Problem Set 4 Part B

1. A firm uses two inputs in production: capital and labor. In the short run, the firm cannot adjust the amount of capital it is using, but it can adjust the size of its workforce. What happens to the firm's average total cost curve, the average variable cost curve, and the marginal cost curve when
   a. the cost of renting capital increases?

      Since capital is fixed in the short run, the cost of capital is a fixed cost. Therefore, only average total cost will be affected by a rise in the price of capital. Average variable cost and marginal cost will remain the same. The average-total-cost curve will shift up.

   b. the cost of hiring labor increases?

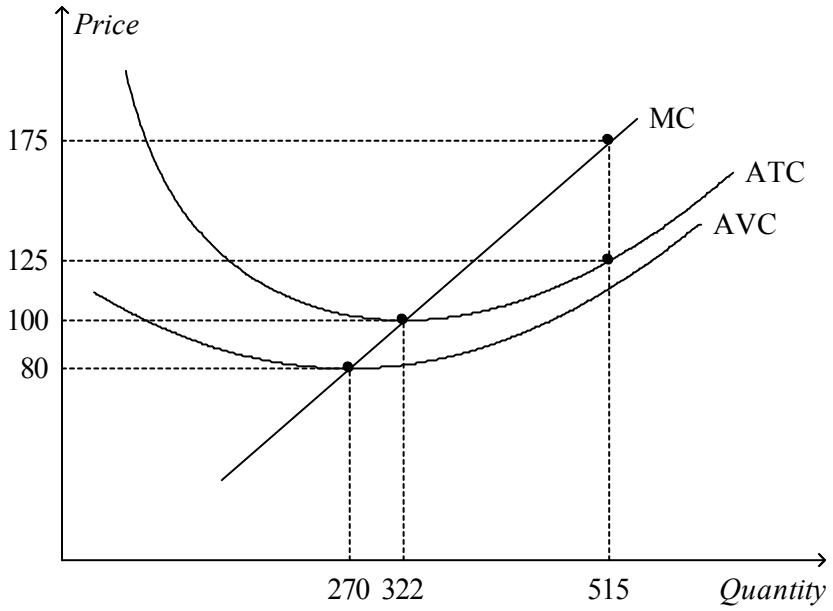
      Labor is a variable expense, so an increase in the price of labor will increase average variable cost, average total cost, and marginal cost. All three cost curves will shift up.

2. Bob's lawn mowing service is a profit maximizing, competitive firm. Bob mows lawns for $27 each. His total cost each day is $280, of which $30 is a fixed cost. He mows 10 lawns a day. What can you say about Bob's short- run decision regarding shutdown and his long-run decision regarding exit?

   Because Bob's average total cost is $280/10 = $28, which is greater than the price, he will exit the industry in the long run. Because fixed cost is $30, average variable cost is ($280 − $30)/10 = $25, which is less than price, so Bob will not shut down in the short run.

3. Suppose a firm that is operating in a perfectly competitive market faces total fixed costs (FC) of $1000 and a market price of $50. The firm chooses to produce 200 units. The average variable cost (AVC) of producing 200 units is $55. Is this firm acting like a profit maximizer? Why or why not? (Hint: what are the firm's profits/losses if it operates versus if it chooses to shutdown?) No. The firm should shut down b/c its AVC>P. By producing this firm is losing $2000. If it shutdown its losses would only be $1000.

4. This graph represents the cost structure of a representative profit-maximizing firm that is operating in a perfectly competitive market. Use the graph below to answer the questions that follow.



a. Suppose the market price is $175. How many units will this firm produce? How much revenue will the firm earn? What are the firm's profits/losses? The firm will produce 515 units; TR = $90,125; Profit = ($175-$125)515 = $25,750

b. If the market price is $125, then what is the marginal revenue of the 300th unit? MR=P=$125

c. Consider the following prices. Determine whether this firm will choose to operate or shutdown at these prices in the short run.
   - $150; operate
   - $100; operate
   - $90; operate
   - $80; operate
   - $50; shutdown

   At which of the above prices will the firm's losses = FC? $80 and $50

d. Consider the following prices. Determine whether this firm will choose to operate or exit the market at these prices in the long run.
   - $150; operate
   - $100; operate
   - $90; exit
   - $80; exit
   - $50; exit

   At which of the above price will the firm's profits be normal (i.e. profit = $0)? $100

5. An industry currently has 100 firms, all of which have fixed costs of $16 and average variable cost as follows:

Quantity	Avg. Variable Cost

1	$1
2	2
3	3
4	4
5	5
6	6

a. The price is currently $10. What is the total quantity supplied in the market? If the price is $10, each firm will produce 5 units, so there will be 5 × 100 = 500 units supplied in the market.
b. As this market makes the transition to its long- run equilibrium, will the price rise or fall? Will the quantity demanded rise or fall? Will the quantity supplied by each firm rise or fall? At a price of $10 and a quantity supplied of 5, each firm is earning a positive profit because price is greater than average total cost (profit = $9 per firm). Thus, entry will occur and the price will fall. As price falls, quantity demanded will rise and the quantity supplied by each firm will fall.
c. How much output will the firm produce if its fixed costs fall from $16 to $5? The market price is still $10. No change in the rate of output since MC have not changed.

6. A firm in a competitive market has the following cost structure:

Output	Total Cost
0	$5
1	$10
2	$12
3	$15
4	$24
5	$40

   a. If the market price is $4, how many units will the firm produce in the short run? 3 In the long run? 0 b/c the firm will exit the market.
   b. If this is a representative firm in the competitive market, what will happen to the market price in the long run? When firms exit the market, the market supply curve will shift to the left → market price will rise.

7. Ball Bearings, Inc. faces costs of production as follows:

Quantity	Total Fixed Costs	Total Variable Costs
0	$100	$0
1	100	50
2	100	70
3	100	90
4	100	140
5	100	200
6	100	360

   a. The price of a case of ball bearings is $50. Seeing that she can't make a profit, the Chief Executive Officer (CEO) decides to shut down operations. What are the firm's profits/ losses? Was this a wise decision? Explain.If the price is $50, the firm will minimize its loss by producing 4 units (note: find the quantity where MC=P). This would give the firm a loss of $40. If the firm shuts down, it will earn a loss equal to its fixed cost ($100).

   b. Vaguely remembering his introductory economics course, the Chief Financial Officer tells the CEO it is better to produce 1 case of ball bearings, because marginal revenue equals marginal cost at that quantity. What are the firm's profits/ losses at that level of production? Was this the best decision? Explain.If the firm produces 1 unit, its loss will still be $100. However, because the marginal costs of

the second and third unit are lower than the price, the firm could reduce its loss by producing more units.