



- Name: _____
 - Date: _____
 - Section: _____
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ECON 300: Intermediate Price Theory

Final Exam

Fall 2024

INSTRUCTIONS:

- Please read all questions carefully before you begin answering.
- Answer all questions in the spaces provided on the question sheet.
- This quiz consists of 7 pages, including this one. There are a total of 5 problems with a total of 25 subquestions.
- This is a closed-book quiz. Please remove all materials from the top of the desk and take any necessary items from your bags before the exam begins.
- Good luck, and have a great winter break!

Problem 1. Definitions**(4 Points Each)**

Select FIVE items on the list of items below, and provide a definition of the items that you chose.

- Marginal Rate of Substitution
- Ordinary Goods
- Consumer Surplus
- Marginal Utility
- Deadweight Loss
- Monopoly
- Marginal Revenue
- Nash Equilibrium
- Isoquant

1.A Item #1: _____

1.B Item #2: _____

1.C Item #3: _____

1.D Item #4: _____

1.E Item #5: _____

Problem 2. True / False**(4 Points Each)**

Determine whether the following statements are TRUE or FALSE. If you conclude that a statement is TRUE, no justification is required. However, if you conclude that a statement is FALSE, you MUST provide an explanation to justify your answer.

2.A If a profit-maximizing producer finds that their marginal revenue is greater than their marginal cost (i.e., $MR(Q) > MC(Q)$), the producer should reduce their level of output.

2.B Price controls will always result in deadweight loss, as they distort prices.

2.C If a firm's production function displays decreasing returns to scale, it is likely that it will result in a natural monopoly.

2.D When two goods are seen as perfect complements to each other, we can use the Leontief (min) family of utility functions to model the consumer's preferences.

2.E When $\frac{MU_x}{P_x} > \frac{MU_y}{P_y}$, the consumer should increase their consumption of x while giving up some of their y .

Problem 3. The Utility Maximization Problem**(4 Points Each)**

Consider the a consumer participating in a market with two goods: good x and good y . The consumer's preference relation is represented by the following utility function:

$$u(x, y) = 5x^2y^3$$

The unit price of good x is \$5, the unit price of good y is \$15, and the consumer's budget is \$1,000.

3.A Formally express the consumer's budget constraint.

3.B Derive the consumer's marginal utility of good x and y , respectively.

- $MU_x =$

- $MU_y =$

3.C Assuming that $MU_x = 2y$ and $MU_y = 3x$, derive the consumer's marginal rate of substitution between goods x and y . From now on until the last question in Problem 3, use this MRS_{xy} whenever you need to use MRS_{xy} .

- $MRS_{xy} =$

3.D Derive the optimal ratio of goods x and y that the consumer should purchase.

3.E Find the optimal quantity of good x and good y that the consumer should purchase.

- $x^* =$

- $y^* =$

Problem 4. Profit Maximization & Market Structure**(4 Points Each)**

Consider a profit-maximizing producer of good x . The market demand for good x is given by the following inverse demand function:

$$P = 6 - Q$$

Also, assume that the producer's total cost function is given as:

$$TC(Q) = 5 + 2Q + Q^2$$

For questions 4.A through 4.D, assume that the output market for good x is in perfect competition.

4.A Derive the producer's marginal cost function, $MC(Q)$.

- $MC(Q) =$

4.B Derive the producer's total revenue function, $TR(Q)$, assuming the market for good x is in perfect competition with a market price of $P_x = 6$.

- $TR(Q) =$

4.C Derive the producer's marginal revenue function, $MR(Q)$, assuming the market for good x is in perfect competition with a market price of $P_x = 6$.

- $MR(Q) =$

4.D What is the profit maximizing quantity of good x produced in the economy when the market for good x is in perfect competition?

- $Q^* =$

Problem 4. Profit Maximization & Market Structure (continued) (4 Points Each)

Consider a profit-maximizing producer of good x . The market demand for good x is given by the following inverse demand function:

$$P = 6 - Q$$

Also, assume that the producer's total cost function is given as:

$$TC(Q) = 5 + 2Q + Q^2$$

For questions 4.E through 4.G, assume that there is exactly one producer of good x .

4.E Derive the producer's total revenue function, $TR(Q)$, assuming that the producer is the monopoly producer of good x .

- $TR(Q) =$

4.F Derive the producer's marginal revenue function, $MR(Q)$, assuming that the producer is the monopoly producer of good x .

- $MR(Q) =$

4.G What is the profit maximizing quantity and price of good x produced in the economy when there is one producer of good x ?

- $Q^M =$

- $P^M =$

Problem 5. Game Theory**(4 Points Each)**

Consider the following setup with two players: player 1 and player 2. Player 1 can either choose to play U or D, and player 2 can choose to play either L or R. Each player makes their moves simultaneously. The payoffs are as follows:

- If player 1 plays U and player 2 plays L: Player 1 receives 15, player 2 receives 1.
- If player 1 plays U and player 2 plays R: Player 1 receives 4, player 2 receives 16.
- If player 1 plays D and player 2 plays L: Player 1 receives 10, player 2 receives 20.
- If player 1 plays D and player 2 plays R: Player 1 receives 9, player 2 receives 3.

5.A Express this game in its normal form.

5.B Are there any strictly dominant / dominated strategies? If so, identify them.

5.C Find the pure strategy Nash equilibrium.

- Original Score: _____
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