EC 224: Intermediate Microeconomics

Midterm I Exam

Spring 2026

NAME: _____

Instructions: Write all answers on your exam. The exam is closed notes, closed book. Clearly indicate your answer. Show all work for partial credit on problem sets.

Total Points: 100

- Part I: True/False — 5 questions × 2 points = 10 points
- Part II: Multiple Choice — 15 questions × 2 points = 30 points
- Part III: Problem Set — 5 questions × 8 points = 40 points
- Part IV: Short Problems — 2 problems × 10 points = 20 points

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Part I: True/False (10 points)

*For each statement, circle **TRUE** or **FALSE**. Each question is worth 2 points.*

1. The marginal rate of substitution (MRS) between two goods is constant along a standard convex indifference curve.

TRUE / FALSE

2. If a consumer's income doubles and all prices also double, the consumer's optimal consumption bundle does not change.

TRUE / FALSE

3. For an inferior good, the income and substitution effects of a price decrease work in the same direction.

TRUE / FALSE

4. According to the lump-sum principle, an excise tax on a specific good creates a larger welfare loss than an income tax that raises the same revenue.

TRUE / FALSE

5. Consumer surplus measures the difference between the maximum amount consumers are willing to pay and the amount they actually pay.

TRUE / FALSE

Part II: Multiple Choice (30 points)

Circle the letter of the best answer. Each question is worth 2 points.

1. Which of the following is **NOT** an assumption required for rational preferences?

a. Completeness
b. Transitivity
c. More is better
d. Diminishing marginal utility of income

2. Two indifference curves cannot cross because crossing would violate:

a. Completeness
b. More is better
c. Transitivity
d. The budget constraint

3. Suppose a consumer has the utility function $U = \min(2X, Y)$. What is the optimal consumption ratio?

a. $X = Y$
b. $Y = 2X$
c. $X = 2Y$
d. Cannot be determined without prices

4. A consumer has income $I = 120$, and faces prices $P_X = 4$ and $P_Y = 6$. What is the slope of the budget line (in absolute value)?

a. $\frac{3}{2}$
b. $\frac{2}{3}$
c. 20
d. 30

5. At the optimal interior consumption bundle, which condition must hold?

a. $MRS = \frac{P_Y}{P_X}$

b. $\frac{MU_X}{P_X} = \frac{MU_Y}{P_Y}$

c. $MU_X = MU_Y$

d. $P_X \cdot X = P_Y \cdot Y$

6. Suppose a consumer's preferences can be described by $U = 5X + 3Y$. If $P_X = 10$ and $P_Y = 4$, the consumer will buy:

a. All good X

b. All good Y

c. An equal amount of X and Y

d. More X than Y, but some of both

7. If an individual has a constant MRS of good X for good Y of 2 (willing to give up 2 units of Y for 1 unit of X), and $P_X = 6$, $P_Y = 4$, the consumer will:

a. Buy only X

b. Buy only Y

c. Buy equal amounts of both

d. Be indifferent between any bundle on the budget line

8. When the price of good X falls and X is a normal good, the total effect on demand for X is:

a. Ambiguous, because income and substitution effects work in opposite directions

b. Unambiguously positive, because both effects increase demand for X

c. Unambiguously negative

d. Zero, because the effects cancel out

9. For a Giffen good, when its price decreases:

a. Quantity demanded increases because the substitution effect dominates

b. Quantity demanded decreases because the income effect dominates the substitution effect

c. Quantity demanded increases because it is a normal good

d. The demand curve is upward sloping and the substitution effect is negative

10. With perfect complements (L-shaped indifference curves), the substitution effect of a price change is:

a. Positive

b. Negative

c. Zero

d. Depends on whether the good is normal or inferior

11. A composite good is useful in economic analysis because it:

a. Eliminates the need for a budget constraint

b. Allows us to study the choice between one specific good and "everything else"

c. Assumes all goods have the same price

d. Requires perfect substitutes

12. If income increases and the quantity demanded of a good decreases, that good is:

a. A normal good

b. An inferior good

c. A Giffen good

d. A luxury good

13. Consumer surplus for a linear demand curve is calculated as:

a. $P \times Q$

b. $\frac{1}{2} \times Q \times (P_{max} - P)$

c. $P_{max} \times Q$

d. $(P_{max} - P) \times Q$

14. Suppose the market demand is the horizontal sum of two individual demand curves: $Q_1 = 20 - P$ and $Q_2 = 30 - 2P$. At $P = 12$, the market quantity demanded is:

a. 14

b. 8

c. 6

d. 20

15. A consumer faces a quantity discount: the first 10 units of X cost \$5 each, and all additional units cost \$3 each. With income \$80 and the price of Y equal to \$1, the budget constraint:

a. Is a straight line with slope -5

b. Is a straight line with slope -3

c. Has a kink at $X = 10$, becoming flatter after the kink

d. Has a kink at $X = 10$, becoming steeper after the kink

Part III: Problem Set (40 points)

Each sub-question is worth 8 points. Show all your work.

