

U8213 Colloquium on Policy Analysis Section 3  
Spring 2001  
Problem Set 5: Monopoly, time consistency

1. The only racquetball club in town faces a set of potential members, each of whom has a demand function  $p = 5 - 0.1y$  where  $y$  is the number of court bookings demanded per month and  $p$  is the price per booking (in dollars). The marginal costs of providing a unit of court bookings are constant and equal to \$2. The club charges a fixed membership fee, which each buyer must pay to make bookings, and also charges for each booking. Assuming no income effects on the demand for the commodity, determine the membership fee that will be set.

2. A monopoly that provides electricity in a small town has two plants for generating electricity. The short-run total costs of supplying electricity from each plant are as follows:

$$\text{Plant 1: } TC_1 = 15y_1$$

$$\text{Plant 2: } TC_2 = \frac{19}{2}y_2 + \frac{1}{4}y_2^2$$

Where  $y_1$  and  $y_2$  are units of output in plants 1 and 2 respectively. (Each unit is 1,000 kilowatt-hours.) The monopolist faces the following market demand curve:  $p = 40 - \frac{1}{2}y$  wherein  $y = y_1 + y_2$ . Find the short-run profit-maximizing price and quantities produced by each plant.

3. Nynex is a supplier of telephone services. In the long run, the marginal cost of providing telephone services is zero, but there is a fixed installation cost of \$30 per individual. An individual's demand curve for the telephone services is described by  $y = 100 - 100p$  where  $y$  is the number of message units and  $p$  is the price per message unit.

a. If the price is set at the profit-maximizing level, can the firm cover its costs? Explain, using a diagram.

b. If the firm cannot cover costs in (a), does this mean that telephone service is not socially worthwhile? Explain.

4. A theater has a monopoly on the rights to show movies in the town of Tallahassee. For its feature film of the week, it faces the following demands:

$$\text{Adults: } p_a = 16 - y_a$$

$$\text{Children: } p_c = 10 - \frac{1}{2}y_c$$

Where  $p_a$  is the price per adult ticket,  $p_c$  is the price per child ticket,  $y_a$  is the quantity of adult tickets purchased and sold, and  $y_c$  is the quantity of child tickets purchased and sold. The marginal costs of printing and selling the tickets are:  $MC(y) = \frac{1}{3}y$  and  $TC(y) = \frac{1}{6}y^2$  wherein  $y = y_a + y_c$ .

- a. The monopolist can practice ordinary price discrimination. Determine the equilibrium prices and quantities for adults and children.
- b. Now suppose that the monopolist is banned from practicing price discrimination. Determine the equilibrium price and quantity in this case.
- c. Has there been an increase in the economic efficiency (or social welfare) due to the law against price discrimination in (b)? Why or why not?
5. This problem considers George's efforts to quit smoking. George is a once a day smoker, every morning as he gets up. The utility he derives from a smoke is:  $U(\text{Smoke}) = S \times f(D)$ , where:  $S=1$  if he smokes,  $= 0$  if no;  $D = \text{Days since last smoke}$ ; and

$$f(D) = D \quad \text{if } D \leq 15,$$

$$f(D) = 15 - (D - 15) \quad \text{if } D > 15.$$

- a. George decides to quit today, but he will hang on to his cigarettes in case he has a friend visiting him who wants to smoke. When George gets up tomorrow will he keep his resolve not to smoke?
- b. Instead imagine that George quits and decides ask a neighbor to hang on to his tobacco. George will experience 5 utilities of shame if he asks the neighbor to take a cigarette back. Will he ask the neighbor for a cigarette tomorrow? How long can hold out before asking?
- c. George lives in London. Both he and his neighbor have inherited the use of their flats from potty uncles, so they will be neighbors for many years. You are the neighbor. When George comes calling to ask to borrow a cigarette back will you give it to him? Answer over different time horizons. Will he be happy on the first day he asks you, if you say no? You are his only supplier, so if you say no, will he ask you again? Will he be happy or unhappy if you say no? Is there a point in time when George will thank you for having refused to lend him the cigarette? A graph may be helpful.
- d. You (the neighbor) are a bit strapped for cash. George, instead, is loaded. When he first approaches you ask him if you could charge him a 'storage fee' to hang on to his tobacco. On that day he is a bit short of cash, but he says in two months his uncle will be sending him some more money. So, you say to him, "Imagine yourself in the morning two months from now. And on that basis decide how much money you want to pay me. Being gentlemen, we'll split the difference, and I'll take you on your word." Will George agree to pay you anything? If so, what amount?