ECO 101A: Tutorial # 9

Date: 11/04/2017

1. Demand for light bulbs can be characterized by $Q = 100 - P$, where Q is in millions of boxes of lights sold and P is the price per box. There are two producers of lights, *Everglow* and *Dimlit*. They have identical cost functions: $C_i = 10Q_i + 0.5Q_i^2$ (i=E,D) where $Q=Q_E + Q_D$.
   a) Unable to recognize the potential for collusion, the two firms act as short-run perfect competitors. What are the equilibrium values of Q_E, Q_D, and P? What are each firm's profits?
   b) Top management in both firms is replaced. Each new manager independently recognizes the oligopolistic nature of the light bulb industry and plays Cournot. What are the equilibrium values of Q_E, Q_D, and P? What are each firm's profits?
   c) Suppose the *Everglow* manager guesses correctly that *Dimlit* is playing Cournot, so *Everglow* plays Stackelberg. What are the equilibrium values of Q_E, Q_D, and P? What are each firm's profits?

2. Consider a village where there are only two dairies and they are the only producers of milk. The local demand for milk is given by (P denotes price measured in cents, Q denotes the total quantity measured in cartons): $P = 2000 - 2Q$. Both farmers have the same cost function given by (C is total cost measured in cents and q is individual output measured in cartons): $C = 80{,}000 + 560\ q$.
   a) Calculate and draw the reaction (or best reply) function of firms 1 & 2.
   b) Calculate the Cournot-Nash equilibrium. Give the output of each firm, the total output, the price and the profit of each firm.
   c) Compare social welfare (producer surplus + consumer surplus) at the Cournot-Nash equilibrium with the social welfare that would result if there were only one firm in the industry (with the same cost function as above). How do you explain the result?

3. Suppose the market for tennis shoes has one dominant firm and five fringe firms. The market demand is $Q = 400 - 2P$. The dominant firm has a constant marginal cost of 20. The fringe firms each have a marginal cost of $MC = 20 + 5q$.
   a) Verify that the total supply curve for the five fringe firms is $Q_f = P - 20$.
   b) Find the dominant firm's demand curve.
   c) Find the profit-maximizing quantity produced and price charged by the dominant firm, and the quantity produced and price charged by each of the fringe firms.
   d) Suppose there are ten fringe firms instead of five. How does this change your results?
   e) Suppose there continue to be five fringe firms but that each manages to reduce its marginal cost to $MC = 20 + 2q$. How does this change your results?