First Midterm   Microeconomics   Fall 2019   2019/10/31

Part I: Multiple Choice (40 points, 4 for each question)
Choose the **single** best alternative that completes the statement or answers the question.

1. Ads in a slick business magazine are read by 300 lawyers and 1,000 M.B.A.s. Ads in a consumer publication are read by 250 lawyers and 300 M.B.A.s. If Harry had $3,750 to spend on advertising, the price of ads in the business magazine were $500, and the price of ads in the consumer magazine were $250, then the combinations of M.B.A.s and lawyers whom he could reach with his advertising budget would be represented by the integer values along a line segment that runs between the two points

   a. (4500, 0) and (0, 9000).
   b. (4500, 5250) and (2250, 9000).
   c. (0, 4500) and (2250, 0).
   d. (3750, 4500) and (2250, 7500).
   e. (3000, 0) and (0, 7500).

2. Professor Stern's colleague, Dr. Schmertz, gives one midterm exam and a final exam. He weights the final twice as heavily as the midterm to determine the course grade. No grades can be dropped. If the midterm score is represented on the horizontal axis and the final score on the vertical axis, and if a student in Dr. Schmertz's class cares only about her course grade, her indifference curve is

   a. a line with slope -2.
   b. a line with slope -1.
   c. a line with slope -0.5.
   d. L-shaped with the kink at $(x, 2x)$.
   e. L-shaped with the kink at $(2x, x)$.

3. Waldo consumes only apples and bananas and bananas are an inferior good for him. The price of apples increases, but there is an increase in his income that keeps him on the same indifference curve as before. (Waldo has convex preferences, and he prefers more to less of either good.)

   a. After the change, Waldo will buy more bananas and fewer apples.
   b. After the change, Waldo will buy fewer bananas and more apples.
   c. After the change, Waldo will buy more of both goods.
   d. After the change, Waldo will buy fewer of both goods.
   e. We would need to know his utility function to determine whether any of the above statements are true.

4. Clarissa's utility function is $U(r, z) = z + 120r - r^2$, where r is the number of rose plants she has in her garden and z is the number of zinnias. She has 250 square feet to allocate to roses and zinnias. Roses each take up 4 square feet and zinnias each take up 1 square foot. She gets the plants for free from a generous friend. If she acquires another 100 square feet of land for her garden and her utility function remains unchanged, she will plant

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a. 99 more zinnias and some more roses.

b. 20 more roses and 20 more zinnias.

c. 25 more roses and no more zinnias.

d. 100 more zinnias and no more roses.

e. None of the above.

5. The absolute value of Mar's MRS at his current consumption bundle is greater than 3. (That is, $MU1/MU2 > 3$). Mars has convex preferences and is currently consuming positive amounts of both goods.

a. Taking away some of good 1 and giving Mars 3 units of good 2 for each unit of good 1 taken away will necessarily make him better off.

b. Taking away some of good 1 and giving Mars 3 units of good 2 for each unit of good 1 taken away will necessarily make him worse off.

c. Giving Mars some of good 1 and taking away 3 units of good 2 for each unit of good 1 he is given will necessarily make him worse off.

d. Giving Mars some of good 1 and taking away 3 units of good 2 for each unit of good 1 he is given will necessarily make him better off.

e. More than one of the above is true.

6. Jim's utility function is $U(x, y) = xy$. Jerry's utility function is $U(x, y) = 1,000xy + 2,000$. Tammy's utility function is $U(x, y) = xy(1 - xy)$. Oral's utility function is $-1/(10 + xy)$. Billy's utility function is $U(x, y) = x/y$. Pat's utility function is $U(x, y) = -xy$.

a. No two of these people have the same preferences.

b. They all have the same preferences except for Billy.

c. Jim, Jerry, and Pat all have the same indifference curves, but Jerry and Oral are the only ones with the same preferences as Jim.

d. Jim, Tammy, and Oral all have the same preferences.

e. None of the above.

7. Fred consumes pork chops and lamb chops and nothing else. When the price of pork chops rises with no change in his income or in the price of lamb chops, Fred buys fewer lamb chops and fewer pork chops.

a. Pork chops are a normal good for Fred.

b. Lamb chops are a normal good for Fred.

c. Pork chops are an inferior good for Fred.

d. Lamb chops are an inferior good for Fred.

e. Fred prefers pork chops to lamb chops.

8. Gladys loves music and spends her money only on tapes and compact discs. She is always willing to trade 2 tapes for 1 compact discs. Originally, music stores sold compact disc for $9 each and tapes for $5 each. Then the price of compact discs fell to $8 each. The change in her consumption of compact discs that resulted was

a. entirely due to the income effect.

b. entirely due to the substitution effect.

c. partly due to the income effect and partly due to the substitution effect.

d. due to the income effect for low incomes and the substitution effect for high incomes.

e. There was no change in her demand for compact discs.

9. In the economy of Mungo, discussed in your workbook, there is a third person called Ike. Ike has a red income of 92 rcus and a blue income of 20 bcus. (Recall that red prices are 2 rcus [red currency units] per unit of ambrosia and 6 rcus per unit of bubble gum. Blue prices are 1 bcu [blue currency unit] per unit of ambrosia and 1 bcu per unit of bubble gum. You have to pay twice for what you buy, once in red currency and once in blue currency.) If Ike spends all of his blue income but not all of his red income, then he consumes
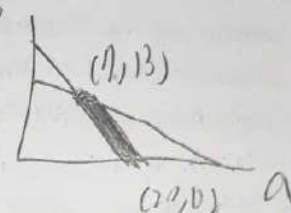
a. at least 13 units of bubble gum.

b. at least 7 units of bubble gum.

c. exactly twice as much bubble gum as ambrosia.

d. at least 17 units of ambrosia.

e. equal amounts of ambrosia and bubble gum.

