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Economics 111: Intermediate Microeconomics

Spring 2005

Midterm 1

You have 1 hour and 20 minutes. Only clarifying questions are allowed. Do not cheat. Do not panic. Enjoy the exam.

Questions 1 to 5 are multiple choice. Circle the correct answer. (5 points each correct answer). (There were two version of the multiple choice questions with shuffled answers)

1. A Giffen good must also be:

   a. a superior good.

   b. a luxury good.

   c. an inferior good.✓

   d. an ordinary good.

   e. none of the above.

2. 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 of 4 units. The following is true about the effect of the price change:

   a. Total effect=-4, substitution effect=-4, income effect=0

   b. Total effect=0, substitution effect=-4, income effect=4

   c. Total effect=-4, substitution effect=-2, income effect=-2

   d. Total effect=-4, but not enough information to distinguish the other effects.

   e. Total effect=-4, substitution effect=0, income effect=-4✓

3. According to the First Welfare Theorem:

a. every competitive equilibrium is fair.

b. every competitive equilibrium is efficient.✓

c. a competitive equilibrium always exists.

d. every efficient allocations is preferred to every inefficient allocation.

e. none of the above.

4. The Armchair Economist thinks that economists want Americans:

a. to die happy.✓

b. to respond to incentives.

c. to work harder and die wealthy.

d. to clear markets.

e. none of the above.

5. In the Tale of Two Cities, the Armchair Economist argues that Grimyville's Clean Air Act will make:

a. Grimyville's tenants happier since the air will be cleaner.

b. Grimyville's landlords happier since they will be able to charge higher rents.✓

c. Cleanstown's landlords less happy since some tenants will move to Grimyville.

d. Cleanstown's tenants happier since rents will be lower.

e. All of the above.

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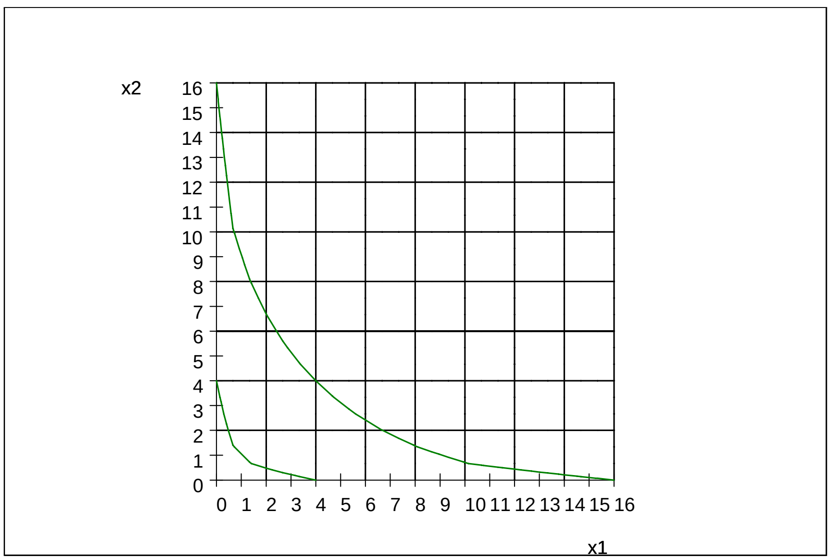
6. Consider the following utility function: $U = \sqrt{x_1} + \sqrt{x_2}$. (25 points)

a. For U=2 and U=4, find the function that describes each indifference curve (x_2 as a function of x_1). In the following figure graph the indifference curves for U=2 and 4. (Be sure to graph correctly where each indifference curve cuts the 45 degree line). (4 points)

$x_2 = \left(U - \sqrt{x_1}\right)^2$

For U=2: $x_2 = \left(2 - \sqrt{x_1}\right)^2$ and for U=4: $x_2 = \left(4 - \sqrt{x_1}\right)^2$



b. Find the formula for the MRS. How does it depend on x_2 and x_1? Are these preferences convex? (4 points)

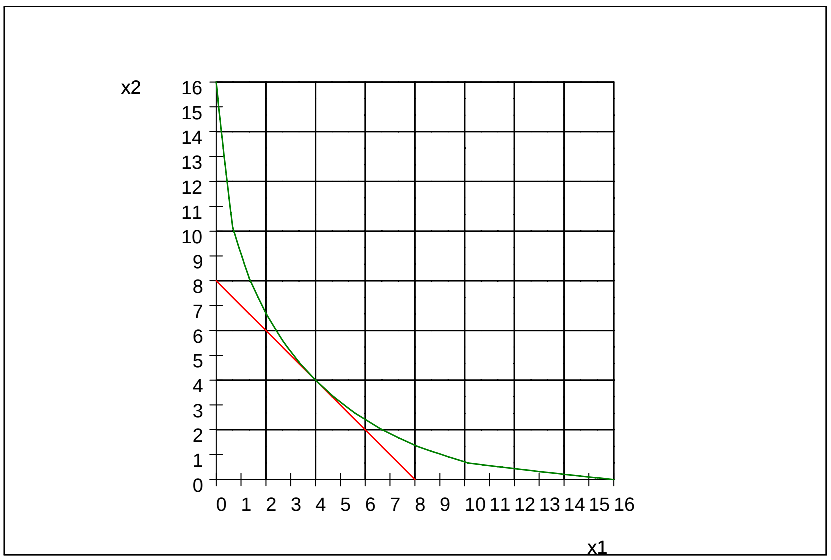
$MRS = \frac{\sqrt{x_2}}{\sqrt{x_1}}$, wich is increasing in x_2 and decreasing in x_1. The preferences are convex.

