

**EC3322**  
**Industrial Organization I**  
**Semester 1, 2015-2016**  
**Tutorial #9**

*You will receive full credit if you present your attempt at the solution during tutorial, whether or not you have the correct answer. Also, feel free to discuss the questions and answers with other students who have not yet attended tutorial. However, I request that you do not ask former students of this module or current students who attend an earlier tutorial than you for the answers before your own tutorial has taken place.*

1. (Final, Sem 1, 2014-15) Is it possible for the leader in a Stackelberg model of quantity competition to have lower profits than in a Cournot simultaneous move game?
  - (a) Yes, if the costs of the leader are higher than the costs of the follower.
  - (b) No, never.
  - (c) Yes, if the costs of the follower are higher than those of the leader.
  - (d) Yes, always.
2. (Final Sem 2, 2013-14) The demand curve for a good is  $P = 90 - Q$ . The marginal cost is  $MC(Q) = Q$  for  $Q \leq 40$  and infinite for  $Q > 40$ . That is, the maximum quantity that can be supplied to this market is  $Q = 40$ .
  - (a) What is the monopoly price and quantity?
  - (b) What is the deadweight loss associated with the solution in (a)?
  - (c) Draw a graph of your answer indicating the monopoly price and output and the deadweight loss, if any.
3. (Final 2012) Suppose that two firms are engaged in Bertrand competition. There are 10,000 people in the market. If the price is \$10 or below, each person buys one unit. If the price is higher than \$10, no one buys the good. Currently both firms have a constant marginal cost of \$5 (and no fixed costs).
  - (a) What price will each firm charge in equilibrium? What are each firm's profits?

- (b) Suppose firm 1 can adopt a new technology that lowers its marginal cost to \$3. What is the maximum amount that the firm would be willing to pay for this technology?

4. (Final Sem 2, 2014-15) A profit-maximizing firm is a member of a cartel, earning 100 in profit per period. The firm must decide whether to stick to the cartel agreement or deviate. If the firm cheats, the cartel breaks down when the cheating is detected and the competitive outcome prevails forever, which results in zero profit per period. The firm's discount factor is 0.5.

There are two different scenarios regarding the detection of cheating behavior. In the first scenario, cheating is detected at the end of the first period of cheating. In the second scenario, cheating is not detected until the end of the second period of cheating.

What can you say about the per period deviation profit if the firm would not want to cheat under scenario 1 but would want to cheat under scenario 2?

*The topic of the next question will be discussed during week 13 lecture. However, you should be able to solve it with what you have learned in the oligopoly lectures.*

5. (Final Sem 2, 2014-15) Consider two Bertrand competitors who sell differentiated products with demand given by:

$$q_1 = 4 - p_1 + 2p_2 \quad \text{and} \quad q_2 = 4 - 2p_2 + p_1$$

Assume that costs are zero.

- (a) Suppose that prices are chosen simultaneously. What are the equilibrium prices?
- (b) Suppose now that prices are chosen sequentially with firm 1 choosing first, and firm 2 choosing second. What are the equilibrium prices?
- (c) Continue to assume that the two firms choose price sequentially, but now assume that firm 2 has entry costs of  $F = 8$  (assume that firm 1 has no fixed costs). What is the limit price of firm 1?
- (d) Based on your answer in part (c), would firm 1 want to deter entry? Why or why not?