

EC 501: Problem Set 9
(Due in class on Tuesday, November 12)

1. The demand for bread in Munchkinland is given by

$$Q = 300 - 5P$$

where Q: quantity, P: price. The long run cost function of each bakery is given by

$$C = 200 + .5q^2$$

- a. If the bread industry is perfectly competitive, and each firm can have only one bakery, how many bakeries would operate in the long run, and what would be P and Q?
- b. Assuming that the monopolist can have any number of bakeries, what would be P and Q and how many bakeries would there be if the industry is a monopoly? How much profit would the monopolist make?
- c. With what P and Q, and with how many bakeries, is social welfare maximized?
- d. If the monopolist realized that he could separate demand into two markets characterized by the demand curves.

$$Q_1 = 100 - 3 P_1 \quad \text{and} \quad Q_2 = 200 - 2 P_2$$

how much would he sell in each market? How much profit would the monopoly make now?

2. A multinational enterprise (MNE) supplies steel at home and abroad. Demand at home is

$$P_h = 30 - Q_h$$

(Q is quantity demanded), and abroad is

$$P_f = 20 - \frac{1}{2} Q_f$$

The MNE can produce steel at home, according to a total cost function

$$C_h = 10 S_h$$

(S is quantity supplied or produced) or at its foreign subsidiary, according to

$$C_f = 5 S_f + \frac{1}{2} S_f^2.$$

The MNE has monopoly power in both markets.

- a. To maximize profits, what is MNE's optimal production, sales and price pattern? Is steel traded, i.e. are shipments made across national boundaries? (Assume zero transport costs for MNE but that re-sale from one country to another is not possible.) How much steel is shipped? How much profit does MNE make?
- b. Suppose all trade is banned. Answer the questions in (a) under these new conditions.
- c. Suppose the trade commissions in the two countries insist that the MNE charge the same price in the two countries. What are now its production, sales and price pattern? How much profit does it lose, relative to (a)?

3. Big Boy Corp. is the largest producer of numos. It has acquired this position because it has a patented process which allows it to produce numos according to the cost function:

$$C(Q_b) = 10 + (Q_b^2/100)$$

Each of the other firms in the industry (there are 100 other firms) uses an older process, characterized by the cost function

$$C(q) = q^2 + 5q + 10.$$

Demand for numos is

$$Q_d = 1000 - 50p.$$

- (a) Assuming that Big Boy acts as a price leader, what will be the price of numos, the total quantity produced, and the quantity produced by each firm in the short run?
- (b) If, in the long run, entry can take place freely by firms using the old technology, what will be the price and total quantity of numos, and also the output of each firm?
4. The annual demand for natural gas in Zuma is given by the formula

$$Q = 60 - 2P$$

where P is the price and Q the quantity demanded. Marginal cost is constant at \$20 per unit and there is no overhead.

- a. If natural gas production is controlled by a monopolist, what will be the monopolist's annual profits?
- b. Suppose the government of Zuma nationalized the gas company. What would it produce and what price would it charge in the interests of efficiency, assuming all other industries in Zuma are perfectly competitive?
- c. Disregarding questions of distribution, in which situation is Zuma better off- monopoly or Government control? Calculate the approximate magnitude of the difference in welfare level between the two situations.
- d. Suppose that in fact there are additional overhead costs of \$75 per year. What would the monopolist do in this situation? Would you advise the Government to take over the industry now? Explain your answer.
5. Bigfoot Corp. manufactures shoes in the small town of Here. It is the only employer in town, and Here is too far from anywhere else for townspeople to work elsewhere. Men and women are equally productive; they each produce two pairs of shoes a day, which Bigfoot sells in the (perfectly competitive) shoe market at a price of \$20 per pair. The labor supply curves of men and women respectively are given by

$$L_m = 25 w_m - 250$$
$$L_w = 50 w_w - 1000$$

where w_m and w_w represent men's and women's wage rates.

- (a) How many men and how many women will Bigfoot employ, and what wage rates will it pay them, if it wishes to maximize profits? How much profit does Bigfoot make?

- (b) What would be the socially efficient employment levels and wage rates? How much profit does Bigfoot make under this scenario? How much better off would society as a whole be in this case as compared to your solution to (a)?