$2x + 6y \le 92$

$x + y = 20$

$x + y \le 46$

$(1, 13)$

$(0, 13)$

$(20, 0)$

10. Daisy received a tape recorder as a birthday gift and is not able to return it. Her utility function is $U(x, y, z) = x + z^{1/2} f(y)$, where z is the number of tapes she buys, y is the number of tape recorders she has, and x is the amount of money she has left to spend. $f(y) = 0$ if $y < 1$ and $f(y) = 24$ if y is 1 or greater. The price of tapes is $4 and she can easily afford to buy dozens of tapes. How many tapes will she buy?

a. 7

$x + 24 y^{\frac{1}{2}}$

b. 11

c. 9

$\frac{1}{12} = \frac{1}{4}$
$\frac{1}{\sqrt{8}}$

d. 13

e. We need to know the price of tape recorders to solve this problem.

Part II: Essay (60 points)

Please answer and **explain** the following essay questions **in detail**. If you use some **notations** and/or **figures**, please **define** them **clearly**.

$4x + y = 36$ $6x = 36$

$2x + 2y = 76$ $x = 6$

$8 + 2y = n$ $y = 12$

1. Murphy's utility function is $U(x, y) = \min\{4x + y, 2x + 2y, x + 4y\}$. Murphy is consuming 12 units of x and 6 units of y.

a. Draw the indifference curve through this point (12, 6). At what points does this indifference curve have kinks? (8%)

b. The price of good x is $1. What is the highest possible price for y? What is the lowest possible price for y? Explain in detail. (2%)

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$$\frac{3\pi^2 b^2}{2a^8 b} = \frac{3b}{2a} = \frac{b}{k} \qquad 2ak=3b \qquad a=\frac{3}{2}b$$
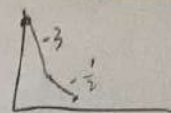
2. Carlos consumes only two goods, apples and bananas. He is endowed with w_a apples and w_b bananas. Unaware that prices are about to change, Carlos buys the quantities of apples and bananas that maximize his utility subject to his budget constraint. After he has made his purchases but before he has eaten them, the relative prices change. Carlos is then free to make further trades at the new relative prices if he wishes.

a. If his utility function is given by $U(x, y) = a^3 b^2$, use a diagram to show that Carlos will definitely be better off after the price change. (5%)

b. If his utility function is given by $U(x, y) = \min\{x, 2y\}$, use a diagram to show that Carlos's purchases will not be affected by the price change. (5%)

3. Charlie's utility function is $x_A x_B$. The price of apples (x_A) used to be $1 per unit and the price of bananas (x_B) was $2 per unit. His income was $40. The price of apples increased to $1.5 and the price of bananas fell to $1.75, then in order to be able to just afford his old bundle, how much income would Charlie have to have? (5%)

$$\frac{3}{2}x_A + \frac{4}{4}x_B = 40 \qquad \frac{3}{2} \times \frac{4}{7} = \frac{6}{7}$$

4. Wilma Q. has a utility function $U(x_1, x_2) = (x_1)^2 + 1.5 x_1 x_2 + 30 x_2$. The prices are $p_1 = $1 and $p_2 = $1. Plot the Engel curves for good 1 and good 2. (10%)

$$\frac{2x_1 + 1.5 x_2}{1.5 x_1 + 30} = \frac{1}{1} \qquad 2x_1 + 1.5 x_2 = 1.5 x_1 + 30$$
$$0.5 x_1 + 1.5 x_2 = 30$$

5. Ms. Laura Mussel's preferences between golf and tennis are represented by $U(g, t) = gt$, where g is the number of rounds of golf and t is the number of tennis matches she plays per week. She has $24 per week to spend on these sports. A round of golf and a tennis match each cost $4. She also decided to limit the time she spends on these sports to 16 hours a week. A round of golf takes 4 hours. A tennis match takes 2 hours. To maximize utility, what is her optimal choice? (5%)

$$t = g \cdot 3 \qquad \frac{t}{g} = \frac{4}{4} \qquad \frac{t}{g} = \frac{4}{2} \qquad 2g = t$$

6. Phil Rupp's sister Ethel has the utility function $U(x, y) = y + 4 \min\{x, y\}$. Where x is measured on the horizontal axis and y on the vertical axis, please plot her indifference curve. (5%)

7. Edmund Stench loves punk rock video tapes. He has no income and therefore has to accept garbage in his backyard in return for money. Each video tape cost $2 and each sack of garbage that he accepts brings him $1. His utility function is given by $U(c, g) = \min\{2c, 20 - g\}$, where c is the number of video tapes and g is the number of sacks of garbage that he gets per month. How many sacks of garbage will he choose to accept each month? (5%)

$$\frac{2}{-1} = \frac{2}{-1} \qquad \frac{2}{1} = \frac{2}{1} \qquad 2c - g =$$

8. Andrew's utility function is $U(x_1, x_2) = 4(x_1)^2 + x_2$. Andrew's income is $32, the price of good 1 is $16 per unit, and the price of good 2 is $1 per unit.

a. What is his optimal consumption bundle? (5%)

b. What happens if Andrew's income increases to $80 and prices do not change? (5%)

$$8 x_1$$