



15.010 / 15.011 Economics Analysis For Business Decisions

HOMEWORK SET #4

(Due Thursday, November 4th, 2004)

Name: _____

Section: _____

**Please staple this sheet to the front of your answer set.
Do NOT write your answers on this sheet.**



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DIRECTIONS: Answer all questions and show your work. Your completed homework is due in class or may be placed in the assignment box for your section before 4:30 p.m. *Late homework sets will not be corrected.* Please read the statement on 15.010/15.011 homework policy contained in the course overview.

1. A monopolist has to decide how to price its product in two markets and how to allocate product output between them. The markets are separated geographically by a national border. Demand in the two markets is:

$$Q_1 = 25 - 1/2 P_1$$

$$Q_2 = 50 - P_2$$

(Prices are in dollars and quantities are in units sold.) The monopolist's total cost is

$$TC = 10(Q_1 + Q_2).$$

What are the prices charged, total product shipped to each market, and total profits under the following two conditions:

- a. The border is opened to free trade
 - b. The markets are separated (the firm can ship to both markets, but product sold in one market can not be resold in the other).
2. A firm sells two goods, MP3 players and Walkmans, to a market consisting of two consumers, who have the following reservation prices.

Reservation Prices

| Consumer | MP3 Players | Walkmans |
|----------|-------------|----------|
| <i>A</i> | 30 | 90 |
| <i>B</i> | 96 | 30 |

The marginal cost of each good is constant at \$15. Compute the optimal prices and profits for the following conditions.

- a. Selling the goods separately.
- b. Bundling

3. Sloan is revising the pricing of its MBA program. The new tuition structure may include an annual tuition, a charge per course-hour, or both. A study of Sloan applicants shows that their willingness to pay for a Sloan education can be stated in terms of a demand for course-hours. Also, Sloan students can be divided into two groups, “normal” students (N) and workaholics (W), in terms of the number of hours they would demand if the School imposed a charge per course-hour. Each of the normal students will demand courses in the amount:

$$Q_N = 100 - 0.25 P$$

where Q is the number of course-hours per academic year and P is the price per course-hour. Each of the workaholics, on the other hand, has a demand of:

$$Q_W = 200 - 0.5 P$$

The school will admit 180 students from each group. (Students may choose not to enroll.) The marginal cost to the School is constant at \$100 per student course-hour. Sloan’s fixed cost is \$2.0 million per year.

For each of the following pricing schemes, please derive the optimal price structure and the total profit, on the assumption that the School’s objective is to maximize profit from the MBA program.

- A single fixed tuition per academic year (with a zero price per course-hour), with no limit on the number of course hours. *Hint:* Sloan may decide to induce both types of students to enroll or just the workaholics.
- A single tuition per academic year plus a single fee per course-hour. *Hint:* Again, Sloan may decide to induce both types of students to enroll or just the workaholics.
- A system that discriminates between the two groups, with a 2-part structure of annual tuition and per-hour fees for each. In other words, Sloan can identify the different types of students and offer each type a different two-part tariff.

4. Recycled Plastics, Inc. (RPI) has an exclusive license to produce and sell New England Patriots bobble-head dolls. These dolls can be manufactured in either of two plants located in Foxboro, MA and St. Louis, MO. The costs of production in each plant are respectively

$$TC_1 = 30 Q_1 + 0.5 Q_1^2$$

$$TC_2 = 30 Q_2 + 0.5 Q_2^2$$

where all quantities are measured in millions of dolls (and all prices are in dollars). In the wake of the Patriots’ stunning Super Bowl victory, the firm’s estimate of the demand curve for their dolls is: $P = (1/6) (340 - 5 (Q_1 + Q_2))$.

- How much should the firm plan to produce in each plant, and what price should it plan to sell the product at?

- b) Mr. Warner recently took a job as production manager at RPI's second plant in St. Louis. He wishes to reorganize his production facility and estimates that doing so will reduce the costs of at least some of the dolls he produces. In fact, he estimates that his plant's total cost curve will become: $TC_2 = 10Q_2 + (5/2) Q_2^2$. If the production facility were reorganized, how much should the firm now produce in each plant, and what price should it sell the product at?
- c) Should RPI implement Mr. Warner's plan? You may assume that there are no costs associated with the reorganization that he proposes.