

14.20 – Spring 2003
Prof. N. L. Rose

14.20 – Problem Set 3
Due Wednesday, April 16, 2003

1. Suppose Volvo can produce a new sedan with the cost function:

$$C(Q) = 50000 + 15Q$$

These sedans are sold in the European and U.S. markets. Demand is given by:

$$Q_E = 18000 - 400P_E$$

$$Q_U = 5500 - 100P_U$$

where E denotes Europe and U denotes the U.S. All prices and quantities are in thousands. Assume that it costs Volvo the same amount to produce and deliver a car for sale in the U.S. as in Europe.

- a. If Volvo must set a single price for its new sedans, what price should it set, what will be the quantity sold in each market, and what are Volvo's profits and total consumer surplus?
 - b. Assume that Volvo is able to restrict U.S. sales to authorized Volvo dealers only, and that individual consumers wishing to purchase a car in Europe, retrofit it to meet U.S. regulations, and ship it to the U.S. incur an additional cost of about \$8 thousand. What quantity of sedans should Volvo sell in each market, and what will be the price in each market? What are total profits and consumer surplus? Why does this differ from the optimal price and quantity you found in (a)?
 - c. The U.S. Supreme Court rules that Volvo cannot prevent auto brokers from purchasing cars in Europe, importing them into the U.S., and re-selling them to consumers. Assume that brokers can import the cars from Europe and prepare them for sale in the U.S. at a constant cost of about \$2 thousand per car. A large number of auto brokers are expected to enter the business, and price will be set competitively. How does this affect the maximum price Volvo can charge in the U.S., relative to the European price? How would this affect Volvo's choice of prices and quantities, and Volvo's profits and total consumer surplus?
2. RCN offers a variety of network television and special interest channels on cable. Assume that the marginal cost of delivering these to an individual customer is zero. RCN believes that it has 100,000 each of two customer types, with the following reservation prices for monthly cable services by each customer:

Customer Type	Network Television Channels	Special Interest Channels
Type A	15	11
Type B	10	17

Suppose RCN sets a price for each service separately. What prices would it choose and what are its operating profits? Would RCN Cable find it profitable to bundle both service types together in a single “enhanced basic service” bundle, and how would it set the price for that bundle?

3. Consider a market characterized by competition around the unit circle. There are 200 consumers uniformly distributed in characteristic space around the circle (density $L = 200$ in the market). Each consumer has a reservation price of \$4 per unit, and incurs travel costs, t , of \$2/unit distance if they purchase from a firm that is not at their preferred location. Each consumer will purchase exactly one unit from the lowest-effective-price firm provided that their effective price, $P + t \cdot (\text{distance to firm})$ is less than their reservation price of 4, and zero otherwise. Products can be produced at a constant marginal cost of \$1, and firms incur a fixed cost of \$4/outlet to begin production at each location on the circle.
 - a. Suppose there is free entry into this market, and each firm can enter this market with at most one product (location). How many firms (products) do you expect there to be in equilibrium? What will be the equilibrium price, quantity, and profits of each firm?
 - b. You are asked to advise the government on how many products would be optimal in this market. If you set products (locations) and prices to maximize total gross surplus (sum consumer and producer surplus) in this market, what will be the equilibrium price, quantity, and profits for each product? How many products should be provided in equilibrium?
 - c. Suppose a single firm owns rights to all locations in this product space. If this firm chooses products and prices to maximize its profits, would you expect the monopolist to provide more or fewer products (locations) than the free-entry equilibrium in (b)?
 - d. Compare the product choice outcomes under competition, monopoly, and social welfare maximization. Explain, in economic terms, how and why they differ.
4. On Sail! is a monopoly producer of a specialized sailboard marketed to resorts. On Sail! can produce two types of boards: “durable” boards last for 2 years and cost the monopolist $c_L=3$ to produce, while “seasonal” boards last for 1 year and cost the seller $c_S=2$. Demand for board use in each period is represented by the inverse demand function $R(Q) = 12-2Q$.

Assume that resorts can distinguish durable from seasonal boards, and that they expect the market for these boards to last only two years (after which time, consumers will want some other new product and there will be no demand for using these boards). The discount factor is 1.0, and there is no depreciation over the product’s life (the product gives full service during its stated life, and at the end of its stated life becomes worthless).

- a. Suppose On Sail! sells the boards. If it chooses to produce durable boards in the first year and seasonal boards in the second year, how many boards of each type should the firm produce each year? What are its profits each year, and total profits over the two-year product cycle.
 - b. Suppose the firm sells boards, but decides to produce only seasonal boards. Calculate how many boards the firm will sell each year, its profits each year, and its total profits.
 - c. You've recommended to On Sail! that it lease, rather than sell, its boards to resorts. What type of boards is it optimal for the firm to produce? Calculate how many boards of each type the firm should produce each year, its profits each year, and total profits.
 - d. From a societal perspective, which policy (a, b, or c) produces the highest overall welfare (consumer surplus plus producer profits)? Why?
5. Read the text on predatory pricing, chapter 21. In May 1999, the Department of Justice filed a predatory pricing suit against American Airlines (see the materials in U.S. v. AMR, linked on the course website to the usdoj.gov website). On April 27, 2001, a federal judge dismissed the case concluding: "The government's claim in the present case fail because American did not price below an appropriate measure of cost, because it at most matched the prices of its competitors, and because there is no dangerous probability (even assuming below-cost pricing) of recoupment of American's supposed profit by means of supra-competitive pricing." **We will discuss this case in class on Wednesday, April 16. You may wish to keep a copy of these answers for the case discussion.**
- a. What behavior by American Airlines did the Department of Justice object to? Why?
 - b. Is the airline industry characterized by conditions that might be conducive to predatory behavior?
 - c. What alternative (non-predatory) explanations could you offer for American's behavior?