Unit III: Costs of Production and Perfect Competition

Problem Set #3

Directions: Write the below questions and answers on a separate sheet of paper. Put the LAST 4 DIGETS OF YOUR ID instead of your name on your answer sheet.

1. Explain an example that demonstrates the “real world” application of each of the following. Define the terms in your own words and use examples that clearly demonstrate your understanding of each concept.
   a. Explicit and Implicit Costs
   b. The Law of Diminishing Marginal Returns
   c. Fixed Costs, Variable Costs, and Total Cost
   d. Economies of Scale and Diseconomies of Scale

2. You make the world’s best cookies. To make 10 batches of cookies, your Average Total Cost is $10, for 11 batches your ATC is $11, and for 12 batches your ATC is $12. If your friend offers you $20 for the 12th batch, should you produce it? EXPLAIN why.

3. Below is information regarding Cory’s Surfboard Inc. Complete the table and do the following:
   a. On a large graph, plot the MC, AFC, AVC, and ATC curves from this data.
   b. EXPLAIN what would happen to each of Cory’s per unit cost curves if the price of Styrofoam blanks (a variable input) increases. How would the cost curves change if there were an increase in his rent (a fixed input)? Explain why the results are different.
   c. If the market for surfboards was perfectly competitive and the market price was $150, how many surfboards should Cory make and how much profit will he make for EACH surfboard? Draw the firms demand on your graph in a. Explain how you got your answer.

<table>
<thead>
<tr>
<th>Total Product</th>
<th>Variable Costs (TVC)</th>
<th>Total Cost (TC)</th>
<th>Average Fixed Cost (AFC)</th>
<th>Average Variable Cost (AVC)</th>
<th>Average Total Cost (ATC)</th>
<th>Marginal Cost (MC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$0</td>
<td>$100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>90</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>130</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>180</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>250</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>340</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>490</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>680</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Assume that apples are an inferior good. Draw a perfectly competitive market for apples and a firm selling apples in the long run equilibrium where price is $10 and the firm’s equilibrium quantity is 50. Explain the following situations graphically and in words (Draw and label side-by-side graphs for each).
   a. GRAPH & EXPLAIN what happens in the short-run if incomes increases by 15%.
   b. GRAPH & EXPLAIN the process by which this market returns to the long-run equilibrium.
   c. GRAPH & EXPLAIN what happens in the short-run if the price of oranges increase.
   d. GRAPH & EXPLAIN the process by which this market returns to the long-run equilibrium.
Unit III: Costs of Production and Perfect Competition
Problem Set #3 Answer Sheet (53 points)

Directions: Evaluate the assigned answer set, write corrections on the paper you are evaluating; on the top of the first pair write their total score clearly and circle it, and write “graded by” with your name.

1. Explain an example that demonstrates the “real world” application of each of the following. Define the terms in your own words and use examples that clearly demonstrate your understanding of each concept (20 points)
   a. Explicit costs and Implicit Costs
      - 1 Point - definition of explicit costs (traditional out of pocket costs)
      - 1 Point - Example showing explicit costs (costs to a firm or a consumer)
      - 1 Point - definition of implicit costs (opportunity costs)
      - 1 Point - Example showing implicit costs (forgone wage, forgone time and effort)
      - 1 Point - Clarity of examples
   b. Law of Diminishing Marginal Returns
      - 2 Points - Definition (As additional inputs (workers) are added to fixed resources, the additional output generated by each new input will eventually fall.
      - 2 Points - Example showing that MARGINAL PRODUCT (additional output from each new worker) will eventually fall
      - 1 Point - Numbers in example (numbers show how marginal product eventually falls)
   c. Fixed, Variable, and Total Costs
      - 1 Point - definition of fixed costs (costs that DO NOT change with the amount produced)
      - 1 Point - Example of a fixed costs/resource
      - 1 Point - definition of variable costs (costs that change with the amount produced)
      - 1 Point - Example of a variable cost/resource
      - 1 Point - Example showing that Total cost equals fixed plus variable.
   d. Economies and Diseconomies of Scale
      - 1 Point - Definition of Economies of Scale-LRATC falls as firm increase their plan capacity and use mass production techniques.
      - 1 Point - Example showing that the average cost falls as a firm utilizes specialization and mass production
      - 1 Point - Definition of Diseconomies of scale- LRATC increases as the firm gets bigger and becomes difficult to manage.
      - 1 Point - Example showing that average costs increase as a firm gets too big.
      - 1 Point - Clarity of examples

