Problem Set # 9: last 4 of TCU ID 5000 - 6249

Costs of Production & Short-run Production Decisions I

Answer the questions below. Then log on to the course web site (http://faculty.tcu.edu/jlovett), go to Microeconomics, then Problem Sets, then PS 9. Fill out the on-line answer form.

*** Your grade is based on your on-line answers. ***

On page three, you are given a chart with costs of production for a dirt farm (it “mines” and bags dirt). Assume these costs include all of the firm’s opportunity costs, both explicit and implicit.

• Fill in the rest of the cost columns for the chart on page three.

1. Are these short-run or long-run costs? How can you tell?

   • Neatly graph the following (on graph paper or in a spreadsheet): AFC, AVC, ATC, and MC. When you graph MC, it is best to plot the point at the higher level of output, not in between the two levels of output.

2. In the short-run, marginal cost may initially decrease as production expands. Does this happen to the dirt farm?

3. In the short-run, marginal cost will always increase as production expands beyond some point. Does this happen to the dirt farm? What causes this increase in marginal costs?

4 Assume the firm is a competitive firm. In other words, assume that the firm takes the market price as given and can sell all it wants at that price.

   a. If the firm is to produce, how much should the firm produce according to production rule?

   b. Is the firm covering its variable costs (i.e. is $P > AVC$) if you produce the amount indicated in 8b?

   c. If the firm produces the amount indicated in 8b, what will its profits (or losses) be?

The Production Rule

The Short-Run Shut-Down Rule
d. If the firm shuts down and continues to pay its fixed costs, what will its profits (or losses) in the short-run be?

e. In the short-run, should this firm produce or shut-down?

The Long-Run Shut-Down Rule (to leave the industry or stay?)

f. Assume these costs and the price indicated in situation 1 are expected to continue long into the future. In the long-run, should this firm produce (i.e. stay in the industry) or shut-down (i.e. leave)?

9. Situation 2 (Medium Demand): Remember, this is a competitive firm. In other words, it takes the market price as given and can sell all it wants at that price.

- On page three, fill in the TR, MR, and Profit columns for situation 2 (Medium Demand). Assume the firm takes the indicated market price as given and can sell all it wants at that price.

The Production Rule

a. If the firm is to produce, how much should the firm produce according to production rule?

The Short-Run Shut-Down Rule

b. Is the firm covering its variable costs (i.e. is \( P > AVC \)) if you produce the amount indicated in 9b?

c. If the firm produces the amount indicated in 9b, what will its profits (or losses) be?

d. If the firm shuts down and continues to pay its fixed costs, what will its profits (or losses) in the short-run be?

e. In the short-run, should this firm produce or shut-down?

The Long-Run Shut-Down Rule (to leave the industry or stay?)

f. Assume these costs and the price indicated in situation 2 are expected to continue long into the future. In the long-run, should this firm produce (i.e. stay in the industry) or shut-down (i.e. leave)?

10. Situation 3 (Low Demand): Remember, this is a competitive firm. In other words, it takes the market price as given and can sell all it wants at that price.

- On page three, fill in the TR, MR, and Profit columns for situation 3 (Low Demand). Assume the firm takes the indicated market price as given and can sell all it wants at that price.

The Production Rule

a. If the firm is to produce, how much should the firm produce according to production rule?

The Short-Run Shut-Down Rule

b. Is the firm covering its variable costs (i.e. is \( P > AVC \)) if you produce the amount indicated in 10a?

c. If the firm produces the amount indicated in 10a, what will its profits (or losses) be?

d. If the firm shuts down and continues to pay its fixed costs, what will its profits (or losses) in the short-run be?

e. In the short-run, should this firm produce or shut-down?

The Long-Run Shut-Down Rule (to leave the industry or stay?)

f. Assume these costs and the price indicated in situation 3 are expected to continue long into the future. In the long-run, should this firm produce (i.e. stay in the industry) or shut-down (i.e. leave)?

11. Look back at the profits columns for problems 8 – 10. Do the production and shut-down rules serve to maximize the firm’s profits?

12. On your graph neatly label the firm’s short-run supply curve.
<table>
<thead>
<tr>
<th>Output (tons)</th>
<th>Total Costs</th>
<th>MC</th>
<th>Average Costs</th>
<th>Situation 1: High Demand</th>
<th>Situation 2: Medium Demand</th>
<th>Situation 1: Low Demand</th>
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<tbody>
<tr>
<td></td>
<td>FC</td>
<td>VC</td>
<td>TC</td>
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</table>

Profit Calculation:
- **Situation 1: High Demand**
  - Price: $70.5/ton
  - TR = P x Q
  - MR = MC
  - Profit = TR - TC

- **Situation 2: Medium Demand**
  - Price: $55.5/ton
  - TR = P x Q
  - MR = MC
  - Profit = TR - TC

- **Situation 1: Low Demand**
  - Price: $40.5/ton
  - TR = P x Q
  - MR = MC
  - Profit = TR - TC