

# HOMework 4

Intermediate Microeconomics EC 308-004  
November 1, 2007

Name: \_\_\_\_\_

by writing my name i swear by the honor code

**Read all of the following information before starting the Assignment:**

- You are allowed to work together on the homework. However, when it comes time for you to write up the solutions, you are required to do this on your own.
- 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.
- This assignment has 5 problems and is worth 100 points. It is your responsibility to make sure that you have all of the answers!
- This assignment is due next Thursday, November 8 in class.
- Good luck!

**1.** (*30 points*) PROBLEM 1: This question has 6 parts. Suppose that a firm's cost function is  $C(q) = 4q^2 + 16$ .

**a.** (*5 pts*) PART A: Find variable cost, fixed cost, average cost, average variable cost, and average fixed cost.

**b.** (*5 pts*) PART B: Show the average cost, marginal cost, and average variable cost curves on a graph.

c. (5 pts) PART C: Find the output that minimizes average cost.

d. (5 pts) PART D: At what range of prices will the firm produce a positive output?

e. (5 pts) PART E: At what range of prices will the firm earn a negative profit?

f. (5 pts) PART F: At what range of prices will the firm earn a positive output?

**2.** (20 points) PROBLEM 2: This problem has 3 parts.

**a.** (10 pts) PART A: Suppose that a firm's production function is  $q = 9\sqrt{x}$  in the short run, where there are fixed costs of \$1000, and  $x$  is the variable input whose cost is \$4,000 per unit. What is the total cost of producing a level of output  $q$ ? In other words, identify the total cost function  $C(q)$ .

**b.** (5 pts) PART B: Write down the equation for the supply curve.

**c.** (5 pts) PART C: If the price is \$1000, how many units will the firm produce? What is the level of profit? Illustrate your answer on a cost-curve graph..

**3.** (20 points) PROBLEM 3: The following problem has 4 parts. Suppose you are given the following information about a particular industry:

$$\text{Market demand : } Q^D = 6500 - 100P \quad (1)$$

$$\text{Market supply : } Q^S = 1200P \quad (2)$$

$$\text{Firm's total cost function : } C(q) = 722 + \frac{q^2}{200} \quad (3)$$

$$\text{Firm's marginal cost function : } MC(q) = \frac{2q}{200} \quad (4)$$

Assume that all firms are identical and that the market is characterized by pure competition.

**a.** (5 pts) PART A: Find the equilibrium price, the equilibrium quantity, the output supplied by the firm, and the profit of each firm.

**b.** (5 pts) PART B: Would you expect to see entry into or exit from the industry in the long run? Explain. What effect will entry or exit have on market equilibrium? (Hint: Look at the profit level).

**c. (5 pts)** PART C: What is the lowest price at which each firm would sell its output in the long run? Is profit positive, negative, or zero at this price? Explain.

**d. (5 pts)** PART D: What is the lowest price at which each firm would sell its output in the short run? Is profit positive, negative, or zero at this price? Explain.

**4.** (15 points) PROBLEM 4: Suppose the market for widgets can be described by the following equations:

$$\text{Demand : } P = 10 - Q \quad (5)$$

$$\text{Supply : } P = Q - 4 \quad (6)$$

**a.** (5 pts) PART A: What is the equilibrium price and quantity?

**b.** (5 pts) PART B: Suppose the government imposes a tax of \$1 per unit to reduce widget consumption and raise government revenues. What will the new equilibrium quantity be? What price will the buyer pay? What amount per unit will the seller receive?

**c.** (5 pts) PART C: Suppose the government has a change of heart about the importance of widgets to the happiness of the American public. The tax is removed and a subsidy of \$1 per unit granted to widget producers. What will the new equilibrium quantity be? What price will the buyer pay? What amount per unit (including the subsidy) will the seller receive? What will the total cost to government be?

**5.** (*15 points*) PROBLEM 5: Among the tax proposals regularly considered by Congress is an additional tax on distilled liquors. The tax would not apply to beer. The price elasticity of supply of liquor is 2.0, and the price elasticity of demand is -0.5. The cross price elasticity of demand for mixing drinks with respect to the price of liquor is -0.1.

**a.** (*10 pts*) PART A: If the new tax is imposed, who will bear the greater burden - liquor suppliers or liquor consumers? Why?

**b.** (*5 pts*) PART B: Assuming that mixing drinks supply is infinitely elastic, how will the new tax affect the mixing drinks market?

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