

Microeconomics II

Homework 5

Question 1.

The inverse market demand curve for bean sprouts is given by $P(y) = 100 - 2y$, and the total cost function for any firm in the industry is given by $TC(y) = 4y$.

- If the bean-sprout industry were perfectly competitive, what would be the industry output and price?
- Suppose that two Cournot firms operate in the market, and each firm has the above total cost function. Find the reaction functions of the two firms.
- Find the Cournot equilibrium output and price.
- For the Cournot case, draw the two reaction curves and indicate the equilibrium point on the graph.
- If the two firms decide to collude, what will be the industry output and price?
- Suppose one firm acts as a Stackleberg leader and the other firm behaves as a follower. Write down the maximization problem for the leader.
- What are the levels of output of the leader and follower? What is the industry price? Compare them to the Cournot case.

Question 2.

Grinch is the sole owner of a mineral water spring. It costs Grinch \$2 per gallon to bottle this water. The inverse demand curve for Grinch's mineral water is $p = 20 - .20q$, where p is the price per gallon and q is the number of gallons sold.

- Write down Grinch's profit function as a function of q , and find the profit-maximizing choice of q for Grinch.
- What price does Grinch get per gallon of mineral water if he produces the profit-maximizing quantity? How much profit does he make?
- Suppose, now, that Grinch's neighbor, Grubb finds a mineral spring that produces mineral water that is just as good as Grinch's water, but that it costs Grubb \$6 a bottle to get his water out of the ground and bottle it. Total market demand for mineral water remains as before. Find the Cournot equilibrium, i.e. outputs of Grinch and Grubb, and the industry price.
- Now suppose that Grinch chooses its output level first, and then Grubb follows. Find the Stackelberg equilibrium outputs and price.

Question 3.

Albatross Airlines has a monopoly on air travel between Peoria and Dubuque. If Albatross makes one trip in each direction per day, the demand schedule for round trips is $q = 160 - 2p$, where q is the number of passengers per day. (Assume that nobody makes one-way trips.) There is an "overhead" fixed cost of \$2,000 per day that is necessary to fly the airplane regardless of the number of passengers. In addition, there is a marginal cost of \$10 per passenger. Thus, total daily costs are $2,000 + 10q$ if the plane flies at all.

- Graph the marginal revenue curve, the average and marginal cost curves.

- B. Calculate the profit-maximizing price and quantity and total daily profits for Albatross Airlines.
- C. If another firm with the same costs as Albatross Airlines (AA) were to enter the Dubuque-Peoria market and if the industry then became a Cournot duopoly, would the new entrant make a profit?
- D. Suppose that the demand for airplane trips between Dubuque and Peoria doubles to become $q = 320 - 4p$. Suppose that the original airplane had a capacity of 80 passengers. If AA must stick with this single plane and if no other airline enters the market, what price should it charge to maximize its output and how much profit would it make?
- E. Let us assume that the overhead costs per plane are constant regardless of the number of planes. If AA added a second plane with the same costs and capacity as the first plane, what price would it charge and many tickets would it sell?
- F. If AA could prevent entry by another competitor, would it choose to add a second plane?
- G. Suppose that AA stuck with one plane and another firm entered the market with a plane of its own. If the second firm has the same cost function as the first and if the two firms act as Cournot oligopolists, what will be the price and the quantities?