There are two goods: X and Y. The consumer's utility function is $U = X^2Y^{1/2}$.
Price of $X = 100$. Price of $Y = 50$. Income = 10,000.
The marginal rate of substitution (MRS) between the two goods is:

$$MRS = \frac{4Y}{X}$$

1. Write down the algebraic equation for the budget constraint, graph it, and show the X and Y intercepts.

2. Calculate the utility if the consumer buys equal amounts of X and Y. Is this consumption choice optimum for the consumer? Very briefly explain (max 2 sentences).

3. Calculate the optimum consumption bundle (amount of X and Y) that the consumer would choose to consume.

4. If the government imposes an income tax of \$2,000, what would be the new optimum consumption level for X and Y?

5. Explain why taxing income is more efficient from the welfare perspective than placing a tax on a specific good. What would be a justifiable case for the government to tax a specific good in this case?

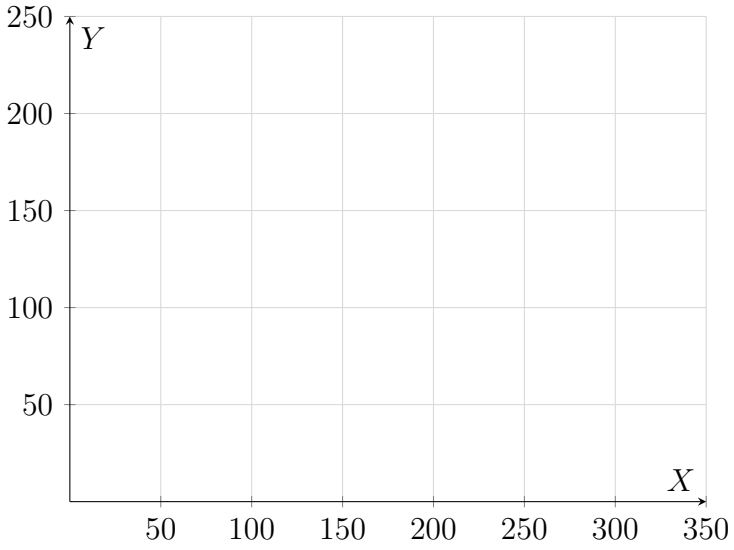
Part IV: Short Problems (20 points)

Each problem is worth 10 points. Show all your work.

Problem 1. (10 points)

There are two goods: X and Y. A consumer's utility function is $U = X + Y$ and her income is \$4,000. The price of $Y = 20$. The price of the first 100 units of X is \$10 per unit, the price of the next 100 units of X is \$20 per unit, and the price of all additional units after that is \$10 per unit.

a. Plot the budget constraint using $X = 0, 100, 200$, and 300 units. Make the calculations below and use the graph for the plot.

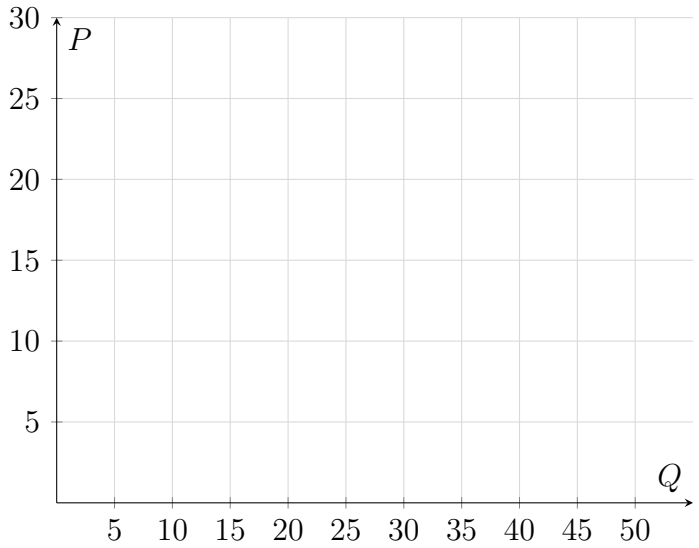


b. Plot the indifference curve on the same graph for $U = 250$ and indicate the optimum level of consumption under the budget constraint. Make the calculations below and use the graph for the plot.

Problem 2. (10 points)

Suppose the demand for a good is given by $Q = 50 - 2P$.

a. At a market price of $P = 10$, calculate the quantity demanded and the consumer surplus. Show the consumer surplus graphically.



b. If the price rises to $P = 15$, calculate the new quantity demanded and the new consumer surplus. What is the change in consumer surplus?