

EXAM 3

Intermediate Microeconomics EC 308-004
December 4, 2007

Name: _____

by writing my name i swear by the honor code

Read all of the following information before starting the Assignment:

- This is an individual take-home exam. I might take you off points if I see any hint of collusion.
- Show all work, clearly and in order, if you want to get full credit. I reserve the right to take off points if I cannot see how you arrived at your answer (even if your final answer is correct).
- Justify your answers algebraically whenever possible to ensure full credit. When you do use your calculator, sketch all relevant graphs and explain all relevant mathematics.
- Circle or otherwise indicate your final answers.
- Please keep your written answers brief; be clear and to the point. I will take points off for rambling and for incorrect or irrelevant statements.
- Answer any 5 of the 7 problems for 100 points overall. Do not answer to more than 5 problems. It is your responsibility to make sure that you have all of the answers!
- This exam will be due Thursday, December 6 in class.
- Good luck!

1. (*20 points*) PROBLEM 1: This problem has several distinct parts.

a. (*5 pts*) PART A: A monopolist faces a demand with constant elasticity of -3.0. It has a constant marginal cost of \$30 per unit and sets a price to maximize profit. If marginal cost should increase by 25%, would the price charged also rise by 25%?

b. (*5 pts*) PART B: A firm faces the following average revenue (demand) curve: $P = 120 - 0.02Q$, where Q is weekly production and P is price, measured in cents per unit. Firm's cost function is given by $C = 60Q + 25,000$. Assume that the firm maximizes profits. What is the level of production, price, and total profit per week?

c. (10 pts) PART C: If the government decides to levy a tax of 14 cents per unit on this product, what will be the new level of production, price, and profit? (Hint: The new price becomes $P' = P + T$).

2. (*20 points*) PROBLEM 2: A monopolist faces the demand curve $P = 11 - Q$, where P is measured in dollars per unit and Q in thousands of units. The monopolist has a constant average cost of \$6 per unit.

a. (*10 pts*) PART A: Draw the AR, MR, AC, and MC curves. What are the monopolist's profit-maximizing price and quantity? What is the resulting profit? Calculate the firm's degree of monopoly power using the Lerner index.

b. (5 pts) PART B: A government regulatory agency sets a price ceiling of \$7 per unit. What quantity will be produced, and what will the firm's profit be? What happens to the degree of monopoly power?

c. (5 pts) PART C: What price ceiling yields the largest level of output? What is the firm's degree of monopoly power at this price?

3. (20 points) PROBLEM 3: (Chapter 11 problem) Suppose that BMW can produce any quantity of cars at a constant MC equal to \$20,000 and fixed cost of \$10 billion. You are asked to advise the CEO as to what prices and quantities BMW should set for sales in Europe and in the US. The demand for BMWs in each market is given by:

$$Q_E = 4,000,000 - 100P_E \quad (1)$$

$$Q_{US} = 1,000,000 - 20P_{US} \quad (2)$$

Assume that BMW can restrict US sales to authorized BMW dealers only.

a. (10 pts) PART A: What quantity of BMWs should the firm sell in each market, and what will the price be in each market? What will total profit be?

b. (10 pts) PART B: If BMW were forced to charge the same price in each market, what would be the quantity sold in each market, the equilibrium price, and the company's profit?

4. (*20 points*) PROBLEM 4: This question has 2 parts.

a. (*10 pts*) PART A: Many retail video stores offer two alternative plans for renting films:

- A two-part tariff: Pay an annual membership fee (e.g., \$20) and then pay a small fee for the daily rental of each film (e.g., \$2 per film per day).
- A straight rental fee: Pay no membership fee, but pay a higher rental fee (e.g., \$4 per film per day).

What is the logic behind the two-part tariff in this case? Why offer the customer a choice of two plans rather than simply a two-part tariff?

b. (*10 pts*) PART B: In June/July 2007, Apple launched the iPhone. However, only two months after the event, Apple slashed the price by \$200. Given the discussion in Chapter 11, why do you think Apple make this abrupt move?

5. (*20 points*) PROBLEM 5: Suppose that two identical firms produce widgets and that they are the only firms in the market. Their costs are given by $C_1 = 60Q_1$ and $C_2 = 60Q_2$, where Q_1 is the output of firm 1 and Q_2 is the output of firm 2. Price is determined by the following demand curve: $P = 300 - Q$, where $Q = Q_1 + Q_2$.

a. (*10 pts*) PART A: Find the Cournot-Nash equilibrium. Calculate the profit of each firm at this equilibrium.

b. (5 pts) PART B: Suppose the two firms form a cartel to maximize joint profits. How many widgets will be produced? Calculate each firm's profit. (hint: Assume $Q = Q_1 = Q_2$).

c. (5 pts) PART C: Suppose firm 1 abides by the agreement, but firm 2 cheats by producing its profit maximizing level. How many widgets will firm 2 produce? What will be each firm's profits?

6. (20 points) PROBLEM 6: Demand for light-bulbs can be characterized by $Q = 100 - P$ where Q is in millions of lights sold, and P is the price per box. There are two producers of lights: Everglow and Dimlit. They have identical cost functions: $C_i = 10Q_i + \frac{1}{2}Q_i^2$ where $i = E, D$, $Q = Q_E + Q_D$.

a. (10 pts) PART A: Unable to recognize the potential for collusion, the two firms act as short-run perfect competitors. What are the equilibrium values of Q_E , Q_D , and P ? What are each firm's profits?

b. (10 pts) PART B: Top management in both firms is replaced. Each new manager independently recognizes the oligopolistic nature of the light bulb industry and plays Cournot. What are the equilibrium values of Q_E , Q_D , and P ? What are each firm's profits?

7. (20 points) PROBLEM 7: This problem has 2 parts:

a. (10 pts) PART A: You are offered the choice of two payment streams: (a) \$150 paid one year from now and \$150 paid two years from now; (b) \$130 paid one year from now and \$160 paid two years from now. Which payment stream would you prefer in the interest rate is 5%? If it is 10%?

b. (10 pts) PART B: A bond has two years to mature. It makes coupon payments of \$100 after one year and both a coupon payment of \$100 and a principal payment of \$1000 after two years. The bond is selling for \$966. What is its yield rate? (Hint: use quadratic formula. If $ax^2 + bx + c = 0$ then $x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$)

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