Intermediate Micro In-Class Problems Oligopoly & Game Theory II

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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.

¹One 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?