Homework 6

Problem 1 A monopolist faces the demand curve $p = 24 - Q$, and has constant marginal cost of \$4. If the firm runs an advertising campaign, its demand shifts out to $p = 32 - Q$. What is the largest amount the firm would be willing to pay for this campaign?

Profit is \$100 with no campaign and \$196 with the campaign, so the firm would be willing to pay any amount less than \$96.

Problem 2 Suppose that BMW can produce and quantity of cars at a constant marginal cost of \$20,000 and a fixed cost of \$10 billion. You are asked to advise the CEO as to what prices and quantities BMW should set for sales in Europe and the United States. The demand for BMW's in each market is given by

$$Q_E = 4,000,000 - 100p_E$$
$$Q_{US} = 1,000,000 - 20p_{US}$$

where all prices are in dollars. Assume that BMW can restrict U.S. sales to authorized BMW dealerships only, so that resale is impossible.

a. What quantity of BMW's should the firm sell in each market, and what should the price be in each market? What will be BMW's total profit?

The profit-maximizing price in Europe is \$30,000, and is \$35,000 in the US. One million cars are sold in Europe, 300,000 in the US. Total profit is thus \$4.5B (don't forget to subtract off the \$10B in fixed costs when computing this).

b. If BMW were forced to charge the same price in each market, what would be the quantity sold in each market, the equilibrium price, and the company's profit?

If BMW must charge the same price in both markets, total demand is given by $Q = 5,000,000 - 120p$. Profit-maximizing price is then given by $p = \$30,833.33$, at which $1,300,000$ cars are sold. Total profits are \$4.08B.

Problem 3 The demand function for a monopolist's product is given by $p = 43 - 2q$. The monopolist has a constant marginal cost of \$3.

a. Find the monopolist's profit-maximizing price and quantity. What is his profit?

Price is \$23, quantity sold is 10, and profit is \$200.

b. Suppose the monopolist is able to perfectly price discriminate. What quantity will he sell, and what will his profit be?

He will sell quantity 20, at prices ranging from \$3 to \$43, for a profit of \$400.

c. Suppose the monopolist is able to charge a two-part tariff. What up-front fee will he charge, and how much will he charge for each unit?

Note: there is an ambiguity with this question. If this demand curve represents one individual's demand for the good, then the monopolist will charge an upfront fee of \$400, and a per-unit fee of \$3. If this demand curve represents market demand, there is not enough information to answer the question.

Problem 4 The Grand Theater is a movie house in a medium-sized college town. On any given night, if the theater is open, it must pay $500 in fixed costs (paying electricity, ushers, etc) regardless of how many people come to the theater. If the theater is closed, its costs are 0. There are two groups of people who come to the Grand Theater, students and non-students. Students have demand function $q_s = 220 - 40p_s$ while non-students have demand function $q_n = 140 - 20p_n$.

a. Suppose that the theater cannot tell students apart from non-students. What price will it charge? How many students will come? How many non-students? What will the profits of the Grand Theater be?

In this case, the total demand will be $Q = 360 - 60p$, marginal revenue will be $6 - \frac{1}{30}Q$, and so profit-maximizing quantity will be 180 patrons, at a price of $3. Profits are $40 ($3*180-$500).

b. Now suppose that the cashier can accurately tell students from non-students by asking students to show their student IDs. Students cannot resell their tickets to non-students after purchase. Will the Grand charge students and non-students different prices? What will these prices be? What will be the Grand's profits?

Treating students and non-students as two separate groups, the theater will charge students $2.75 and sell them 110 tickets, while charging non-students $3.50 and selling them 70 tickets. Total profits are $47.50.

c. Finally, suppose that the Grand Theater can only hold 150 people. If the theater is able to charge separate prices to students and non-students, what prices will it charge, and how many students and non-students will come?

We know that the number of students admitted plus the number of non-students admitted must equal 150. We also know that to be maximizing profits, it must be that the marginal revenue from the last student admitted must equal that from the last non-student admitted. Were this not so, the theater could admit one less from the low marginal revenue group and one more from the high marginal revenue group, and increase profits. Thus, the following two equations define the solution:

$$q_s + q_n = 150$$
$$5.5 - \frac{1}{20}q_s = 7 - \frac{1}{10}q_n$$

which has solution $q_n = 60$, $q_s = 90$, meaning $p_s = \$3.25$ and $p_n = \$4$.

Problem 5 Your firm produces 2 products, each at 0 marginal cost. You face four types of customers, each comprising 25% of your total customers (say you have N total customers). The groups have the following willingness to pay for your product:

customer	good 1	good 2
A	\$25	\$100
B	\$40	\$80
C	\$80	\$40
D	\$100	\$25

a. Compare selling these two products separately to bundling them and selling them together for one price. Which leads to a higher profit?

To sell the two goods bundled, you would charge a price of \$120 and make a profit of \$120N. To sell them separately, you would charge a price of \$80 for each good, and get profits of \$80N. Clearly, bundling them is superior to not.

b. Now consider the possibility that you sell these goods both bundled and unbundled (that is, you set three prices, one for good 1 alone, one for good 2 alone, and one for the bundle of good 1 and good 2). Would doing this improve upon the outcome of part a? Explain.

It does not seem that you could increase profits from the bundling outcome of part a by also sellign the products separately.

c. Now suppose that the production of each good entails a marginal cost of \$30. How does this information change your answers to a and b above? Is it better to sell the goods unbundled, bundled, or both bundled and separately?

Here, A values good 1 and D values good 2 at less than their marginal costs. Consider a bundled price of \$120, a price of \$95 for good 1 and a price of \$95 for good 2. In this case, A buys only good 2, B and C buy the bundle, and D buys only good 1. Profit is \$62.5N. This is higher than could be achieved with only bundling or only separate prices.