

Problem Set #8

Section One: Monopoly

1. ACME is a monopoly producer of bowling balls. The demand for bowling balls is given by the following equation:

$$Q = 1000 - 10P$$

- a) If ACME's cost function is given by the following expression

$$C(Q) = 10Q$$

then find the price that ACME should charge in order to maximize profit. How many bowling balls will ACME sell?

- b) If ACME's cost function is given by:

$$C(Q) = 2Q^2$$

then find the price that ACME should charge in order to maximize profit. How many bowling balls will ACME sell in this situation?

- c) Create a graph that illustrates the answer that you found for part A. (You should graph D, MR, MC, and ATC.) Determine the level of economic profit earned by the monopolist. Calculate the deadweight loss caused by the monopolist.

2. The Gem Theater is a local monopolist in the town of Yellowfish. If the price of a movie ticket is \$7, and the elasticity of demand for movie tickets is five, then what is Gem's marginal cost of producing a single movie ticket?
3. Use the optimal pricing rule to show that a monopolist will never choose to price in the inelastic portion of its demand curve.
4. UNC Power has two plants that it can use to provide power to the residents of western North Carolina. The two plants have the following cost functions:

$$\text{Plant 1 - } C(Q) = 10 + \frac{Q^2}{10}$$

$$\text{Plant 2 - } C(Q) = 40 + \frac{Q^2}{20}$$

If the demand for power is given by $P = 4 - \frac{1}{100}Q$, then what price should UNC Power charge, and how many units of power will it sell? How much profit will the firm earn?

Section Two: Perfect Price Discrimination

5. Suppose that ACME bowling balls is able to perfectly price discriminate. If the demand for bowling balls is $Q = 500 - 20P$, and the marginal cost and average total cost of producing a bowling ball is \$10, then how many bowling balls will ACME sell? How much economic profit will the monopolist earn?
6. Provide a brief explanation for why an economist might be less concerned about a market being served by a monopolist that could perfectly price discriminate than one that could only charge a single price (a standard monopolist).

Section Three: Third Degree Price Discrimination

7. The Manor Theater in Charlotte is a local monopolist in the provision of fine arts films. The demand for films at the Manor Theater may be separated into two groups – adults and senior citizens. Their demand functions are given by the following expressions:

$$\text{Adults - } P = 10 - \frac{Q}{50}$$

$$\text{Senior Citizens - } P = 8 - \frac{Q}{25}$$

The Manor's cost function is $C(Q) = 100 + 2Q$.

- a) Find the profit-maximizing price that the Manor should charge each group. How many tickets will it sell to each group?
 - b) How much additional profit does the Manor earn by being able to engage in third degree price discrimination?
 - c) How does the Manor's ability to price discriminate affect the amount of consumer surplus enjoyed by each group?
8. USAir sells tickets to business and leisure travelers on its route to Chicago. USAir's cost function for the Chicago route is given by the following expression:

$$C(Q_T) = 10,000 + 5Q_T^2 \quad \text{Where } Q_T = Q_B + Q_L$$

The demand functions for the Chicago route are given by the following expressions:

$$\text{Business - } P = 1000 - 4Q_B$$

$$\text{Leisure - } P = 800 - 2Q_L$$

Given this information, answer the following questions:

- a) What price should USAir charge to each type of customer? How many tickets will it sell to each type of traveler?
- b) How large is the profit/loss earned by USAir?