Econ 303 - Intermediate Microeconomic Theory
College of William & Mary
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Problem Set 6

This problem set will not be graded and does not need to be turned in. However, the problem set does cover topics that will be on the final exam, so it is highly recommended that you work through the problems in the same way you would for a graded problem set. Solutions for this problem set will be posted on Blackboard.

1. **Monopoly Outcomes and Deadweight Loss**

   Suppose that a monopolist's cost function is given by:

   $$C(y) = \frac{1}{8}y^2 + 40y \tag{1}$$

   The demand function for the industry is given by:

   $$D(p) = 1600 - 4p \tag{2}$$

   (a) Solve for the monopoly price, quantity and profits.

   (b) Find the socially efficient price and quantity. What would monopoly profits be at the efficient price and quantity?

   (c) Sketch a graph that includes the demand curve, the marginal revenue curve, and the monopolist's marginal cost and average cost curves. On this graph, show what the monopoly profits are and the deadweight loss under the monopoly outcome.

   (d) Can you graph a situation in which a monopoly would earn negative profits at the socially efficient price and quantity (note that we are no longer talking about the cost function given above)? What is true about the minimum efficient scale in this situation? Label the minimum efficient scale on your graph.

2. **Movie Theaters and Price Discrimination**

Suppose that the only movie theater in town has two types of customers, adults and senior citizens. The inverse demand curve for adults is given by:

$$p(y_a) = 40 - \frac{1}{4}y_a \tag{3}$$

where y_a is the number of movie tickets purchased by adults. The inverse demand curve for senior citizens is given by:

$$p(y_s) = 30 - \frac{1}{5}y_s \tag{4}$$

where y_s is the number of movie tickets purchased by adults. The cost function for the movie theater is given by:

$$C(y) = 4y \tag{5}$$

(a) If the movie theater can only charge a single price, what is the demand curve the movie theater sees?

(b) Given this demand curve, what price will the theater set and how many tickets will be sold? How many of these tickets are sold to adults and how many tickets are sold to senior citizens? What are the movie theater's profits?

(c) Now suppose that the theater can charge two different prices, one for adults and one for senior citizens. What prices will the movie theater charge and how many tickets will be sold to each type of consumer? What will the theater's profits be?

(d) Now suppose that the theater can not only charge different prices to different people but can also charge different prices for each ticket sold (first degree price discrimination). How many tickets will the theater sell and what will its profits be?

(e) The theater decides that rather than sell individual tickets, it will sell passes good for seeing twenty movies. What is the most the theater can charge for a twenty-movie pass and still have both adults and senior citizens buy it? (Note: Treat the adult demand curve as the demand for a single adult and the senior citizen demand curve as the demand for a single senior citizen.)

(f) If the theater decides to sell only forty-movie passes, what is the most it can charge for a pass and still have both adults and senior citizens buy the pass?

(g) Suppose that the movie theater offers both twenty-movie passes and forty-movie passes at the prices you found in parts (e) and (f). What will the firm's profits be? Could the firm adjust the pass prices to make even more money? If so, how?

3. **Collusion Between Two Movie Theaters**

Let's say that a town has two different movie theaters. Both theaters have cost curves given by:

$$C(y) = 5y \tag{6}$$

Demand for movie tickets is given by:

$$D(p) = 100 - 2p \tag{7}$$

(a) What would the socially efficient price and quantity be for movie tickets? What would each movie theater's profits be at the socially efficient price and quantity (note that with the constant marginal costs, it doesn't matter how the quantity is split between theaters)?

(b) The movie theater owners decide to collude. They plan to do the following: they will agree on a price and then split outut evenly between them. Under this arrangement, what price will the movie theater's choose? What will each theater's profit be?

(c) Suppose that one of the theaters decides to cheat and lower his price by 50 cents. Assume people will always buy from the theater with cheaper tickets. What will the cheating theater's profits be now? What will the profits be for the other theater?

(d) Given what you found in part (c), what to you expect to happen to the price of movie tickets over time?