Intermediate Micro In-Class Problems

Oligopoly & Game Theory II

June 29, 2016

Profit Sharing Oligopoly

Two firms are competing in a market. Firm 1 and Firm 2 simultaneously announce quantities, q_1 and q_2. The price charged in the market is given by $p = 1 - \frac{q_1}{2} - \frac{q_2}{4}$. Both Firm 1 and Firm 2 have 0 marginal cost of production.

1. What is Firm 1's reaction function?
2. What is Firm 2's reaction function (note, that it is not the same as Firm 1's)?
3. What is the equilibrium price and equilibrium quantities?
4. Firm 1 and Firm 2 enter into a profit sharing agreement where each receives 25% of the other firm's profits. Firm 1 and Firm 2 independently decide on q_1 and q_2.[1] Given this arrangement, write down each of the two firms' profit functions.
5. What are the equilibrium quantities and price? Are consumers better or worse off as compared with part (3)?

Question 4 (8 points)

Firm 1 has cost function $C_1(q) = 3q + q^2$ where q is the quantity of its output. Firm 2, a more efficient firm, has a cost function $C_2(q) = q^2$.

1. Suppose that each firm can sell all of its output for p per unit. What is the profit-maximizing quantity that Firm 1 will choose (as a function of p)? Note that no firm can be compelled to supply if it would lose money.
2. Suppose that each firm can sell all of its output for p per unit. What is the profit-maximizing quantity that Firm 2 will choose (as a function of p)? Note that no firm can be compelled to supply if it would lose money.

[1] One way this can happen is when competitors buy shares in each others' companies.

3. For a given price p, what is the total supply for the industry as a whole?

4. Suppose that the market demand is $D = 2 - p$. Find the price which clears the market. How many firms produce at the market clearing price?

5. Now suppose that there is an increase in demand and after the increases, $D = 6.5 - p$. Find the new equilibrium price and quantity sold. Do both firms produce now?

6. What profits do each firm make at the market-clearing price when demand is $D = 6.5 - p$?

7. Suppose a third firm, Firm 3, with the same cost function as Firm 2 is considering entering the market. Only Firm 1 and Firm 2 have a license to operate in this market. Firm 1 is considering selling its license to Firm 3. Suppose Firm 1 can make a take-it-or-leave-it offer to Firm 3, at what price should it offer the license?