Exercise 1  *Industries with price or quantity competition (10%, 30 words per market)*

Which model, the Cournot or the Bertrand model, would you think provides a better first approximation to each of the following industries/markets: (a) the oil refining industry, (b) farmer markets, (c) cleaning services.

Exercise 2  *Capacity-constrained imperfect competition (7x5.7=40%, 30 words per answer on average)*

Suppose two firms in an industry face linear inverse demand curves $P_i(q_i, q_j) = 7 - q_i - q_j$, $i = 1, 2$, $i \neq j$. Firms compete in a two-stage game; first they set capacity and then they set price or output. At the first stage firms set capacities, at this stage the marginal costs of capacity is 6. Suppose that firms have zero marginal costs of production up until installed capacity and that production above capacity is not feasible. In case of rationing, rationing is assumed to be efficient (consumer valuations and unit prices are matched from the highest to lowest).

1. Suppose each firm has a capacity of 7. Analyze competition at stage 2. Determine the Nash equilibrium if both firms set prices.

2. Consider the same situation as in (1) but suppose that firms choose quantities, not prices at stage 2. Determine the Nash equilibrium.

3. Consider the same situation as in (1) but suppose that consumers do not observe price and incur a cost of 1/2 if, after visiting one firm, they decide to visit the other firm. [You can think of identical consumers with the demand function as given above]. Characterize the equilibrium if both firms set prices.

4. (a) What is the highest capacity that a monopoly firm could set and still earn non-negative profits. Denote that capacity $\bar{q}$. (b) Suppose that firms have given capacities $\bar{q}_1$ and $\bar{q}_2$, respectively. Argue that $\bar{q}_i \leq \bar{q}$, $i = 1, 2$). If firm 1 is the high-price firm, what is its demand function?

5. (a) Show that the Nash equilibrium in prices in the stage game after capacities have been set satisfies $p_1 = p_2 = p^* = a - \bar{q}_1 - \bar{q}_2$. (b) Determine the subgame perfect equilibrium of the two-stage game in which firms first set capacities and then prices.
6. Suppose that firms collude at the stage at which they set capacity. What should they do?

7. Suppose that firms are able to use a less costly technology (e.g., the marginal cost of capacity falls from 6 to 11/2). What are the competitive effects of this reduction in capacity costs? What would happen if those costs fell to zero? Discuss your results.

Exercise 3  
Research Article (5x10=50%, 40 words per answer on average)


1. (a) Why a demand shock argument cannot be a satisfactory explanation for the 1955 increase in auto sales? (b) Why is the evidence that profits have increased in 1955 not sufficient to argue that the 1955 increase in auto sales is due to a supply shock?

2. (a) Compute the price elasticity of substitution of good \( x_i \) with respect to the price of \( x_j \). How does it depend on the distance between \( i \) and \( j \)? What happens when \( x_i - x_j \) goes to zero? (b) Why don’t 4-5 decrease as much as 2-3 in figure 2a and 2b? Would you expect 6-7 to have changed at all?

3. What distinguishes the paper’s explanation for the 1955 increase in sales from a standard supply explanation assuming a decrease in cost? Why is the argument convincing?

4. Why is it important that the estimated parameters in Table IV do not change across years?

5. Assume that the product qualities (\( x \)) are chosen by firms. Would this change the analysis?