

14.27 Problem Set #2

Due on the day of lecture on Market Leadership.

1. Suppose that all economics professors are identical. They all derive \$600 worth of utility from owning a full working copy of the current year's version of Stata or \$200 worth of utility from owning a student version with some features disabled. Students don't care at all about the extra features of the full version. At any price p for the student version, student demand at MIT is $300 - 2p$ units per year. Assume that Stata has no marginal cost of selling its software.

If Stata sells the student version for p , what price will it choose for the full version? If there are forty economics faculty members, what are the profit maximizing prices? Has the company created a Pareto-improvement by damaging some of its products, as opposed to marketing only the full version? What would happen if there were one hundred faculty members?

2. Suppose two firms are located at opposite endpoints of a circle of unit circumference in product space. Suppose that a continuum of consumers is uniformly distributed around the circle. Consumers have utility of $v - t d - p$ if they purchase one unit of a product from a firm located a distance d away from them around the circle. They receive zero utility if they don't purchase a product and will buy from at most one firm.

Write down the equation that determines the demand for firm 1's product as a function of the two firms' prices. Use this to determine firm 1's profit function and to find the price p_1 that maximized firm 1's profits holding p_2 fixed. Solve firm 1 and firm 2's profit maximization equations simultaneously and show that you get the equilibrium described in class.

This example involves Bernoulli-style competition, since the firms choose prices. What is the difficulty with trying to adapt Cournot-style competition (firms choose quantities) to this situation?

3. Consider a two-stage game in which firms may enter by paying a fixed cost of E and then compete as in the model of competition around a circle. For what values of E is there

an equilibrium in which one firm is a monopolist? For what values of E is there an equilibrium with two firms? Extra Credit: What would happen in this model if the fixed cost of entry was a function of the firm's capacity, e.g. a firm could enter and choose a capacity of Q at a cost of eQ ? Observe that this last scenario involves a combination of Bernoulli and Cournot competition.

4. Go to the census bureau's web site and look at the list of industry reports available there from the 1997 census of manufactures:

<http://www.census.gov/prod/www/abs/97ecmani.html>.

Pick two industries from the list that sound interesting. Look in the reports to see how many large plants there are in the industry, e.g. how many plants are needed to account for 50% of the industry's output? In the table that breaks down establishments by size look at the difference between the value of shipments and the sum of the cost of materials and wages. What does this suggest about the difference between price and marginal cost? How does this difference compare across the different sizes of establishments?

Do the two industries you picked look similar or different? If they are different, speculate about why this might be the case.