

## Exercise 4

### Monopoly

1. Algebraically (i.e., use calculus) show that the marginal revenue for a single-price monopolist is less than the market price for positive quantities of output. Briefly explain why.
2. Suppose that Intel has a monopoly in the market for microprocessors in Brazil. During the year 2005, it faces a market demand curve given by  $P = 9 - Q$ , where  $Q$  is millions of microprocessors sold per year. Suppose you know nothing about Intel's costs of production. Assuming that Intel acts as a profit-maximizing monopolist, would it ever sell 7 million microprocessors in Brazil in 2005? (Hint: Find MR at  $Q = 7$ , and then interpret its value in order to answer the question.)
3. Suppose a monopolist has a constant marginal cost  $MC = £10$  and faces a linear demand curve  $P = 100 - \frac{1}{2}Q$  (which can be rewritten as  $Q = 200 - 2P$ ).
  - a. Find the profit-maximizing price and quantity using the monopoly midpoint rule.
  - b. Find the profit-maximizing price and quantity by setting MR equal MC.
  - c. Calculate the consumer surplus, producer surplus, and deadweight loss in the market.(Hint: Questions 14a and 14b have the same answer.)  
(Note: The midpoint rule can ONLY be used with constant MC and linear demand curve.)
4. The marginal cost of preparing a large latte in a specialty coffee house is \$1. The firm's market research reveals that the elasticity of demand for its large lattes is constant, with a value of about  $-1.3$ . If the firm wants to maximize profit from the sale of large lattes, about what price should the firm charge? Use the inverse elasticity pricing rule. Also, calculate the Lerner index.
5. What is a natural monopoly? How does it arise? Why should the government NOT break the natural monopoly down into smaller firms? With a relevant diagram, discuss the pros and cons of the average cost and marginal cost pricing that the government can use to regulate the firm.

6. Suppose a profit-maximizing monopolist has three factories, each of which has different MC as shown below. The MR from selling each unit is also given. Answer the following questions.
- Among the three factories, which is the most cost-efficient? Which is the least cost-efficient?
  - What is the profit-maximizing condition for the multi-plant monopolist? Briefly explain it.
  - How much output should the monopolist produce in total? How much output should be produced in each factory?

(Note: Your answer in Part c should be consistent with Part a.)

Quantity	MR	MC1	MC2	MC3
1	20	2	5	3
2	19	4	10	6
3	18	6	15	9
4	16	8	20	12
5	15	10	25	15
6	14	12	30	18
7	13	14	35	21
8	12	16	40	24
9	11	18	45	27
10	10	20	50	30