Problem Set 3

Part I – Multiple Choice

1. Bev is opening her own court-reporting business. She financed the business by withdrawing money from her personal savings account. When she closed the account, the bank representative mentioned that she would have earned $300 in interest next year. If Bev hadn’t opened her own business, she would have earned a salary of $25,000. In her first year, Bev’s revenues were $30,000. Which of the following statements is correct?
   a. Bev’s total explicit costs are $25,300.
   b. Bev’s total implicit costs are $300.
   c. Bev’s accounting profits exceed her economic profits by $300.
   d. Bev’s economic profit is $4,700.

ANS: D

2. Refer to the figure above. Which of the following is true of the production function (not pictured) that underlies this total cost function?
   (i) Total output increases as the quantity of inputs increases but at a decreasing rate.
   (ii) Marginal product is diminishing for all levels of input usage.
   (iii) The slope of the production function decreases as the quantity of inputs increases.

   a. (i) only
   b. (ii) and (iii) only
   c. (i) and (iii) only
   d. (i), (ii), and (iii)

ANS: D
3. Suppose that a firm has only one variable input, labor, and firm output is zero when labor is zero. When the firm hires 6 workers the firm produces 90 units of output. Fixed costs of production are $6 and the variable cost per unit of labor is $10. The marginal product of the seventh unit of labor is 4. Given this information, what is the average total cost of production when the firm hires 7 workers?
   a. $10.06
   b. $9.64
   c. 81 cents
   d. 70 cents
   ANS: C

4. Refer to Table 1. What is the average total cost of producing 6 cakes at Betty’s Bakery?
   a. $16.34
   b. $22.00
   c. $22.17
   d. $22.57
   ANS: C

5. Refer to Table 1. What is the marginal cost of the 8th cake at Betty’s Bakery?
   a. $20
   b. $27
   c. $160
   d. $185
   ANS: B
6. Consider the following table of long-run total cost for four different firms:

<table>
<thead>
<tr>
<th>Quantity</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm 1</td>
<td>$210</td>
<td>$340</td>
<td>$490</td>
<td>$660</td>
<td>$850</td>
<td>$1,060</td>
<td>$1,290</td>
</tr>
<tr>
<td>Firm 2</td>
<td>$180</td>
<td>$350</td>
<td>$510</td>
<td>$660</td>
<td>$800</td>
<td>$930</td>
<td>$1,050</td>
</tr>
<tr>
<td>Firm 3</td>
<td>$120</td>
<td>$250</td>
<td>$390</td>
<td>$540</td>
<td>$700</td>
<td>$870</td>
<td>$1,050</td>
</tr>
<tr>
<td>Firm 4</td>
<td>$150</td>
<td>$300</td>
<td>$450</td>
<td>$600</td>
<td>$750</td>
<td>$900</td>
<td>$1,050</td>
</tr>
</tbody>
</table>

Refer to the table above. Which firm has economies of scale over the entire range of output?

a. Firm 1 only
b. Firms 1 and 2 only
c. Firm 2 only
d. Firm 3 only

ANS: C

7. A competitive firm has been selling its output for $20 per unit and has been maximizing its profit, which is positive. Then, the price rises to $25, and the firm makes whatever adjustments are necessary to maximize its profit at the now-higher price. Once the firm has adjusted, its

a. quantity of output is higher than it was previously.
b. average total cost is higher than it was previously.
c. marginal revenue is higher than it was previously.
d. All of the above are correct.

ANS: D

8. Suppose a profit-maximizing firm in a competitive market produces rubber bands. When the market price for rubber bands falls below the minimum of its average total cost, but still lies above the minimum of average variable cost, in the short run the firm will

a. experience losses but will continue to produce rubber bands.
b. shut down.
c. earn both economic and accounting profits.
d. raise the price of its product.

ANS: A
9. A competitive market is in long-run equilibrium. If demand decreases, we can be certain that price will
   a. fall in the short run. All firms will shut down, and some of them will exit the industry. Price will then rise to reach the new long-run equilibrium.
   b. fall in the short run. No firms will shut down, but some of them will exit the industry. Price will then rise to reach the new long-run equilibrium.
   c. fall in the short run. All, some, or no firms will shut down, and some of them will exit the industry. Price will then rise to reach the new long-run equilibrium.
   d. not fall in the short run because firms will exit to maintain the price.

ANS: C

10.

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$2</td>
</tr>
<tr>
<td>1</td>
<td>$7</td>
</tr>
<tr>
<td>2</td>
<td>$10</td>
</tr>
<tr>
<td>3</td>
<td>$11</td>
</tr>
<tr>
<td>4</td>
<td>$18</td>
</tr>
<tr>
<td>5</td>
<td>$27</td>
</tr>
<tr>
<td>6</td>
<td>$38</td>
</tr>
</tbody>
</table>

Refer to the table above. What is the lowest price at which this firm would operate in the short run?
   a. $3.
   b. $4.
   c. $5.
   d. $6.

ANS: A

11. Suppose a competitive market is comprised of firms that face identical cost curves. The firms experience an increase in demand that results in positive profits for the firms. Which of the following events are then most likely to occur?
   (i) New firms will enter the market.
   (ii) In the short run, price will rise; in the long run, price will rise further.
   (iii) In the long run, all firms will be producing at their efficient scale.
   a. (i) and (ii) only
   b. (i) and (iii) only
   c. (ii) and (iii) only
   d. (i), (ii) and (iii)

ANS: B
12. In the short run, a perfectly competitive market consists of 100 identical firms. The market price is $8, and the total cost to each firm of producing various levels of output is given in the table below. What will total quantity supplied be in the market?

