PROBLEM SET #6: FIRM OBJECTIVES, PRODUCTION COSTS

A. Profit Maximization

1. (a) Suppose that the firm’s demand curve for its product is flat at P=6. What is total revenue (TR), average revenue (AR) and marginal revenue (MR) as a function of the quantity of output q. Graph each of these on a diagram with output on the horizontal axis.

(b) Suppose that the firm’s demand curve for its product is \( q = 20 - 2P \). Calculate total revenue (TR), average revenue (AR) and marginal revenue (MR) for \( q = 0, 1, 2, \ldots \) etc. Graph each of these on a diagram with output on the horizontal axis.

(c) Show that in (a) if the firm chooses q so that MR = MC, then it will set P = MC.

(d) Show that in (b) if the firm chooses q so that MR = MC, then it will set q at a point where P > SMC. Show that this decision is inefficient.

2. In a perfectly competitive industry, firms set output such that P = SMC (short run marginal cost). Using this criterion analyze whether the following industries are perfectly competitive or not:
   (a) College Economics 1 texts.
   (b) Auto dealerships.
   (c) The US airline industry.
   (d) The movie theater market.
   (e) Long distance telephone service providers.
   (f) Restaurants.

B. Firm and Industry Costs

3. Suppose that McDonald’s produces hamburgers at a constant LMC of $2 each. Plot the LAC and LTC as a function of output on a diagram with output on the horizontal axis.

4. Suppose that Ford produces a particular model of auto only with a lumpy investment of $1 billion in research and development. Once this investment is undertaken they can produce vehicles at a constant long run marginal cost of $10,000 each. Graph the LTC and LAC curves as a function of output, q.

5. A firm has short run total costs, \( STC = 9 + 2q + q^2 \). It has short run marginal costs of 2+2q (these are just the derivative of STC with respect to q).

   (a) Calculate FC, SVC, AFC, SAVC, SATC, SMVC as functions of q.
   (b) Plot on a diagram SATC, SAVC, AFC and SMC as a function of q.
   (c) Show that SMC = SATC at the point where SATC is minimized.