c. Find the MRS for $x_1 = 4$ and $x_2 = 0$ and for $x_1 = 0$ and $x_2 = 4$. Is there any combination of prices and incomes that would make the agent buy any of these two bundles? (4 points)

$MRS(4,0) = 0$ and $MRS(0,4) = \infty$. The indifference curves touch the horizontal axis with zero slope and the vertical axis with infinite slope. Therefore, you would need $p_2 = 0$ to have MRS=$\frac{p_1}{p_2}$, but then the agent would not consume a finite amount of good 2. There is no combination of prices and incomes that would make the agent consume a bundle on the axis.

d. Assume that $p_1 = 1$, $p_2 = 1$ and $m = 8$. Draw his budget line in the following figure. Also draw the indifference curve that goes through $(16, 0)$. (4 points)

Budget Line: $x_1 + x_2 = 8$.



e. What is his optimal consumption if $p_1 = 1$, $p_2 = 1$ and $m = 8$? (3 points)

$x^* = (4, 4)$

f. Find the demand functions for general p_1, p_2 and m. (Some of the algebra may get a little difficult/ugly! Do not panic.) (3 points)

Since preferences are convex and smooth, we have that in the optimum $MRS = \frac{\sqrt{x_2}}{\sqrt{x_1}} = \frac{p_1}{p_2}$ and $p_1 x_1 + p_2 x_2 = m$.

From the first equation: $x_2 = \left(\frac{p_1}{p_2}\right)^2 x_1$. Substituting in the second equation we have that: $p_1 x_1 + \frac{p_1^2}{p_2} x_1 = m$. Solving, $x_1^* = \frac{m}{p_1 + \frac{p_1^2}{p_2}}$ which can be simplified to $x_1^* = \frac{m}{p_1}\frac{p_2}{p_2+p_1}$. Substitutin in the budget line and doing some algebra we get: $x_2^* = \frac{m}{p_2}\frac{p_1}{p_2+p_1}$.

g. How are these goods?: Normal or inferior? Giffen or ordinary? Complements or substitutes? (3 points)

These goods are normal ($\frac{dx_1^*}{dm} > 0, \frac{dx_2^*}{dm} > 0$), ordinary ($\frac{dx_1^*}{dp_1} < 0, \frac{dx_2^*}{dp_2} < 0$) and substitutes ($\frac{dx_1^*}{dp_2} > 0, \frac{dx_2^*}{dp_1} > 0$).

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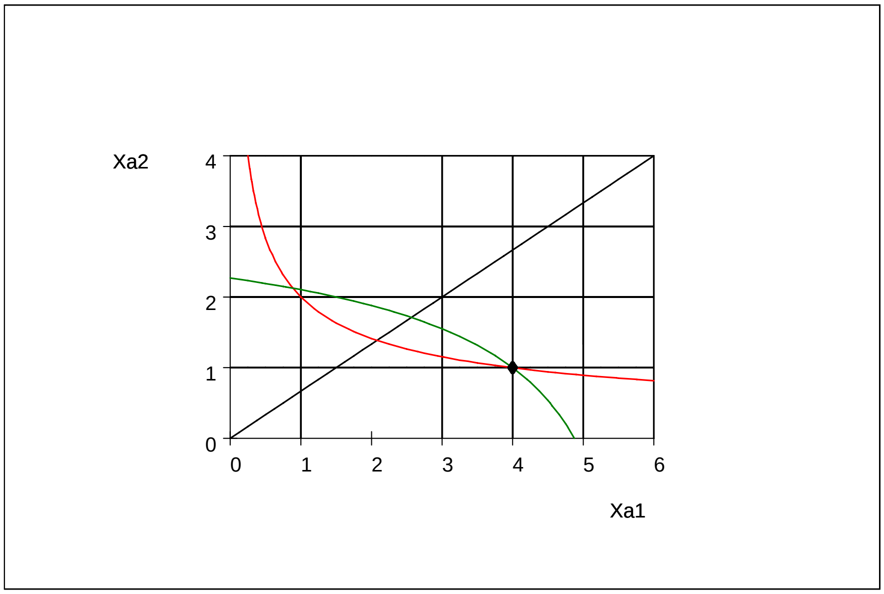
7. Consider a world with two agents: A and B. The utility of A is $U_A = x_{A1}x_{A2}^2$ and the utility of B is $U_B = x_{B1}x_{B2}^2$. The initial endowments are $\omega_A = (4,1)$ and $\omega_B = (2,3)$. (25 points)

a. In the following figure draw the Edgeworth Box labeling all axis and draw the initial endowment and the indifference curves that go through it. (3 points)



b. Find the Contract Curve. Draw the Contract Curve in the Edgeworth Box of point a. (4 points)

