Econ 201, Fall 2007
Midterm Exam

Instructions

• Stick your name tag (or write your name) in the space above.
• There are 10 questions. Answer all of them in the pages provided to you.
• Show all your work. The quality of the explanation determines the grade.
• Exam is closed book and notes. No cellphones or calculators allowed.
• Time allowed: 2 hours
Question 1. 10 points.
John consumes only 3 goods, good X, good Y and good Z. The prices of these goods are the following: $p_X = 3$, $p_Y = 5$ and $p_Z = 10$. John has an income of 35 dollars ($m = 35$).

1. Does the consumption bundle $(X = 2, Y = 3, Z = 1)$ belong to the budget set?

2. Is the consumption bundle $(X = 2, Y = 3, Z = 1)$ a possible optimal choice for John?

Show your work. Explain your answer.
Question 2. 10 points.
Burcu consumes only two goods $x_1$ and $x_2$. One indifference curve for Burcu is given by the equation $x_2 = \frac{12}{x_1}$.

1. Draw this indifference curve.
2. Is it true that $(3, 4) \succeq (2, 6)$?
3. Does Burcu have convex preferences?

Show your work. Explain your answer.
Question 3. 10 points

Alp considers goods $X$ and $Y$ as perfect substitutes. The prices of goods are $p_X = 1$ and $p_Y = 3$. The income of Alp is 30 dollars ($m = 30$).

1. Draw few indifference curves for these preferences.

2. Show on the graph the consumption bundle chosen by Alp.

Show your work. Explain your answer.
Question 4. 10 points
The utility function for Cem is given by $U(x_1, x_2) = \min\{x_1, x_2\}$.

1. What is the Marginal Rate of Substitution when he consumes 3 units of good 1 and 2 units of good 2?

2. What is the economic meaning of the number you found in part (1)?

Show your work. Explain your answer.
Question 5. 10 points
Do the following utility functions represent the same preferences or different ones?

\[ U(x_1, x_2) = x_1 x_2 \text{ and } V(x_1, x_2) = x_1 + x_1 x_2? \]

Show your work. Explain your answer.
Question 6. 10 points

Mary has the following utility function $U(x_1, x_2) = 4\sqrt{x_1} + x_2$. The price of good 1 is $p_1 = 2$ and the price of good 2 is $p_2 = 4$ and the income is $m = 18$.

1. What is the consumption bundle that Mary chooses to buy? (Hint: the derivative of $U$ with respect to $x_1$ is equal to $\frac{2}{\sqrt{m}}$. The derivative of $U$ with respect to $x_2$ is equal to 1.)

2. At the consumption bundle that you found in part (1), what is the relation between MRS and the prices of the goods? Why?

Show your work. Explain your answer.
**Question 7. 10 points**

John has the following utility function \( U(x_1, x_2) = \ln x_1 + \ln x_2 \); the price of good 2 is equal to 1 and his income is 100 (\( p_2 = 1 \) and \( m = 100 \)).

1. Compute John’s demand curve for good 1. (Hint: the derivative of \( U \) with respect to \( x_1 \) is equal to \( \frac{1}{x_1} \). The derivative of \( U \) with respect to \( x_2 \) is equal to \( \frac{1}{x_2} \).)

2. Draw the graph of John’s demand curve for good 1.

3. Now assume that the price of good 1 is equal to 10 (\( p_1 = 10 \)). Show the corresponding quantity demanded in the demand curve graph and the optimal choice of John in the consumer choice graph. (Hint: the consumer choice graph is the one with the Budget Set and the Indifference Curves.)

**Show your work. Explain your answer.**
Question 8. 10 points
The demand function for good 1 is given by \( x_1(p_1, p_2, m) = \frac{m}{2p_1 + p_2} \). Are good 1 and good 2 substitutes or complements?
Show your work. Explain your answer.
Question 9. 10 points
Consider the individual demand curve \( D(p) = 60 - 3p \).

1. When the price changes from 3 to 5 what is the resulting change in consumer’s surplus?

2. What is the economic interpretation of the number that you found in part (1)?

Show your work. Explain your answer.
Question 10. 10 points
Consider the individual demand curve $D(p) = 60 - 3p$.

1. Compute the value of the price elasticity when $p = 15$. 