2. 2 points - No, explanation: the marginal cost of the 12th batch is $23

3. 5 points - correct numbers

<table>
<thead>
<tr>
<th>Total Product</th>
<th>Variable Costs (TVC)</th>
<th>Total Cost (TC)</th>
<th>Average Fixed Cost (AFC)</th>
<th>Average Variable Cost (AVC)</th>
<th>Average Total Cost (ATC)</th>
<th>Marginal Cost (MC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>$0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>60</td>
<td>160</td>
<td>100</td>
<td>60</td>
<td>160</td>
<td>60</td>
</tr>
<tr>
<td>2</td>
<td>90</td>
<td>190</td>
<td>50</td>
<td>45</td>
<td>95</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>130</td>
<td>230</td>
<td>33.33</td>
<td>43.33</td>
<td>76.67</td>
<td>40</td>
</tr>
<tr>
<td>4</td>
<td>180</td>
<td>280</td>
<td>25</td>
<td>45</td>
<td>70</td>
<td>50</td>
</tr>
<tr>
<td>5</td>
<td>250</td>
<td>350</td>
<td>20</td>
<td>50</td>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td>6</td>
<td>340</td>
<td>440</td>
<td>16.67</td>
<td>56.67</td>
<td>73.33</td>
<td>90</td>
</tr>
<tr>
<td>7</td>
<td>490</td>
<td>590</td>
<td>14.29</td>
<td>70</td>
<td>84.29</td>
<td>150</td>
</tr>
<tr>
<td>8</td>
<td>680</td>
<td>780</td>
<td>12.5</td>
<td>85</td>
<td>97.5</td>
<td>190</td>
</tr>
</tbody>
</table>
3a. **1 point**- On a large graph, plot the MC, AFC, AVC, and ATC curves from this data.

3b. **1 point**- EXPLAIN what would happen to each of Cory’s per unit cost curves if the price of Styrofoam blanks (a variable input) increases.
   - **1 point**- AVC, MC, and ATC shift upwards (all fixed costs stay the same)
   - **1 point**- A change in variable inputs shifts MC, change in fixed costs do not.

3c. If the market for surfboards was perfectly competitive and the market price was $150, how many surfboards should Cory make and how much profit will he make for EACH surfboard? Draw the firms demand on your graph in a.
   - **1 point**- 7 surf boards
   - **1 point**- Shows horizontal demand curve at $150 on graph a.

4 a&b. **GRAPH & EXPLAIN** what happens in the short-run and long-run if incomes increases by 15%?

**5 Points - Graphs**
- **1 Point**- Showing an industry and firm in original long-run
- **1 Point**- Showing demand decrease for industry AND firm
- **1 Point**- Showing area of loss (MAKE SURE IT GOES UP TO ATC)
- **1 Point**- Showing supply fall (shift left) for the industry
- **1 Point**- Showing price increase/return to long run equilibrium with no economic profit or loss

**5 Points- Words**
- **1 Point**- Since Apples are inferior, the increase in income leads to an decrease in demand
- **1 Point**- Demand falls for the industry causing price to fall
- **1 Point**- Price for the firm falls causing a LOSS
- **1 Point**- Since there is a loss, FIRMS WILL LEAVE, decreasing supply
- **1 Point**- Price will return to long-run equilibrium

4 c&d. **GRAPH & EXPLAIN** what happens in the short-run and long-run if the price of oranges increase.

**5 Points - Graphs**
- **1 Point**- Showing an industry and firm in original long-run
- **1 Point**- Showing demand increase for industry AND firm
- **1 Point**- Showing area of profit (MAKE SURE IT GOES DOWN TO ATC)
- **1 Point**- Showing supply increase (shift right) for the industry
- **1 Point**- Showing price decrease/return to long run equilibrium with no economic profit or loss

**5 Points- Words**
- **1 Point**- Since oranges are a substitute, the price increase causes demand for apples to increase
- **1 Point**- Demand increases for the industry causing price to increase
- **1 Point**- Price for the firm falls causing a PROFIT
- **1 Point**- Since there is a loss, FIRMS WILL ENTER THE INDUSTRY, increasing supply
- **1 Point**- Price will return to long-run equilibrium