

**KANSAS STATE UNIVERSITY**  
**Economic Analysis For Business**

Problem Set 5  
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Economics 815  
Spring 2003

1. The inverse market demand function is given by  $P = 24 - 1(q + Q)$ , where  $P$  is price,  $q$  is fringe output and  $Q$  is dominant firm output. The cost function for the dominant firm is given by  $C(Q) = 4Q$ . The cost function for the fringe firm is given by  $C(q) = 25 + 4q$ , where “25” represents the sunk cost of entry into the market.
  - a) What is the monopoly level of output for the dominant firm?
  - b) Derive an expression for the output of the fringe firm for any output choice,  $Q$ , of the dominant firm.
  - c) What is the limit level output for the dominant firm and the corresponding limit price?
2. Let the inverse market demand function be given by  $P = 20 - (q + Q)$ , where  $q$  is the output of the competitive fringe and  $Q$  is the output of the dominant firm. Suppose the dominant firm’s cost function is given by  $C(Q) = 2Q$  and the entrant’s cost function is given by  $C(q) = 4q$ . What is the limit level of output,  $Q^L$ , and the corresponding limit price,  $P^L$ ?
3. Let the inverse market demand function be given by  $P = 20 - Q$ , where  $Q = q_1 + q_2$ , and  $q_i = 1, 2$  represents the output level of firm  $i$ . Suppose the cost function is of the form  $C(q_i) = 2q_i$ ,  $i = 1, 2$ .
  - a) Derive the reaction function for firm  $i$ ?
  - b) Determine the Nash-Equilibrium output level, market price and industry profits?
  - c) How much better off are consumers under Cournot competition relative to the monopoly case?
4. Two firms compete in a Bertrand setting for homogenous products. The market demand curve is given by  $Q = 100 - P$ , where  $Q$  is quantity demanded and  $P$  is price. The cost function for firm 1 is given by  $C(Q) = 10Q$  and the cost function for firm 2 is given by  $C(Q) = 4Q$ . What is the Nash-Equilibrium price? What are the profits for each firm in equilibrium?