



## INDUSTRIAL ECONOMICS

### PRACTICE PROBLEM SET I: MONOPOLY

1. Consider a market with demand function  $q = a - bp$ , where  $q$  denotes the total quantity. There is only one firm in the market with marginal (and average) cost constant and equal to  $c$ .

- (i) Find the equilibrium price and quantity and represent them in a graph.
- (ii) Find the price demand elasticity. How does it vary with  $b$ ?

2. Las-O-Vision is the sole producer of holographic TVs, 3DTVS. The daily demand for 3DTVS is given by  $D(p) = 10200 - 100p$ . The total cost of producing 3DTVs per day is  $q^2/2$ .

- (i) Find the total revenue and the marginal revenue of Las-O-Vision.
- (ii) Find the quantity of 3DTVS that Las-O-Vision produces on a daily basis, the price it charges and its profit.

3. The total cost function faced by a firm which produces pens ( $q_1$ ) and pencils ( $q_2$ ) in millions of units per year is:

$$C(q_1, q_2) = \begin{cases} 6 + q_1 + 3q_2 + q_1q_2 & \text{if } q_1 > 0 \text{ and } q_2 > 0 \\ 4 + 3q_2 & \text{if } q_1 = 0 \text{ and } q_2 > 0 \\ 3 + q_1 & \text{if } q_1 > 0 \text{ and } q_2 = 0 \end{cases}$$

Are there economies of scope? Explain.

4. Consider a monopolist that produces a single good. The monopolist sells the good in two consecutive periods,  $t=1$  and  $t=2$ . The demand for the good is  $q_t = 1 - p_t$ . Marginal (and average) cost is equal to  $c$  in  $t=1$  and to  $c - \lambda q_1$  in  $t=2$ .

- (i) Based on the provided information, do you think that demands and costs of the two periods are dependent or independent?
- (ii) Find the prices that the monopolist charges in each period (assume that discount factor is 1).
- (iii) Compute the Lerner index and the elasticity of demand in equilibrium for both periods. Discuss your findings.

5. Consider a monopolist that produces a single good. The monopolist sells the good in two consecutive periods,  $t=1$  and  $t=2$ . The demand for the good is  $q_1 = 1 - p_1$  in period  $t=1$  and  $q_2 = 1 - p_1 - p_2$  in period  $t=2$ . Marginal (and average) cost is equal to  $c$  in both periods.

- (i) Based on the provided information, do you think that demands and costs of the two periods are dependent or independent?

- (ii) Find the prices that the monopolist charges in each period (assume the discount factor is 1).
- (iii) Compute the Lerner index and the elasticity of demand in equilibrium for both periods. Discuss your findings.

6. Axis Airlines is a monopolist in a particular route and sells two types of tickets: economy class tickets and first class tickets. It knows that the demand for first class tickets is given by  $P_f = 100 - 2Q_f$  while the demand for economy tickets by  $P_e = 50 - 0,5Q_e$ . Assume that the marginal cost that Axis Airlines faces is the same for both types of tickets. If Axis Airlines charges different prices for the two types of tickets, which price will it charge for first class tickets and which for economy class tickets?

7. Purple Dream has the monopoly on the production of purple light-emitting diodes (LEDs). It faces geographically separated markets, denoted A and B. The demands on these two markets are respectively given by  $q_A = 1 - p_A$  and  $q_B = 1/2 - p_B$ . The transport and production costs are set to zero.

- (i) Assume that the firm chooses to set a uniform price across the two markets. What is the profit-maximizing uniform price? What are the quantities sold on the two markets at this price?
- (ii) Assume that the firm uses third degree price discrimination. What are the profit maximizing prices and quantities on the two markets?
- (iii) Calculate consumer surplus and profit under a uniform price and under third degree price discrimination. Compare these two situations and comment on the result.
- (iv) Does the result that you have found in part (iii) hold generally? How would the results change if  $q_B = 1/3 - p_B$ ?