* = 0$ , and  $x_2^* = 0$  and  $x_3^* = 12$ .
- d.  $x_1^* = 4$ , and  $x_2^* = 4$  and  $x_3^* = 4$ .
- e. none of the above.

6. The Armchair Economist thinks that installing spars in driving wheels may:

- a. decrease the quantity of life insurance.
- b. increase the price of life insurance.
- c. reduce global warming since people would drive less.
- d. reduce car accidents since it will increase the incentives to drive carefully. ✓
- e. All of the above.

7. Consider the following utility function:  $U = x_1x_2$ . (35 points)

a. Find the demand functions for general  $p_1$ ,  $p_2$  and  $m$ .

$$x_1^* = \frac{m}{2p_1}, x_2^* = \frac{m}{2p_2}$$

b. What would be the optimal demand if  $p_1 = 1$ ,  $p_2 = 1$  and  $m = 24$ ?

$$x_1^* = 12, x_2^* = 12$$

c. What would be the optimal demand if the price of good one increases to  $p_1 = 4$ , and the other price and income remain the same?

$$x_1^* = 3, x_2^* = 12$$

d. How much of the difference on the consumption of good one in points b and c is due to the substitution effect?

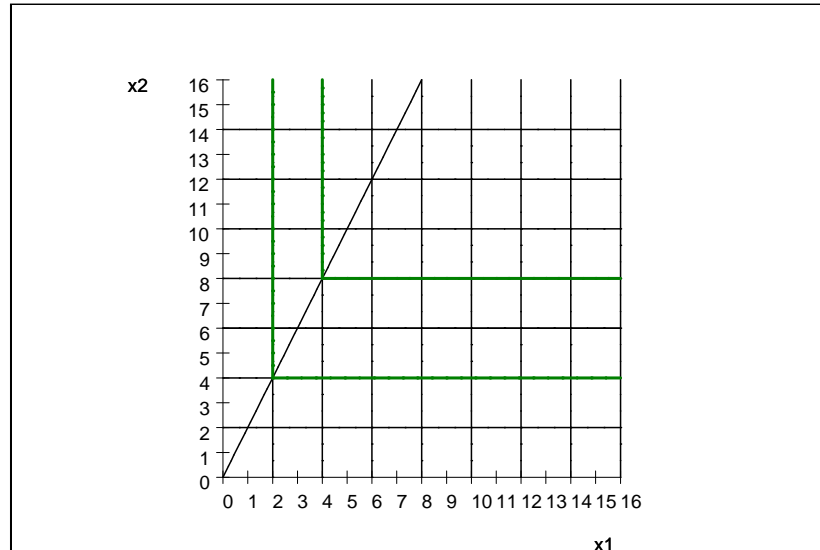
$$\Delta x_1^s = -6$$

e. How much of the difference is due to the income effect?

$$\Delta x_1^I = -3$$

8. Consider the following utility function:  $U = \min \{2x_1, x_2\}$ . (35 points)

a. In the following figure graph the indifference curves for  $U=4$  and  $8$ .



b. Find the formula for the MRS. Is the MRS defined for all bundles?

$$MRS = \begin{cases} \infty & \text{if } x_2 > 2x_1 \\ 0 & \text{if } x_2 < 2x_1 \end{cases}$$

MRS is not defined if  $x_2 = 2x_1$ .

c. Find the demand functions for general  $p_1$ ,  $p_2$  and  $m$ .

$$x_1^* = \frac{m}{p_1 + 2p_2}, x_2^* = \frac{2m}{p_1 + 2p_2}$$

d. Based on their demand functions how do you classify these goods?: Normal or inferior? Giffen or ordinary? Complements or substitutes?

Normal, ordinary and complements.

e. Assume that  $m = 5$  and  $p_2 = 1$ . In the following figure graph the demand function ( $x_1$  as a function of  $p_1$ ).

