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Economics 111: Intermediate Microeconomics S1a  
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 the exam that differ on small details)

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

1. The MRS (the absolute value of the slope of the indifference curve) of the following utility function  $U = x_1 + \sqrt{x_2}$  is:

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

2. (This question was not clear. Here is a corrected version.) Suppose a consumer has preferences between two goods,  $x$  and  $y$ , that are perfect complements. Imagine that an increase in the price of good  $x$  resulted in a decrease in the consumption of that good from 4 units and an increase in the consumption of good  $y$  of 2 units. The following is true about the effect of the price change on good  $x$ :

- a. Total effect=-4, but not enough information to distinguish the other effects.
- b. Total effect=-4, substitution effect=-2, income effect=-2
- c. Total effect=-4, substitution effect=0, income effect=-4 ✓
- d. Total effect=-4, substitution effect=-4, income effect=0
- e. Total effect=0, substitution effect=-4, income effect=4

3. Which of the following pairs of utility functions represent exactly the same preferences?

- a.  $U = x_1 + x_2, V = x_1^2 + 2x_1x_2 + x_2^2$ . ✓
- b.  $U = (\sqrt{x_1} + x_2)^2, V = 2x_1x_2$ .
- c.  $U = x_1^2 - x_2, V = -x_1 + x_2^2$ .
- d.  $U = x_1x_2, V = x_1x_2^2$ .
- e.  $U = 2x_1x_2, V = \frac{1}{x_1+x_2}$ .

4. Which of the following cannot be true about a good:

- a. it is inferior and giffen.
- b. it is inferior and ordinary.
- c. it is normal and giffen. ✓
- d. it is normal and ordinary.
- e. none of the above.

5. The Armchair Economist thinks that installing spears in the driving wheel of cars may:

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

6. If a consumer has the utility function  $U = \min\{x_1, 2x_2\}$ , 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.  $x_1^* = 10$  and  $x_2^* = 10$ .
- d.  $x_1^* = 5$  and  $x_2^* = 5$ .
- e. none of the above. ✓

7. Consider the following utility function:  $U = x_1^2 x_2$ . (35 points)

a. Find the formulas for the marginal utilities  $MU_1$  and  $MU_2$ .

$$MU_1 = 2x_1 x_2$$

$$MU_2 = x_1^2$$

b. Find the formula for the MRS. How does it depend on  $x_2$  and  $x_1$ ? Are these preferences convex?

$$MRS = \frac{MU_1}{MU_2} = 2 \frac{x_2}{x_1}$$

MRS is increasing in  $x_2$  and decreasing in  $x_1$ . Yes, the preferences are convex.

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

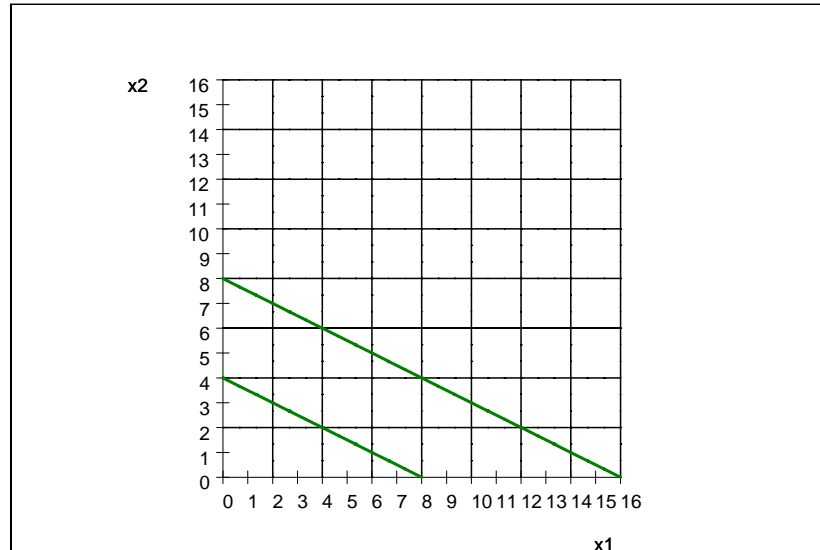
$$x_1^* = \frac{2}{3} \frac{m}{p_1}, x_2^* = \frac{1}{3} \frac{m}{p_2}$$

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

These goods are normal and ordinary.

8. Consider the following utility function:  $U = x_1 + 2x_2$ . (35 points)

a. In the following figure graph the indifference curves for  $U=8$  and  $16$ .



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

$$MRS = \frac{1}{2}$$

Yes, the MRS is defined for all bundles.

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

$$x_1^* = \begin{cases} \frac{m}{p_1} & \text{if } \frac{p_1}{p_2} < \frac{1}{2} \\ \left[0, \frac{m}{p_1}\right] & \text{if } \frac{p_1}{p_2} = \frac{1}{2} \\ 0 & \text{if } \frac{p_1}{p_2} > \frac{1}{2} \end{cases}, x_2^* = \begin{cases} \frac{m}{p_2} & \text{if } \frac{p_1}{p_2} > \frac{1}{2} \\ \left[0, \frac{m}{p_2}\right] & \text{if } \frac{p_1}{p_2} = \frac{1}{2} \\ 0 & \text{if } \frac{p_1}{p_2} < \frac{1}{2} \end{cases}$$

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

These goods are normal, ordinary and substitutes.

e. Assume that  $m = 10$  and  $p_2 = 4$ . In the following figure graph the demand function ( $x_1$  as a function of  $p_1$ ).