Since utility functions are smooth and convex we can find the contract curve from the following the equality of MRSs and feasibililty:

$\frac{x_{A2}}{2x_{A1}} = \frac{x_{B2}}{2x_{B1}}$

$x_{A1} + x_{B1} = 6$

$x_{A2} + x_{B2} = 4$

Solving, $x_{A2} = \frac{2}{3}x_{A1}$.

c. What is the MRS of both players in the contract curve? (3 points)

$MRS(CC) = \frac{\frac{2}{3}x_{A1}}{2x_{A1}} = \frac{1}{3}$.

d. Find the demand functions of A for general p_1, p_2 and m_A. (4 points)

$x^*_{A1} = \frac{1}{3}\frac{m_A}{p_1}$ and $x^*_{A2} = \frac{2}{3}\frac{m_A}{p_2}$.

e. Find the demand functions of B for general p_1, p_2 and m_B. (3 points)

$x^*_{B1} = \frac{1}{3}\frac{m_B}{p_1}$ and $x^*_{B2} = \frac{2}{3}\frac{m_B}{p_2}$.

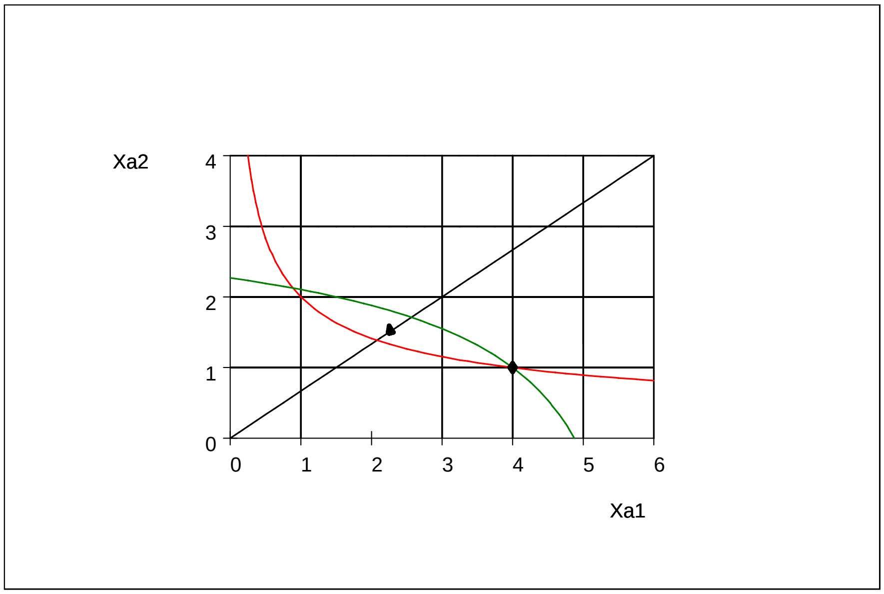
f. Find the competitive equilibrium price p_1^* (assume that $p_2 = 1$). Find the equilibrium allocation ($x^*_{A1}, x^*_{A2}, x^*_{B1}$ and x^*_{B2}). (4 points)

We find p_1^* such that market one clears: $x^*_{A1} + x^*_{B1} = \omega_1$.

Given the initial endowments: $\frac{1}{3}\frac{4p_1+1}{p_1} + \frac{1}{3}\frac{2p_1+3}{p_1} = 6$

Solving, $p_1^* = \frac{1}{3}$. Plugging $p_1^* = \frac{1}{3}$ in the demand functions we have: $x^*_{A1} = \frac{1}{3}\frac{4\frac{1}{3}+1}{\frac{1}{3}} = \frac{7}{3}, x^*_{A2} = \frac{14}{9}, x^*_{B1} = \frac{11}{3}, x^*_{B2} = \frac{22}{9}$.

g. In the following figure draw the draw the initial endowment, the contract curve, the equilibrium budget lines and the equilibrium consumption bundles. (Label each of them in the graph). (4 points)



h. Why is good one cheaper than good 2? Provide two reasons. (4 points)

1) Both agents' preferences are biased towards good 2 (if prices were equal they would buy more of good 2 than of good 1).

2) There are more units of good 1 available.