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Total Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$1</td>
</tr>
<tr>
<td>1</td>
<td>$7</td>
</tr>
<tr>
<td>2</td>
<td>$14</td>
</tr>
<tr>
<td>3</td>
<td>$22</td>
</tr>
<tr>
<td>4</td>
<td>$31</td>
</tr>
<tr>
<td>5</td>
<td>$41</td>
</tr>
</tbody>
</table>

a. 200 units  
b. 300 units  
c. 400 units  
d. 500 units

ANS: B

13. Suppose the market demand in perfectly competitive market is given by the equation \( Q^D = 200 - 10P \) and the market supply is given by the equation \( Q^S = 10P \). In addition, suppose the following table shows the marginal cost of production for various levels of output for firms in this market.

<table>
<thead>
<tr>
<th>Output</th>
<th>Marginal Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>--</td>
</tr>
<tr>
<td>1</td>
<td>$5</td>
</tr>
<tr>
<td>2</td>
<td>$10</td>
</tr>
<tr>
<td>3</td>
<td>$15</td>
</tr>
<tr>
<td>4</td>
<td>$20</td>
</tr>
<tr>
<td>5</td>
<td>$25</td>
</tr>
</tbody>
</table>

How many units should a firm in this market produce to maximize profit?

a. 1 unit  
b. 2 units  
c. 3 units  
d. 4 units

ANS: B
Figure 1 – Suppose a firm operating in perfectly competitive market.

14. Refer to Figure 1. If the market price is $10, what is the firm’s short-run economic profit?
   a. $9
   b. $15
   c. $30
   d. $50

   ANS: B

15. Refer to Figure 1. If the market price is $10, what is the firm’s total cost?
   a. $15
   b. $30
   c. $35
   d. $50

   ANS: C
PART II – Short Answer

1. Chp 14, question 4

Here is the table showing costs, revenues, and profits:

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Total Cost</th>
<th>Marginal Cost</th>
<th>Total Revenue</th>
<th>Marginal Revenue</th>
<th>Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$8</td>
<td>---</td>
<td>$0</td>
<td>---</td>
<td>$-8</td>
</tr>
<tr>
<td>1</td>
<td>9</td>
<td>$1</td>
<td>8</td>
<td>$8</td>
<td>$-1</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td>1</td>
<td>16</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>11</td>
<td>1</td>
<td>24</td>
<td>8</td>
<td>13</td>
</tr>
<tr>
<td>4</td>
<td>13</td>
<td>2</td>
<td>32</td>
<td>8</td>
<td>19</td>
</tr>
<tr>
<td>5</td>
<td>19</td>
<td>6</td>
<td>40</td>
<td>8</td>
<td>21</td>
</tr>
<tr>
<td>6</td>
<td>27</td>
<td>8</td>
<td>48</td>
<td>8</td>
<td>21</td>
</tr>
<tr>
<td>7</td>
<td>37</td>
<td>10</td>
<td>56</td>
<td>8</td>
<td>19</td>
</tr>
</tbody>
</table>

(a) The firm should produce five or six units to maximize profit.

(b) Marginal revenue and marginal cost are graphed in Figure 4. The curves cross at a quantity between five and six units, yielding the same answer as in Part (a).

![Figure 4](image)

(c) This industry is competitive because marginal revenue is the same for each quantity. The industry is not in long-run equilibrium, because profit is not equal to zero.
2. Chp 14, question 5

a. Costs are shown in the following table:

<table>
<thead>
<tr>
<th>Q</th>
<th>TFC</th>
<th>TVC</th>
<th>AFC</th>
<th>AVC</th>
<th>ATC</th>
<th>MC</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$100</td>
<td>$0</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>1</td>
<td>100</td>
<td>50</td>
<td>$100</td>
<td>$50</td>
<td>150</td>
<td>50</td>
</tr>
<tr>
<td>2</td>
<td>100</td>
<td>70</td>
<td>50</td>
<td>35</td>
<td>85</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>100</td>
<td>90</td>
<td>33.3</td>
<td>30</td>
<td>63.3</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>100</td>
<td>140</td>
<td>25</td>
<td>35</td>
<td>60</td>
<td>50</td>
</tr>
<tr>
<td>5</td>
<td>100</td>
<td>200</td>
<td>20</td>
<td>40</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>6</td>
<td>100</td>
<td>360</td>
<td>16.7</td>
<td>60</td>
<td>76.7</td>
<td>160</td>
</tr>
</tbody>
</table>

b. If the price is $50, the firm will minimize its loss by producing 4 units. 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).

c. 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.

3. Chp 14, question 8

a. Profit is equal to \((P - ATC) \times Q\). Price is equal to AR. Therefore, profit is \(($10 - $8) \times 100 = $200\).

b. For firms in perfect competition, marginal revenue and average revenue are equal. Since profit maximization also implies that marginal revenue is equal to marginal cost, marginal cost must be $10.

c. Average fixed cost is equal to \(AFC/Q\) which is $200/100 = $2. Since average variable cost is equal to average total cost minus average fixed cost, \(AVC = $8 - $2 = $6\).

d. Since average total cost is less than marginal cost, average total cost must be rising. Therefore, the efficient scale must occur at an output level less than 100.