

Homework Set 5

1. (5%) Suppose a firm's cost function is $C(q) = 80 + 12q + 5q^2$. What level of output minimizes AC? At that level of output, what is AC? MC?
2. (10%) I have two plants. One has a cost function $C = 3 + 10q$. The second plant has a cost function $C = 15 + q + 0.5q^2$. I want to produce 80 units of the product. How many should I produce at the first plant? At the second? Explain your answer.
3. (10%) A company operates two oil wells in a state. Well A is capable of producing 1,000 barrels per day and well B is capable of producing a maximum of 900 barrels a day. The state government regulated the rate of oil extraction from each well in the state. These restrictions are expressed in terms of the percentage of the maximum flow from each well (Method 1). Currently the government restricts output of each well to 50 percent of maximum output and so the total allocation for the company is 950 barrels a day. Suppose the government is considering a different method of regulating the industry. Under Method 2, it simply restricts the company's output to 950 barrels per day. Compare the two methods of regulation and explain whether they would result in the same rate of utilization of the two wells.
4. (10%) A firm operates a plant in Ohio and another plant in Texas. Show graphically how the firm allocates production between the two plants to that it produces q^* units per period at minimum total cost. Suppose that the officials in Ohio try to entice the company to schedule all of its production there. With the aid of graphs show the minimum size of a lump sum subsidy that Ohio would have to offer the company before it would shift all production to Ohio

5. (10%) The number of beer manufacturers has declined over time. The accompanying table shows the number from 1947 to 1987

Year	Number of Companies
1947	404
1954	263
1958	211
1963	171
1967	125
1972	108
1977	81
1982	67
1987	101

How would you explain the 83% decline in the number of companies between 1947 and 1982? How would you explain the growth of companies between 1982 and 1987?

6. (5%) A firm has a cost function

$$C = 16 + 2q + q^2.$$

The current price of the product in the market is 30. How many units should the firm produce? What will be its profits?

7. (10%) All the competitive firms in an industry have a cost function

$$C = 16 + 2q + q^2.$$

The demand function is $Q = 800 - 20p$. Assuming that firms can enter and leave freely, what will be the equilibrium price of the product? The equilibrium quantity sold? The number of firms?

8. (10%) The market for Thumpleblowers is global and highly competitive. Many European and Japanese firms offer Thumpleblowers for sale in the United States at \$80 each. The demand for Thumpleblowers in the United States has been extensively studied. It is $Q = 5000 - 50p$. Two American firms produce Thumpleblowers: their cost functions are:

$$\text{Acme: } C = 10 + 10Q + 5Q^2$$

$$\text{Baker: } C = 20 + 6Q + Q^2$$

How many Thumpleblowers will Acme Produce? Baker? How many will be imported?

9. (5%). Normally competitive firms with constant long run costs find that increases in market demand mean no increase in long run profits. This is also true if there are pecuniary external diseconomies. Explain whether you agree or disagree with this statement.

10. (5%) If a new technology for producing a product is discovered so that it is possible to build plants that have lower unit production costs than existing plants for any given level of production, it will be economical to shut down existing plants quickly. Explain whether you agree or disagree with this statement.

11. (!0%) A firm's cost function is given by the following table:

Quantity	Cost
0	10
1	12
2	14
3	17
4	20
5	25
6	32
7	41

Assuming that the current price of the product is \$9, how many units will the firm produce (remember our rules for breaking ties)?

If all other firms in the industry have the same cost function, what will be the price of the product.

12. (10%) Tell me which of the following statements is false- and explain why that statement is false:
- (a) In a perfectly competitive industry where all firms have the same cost function the short run supply curve may be upward sloping, but the long run supply curve is infinitely elastic at the current level of operation unless there are pecuniary external diseconomies of scale.
 - (b) In a perfectly competitive industry, where many existing firms have one cost function and the other, newer firms, have a different cost function using technology also available to potential entrants, the long run supply curve is infinitely elastic at the current level of operation unless there are pecuniary external diseconomies of scale.
 - (c) In a perfectly competitive industry, where each firm has a different cost function, the long run supply curve is infinitely elastic at the current level of operation unless there are pecuniary external diseconomies of scale