Problem Set # 10: IDs 8750 - 9999

Costs of Production & Short-run Production Decisions

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 10. Fill out the on-line answer form.

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

- On pages 4 through 6 you are given costs data for a firm producing gravel in Bedrock. The costs curves on both pages are the same. You are also given the demand faced by the firm (the relationship between P and qD) for three different situations. High demand refers to a situation in which demand for the firm’s gravel is the highest. In each following situation, demand falls.

- Fill in the cost columns for the charts on pages 4 through 6. Plot AFC, AVC, ATC, and MC to the graph.¹

- Fill in the columns for MR on each graph.

1. What time period are we dealing with in these charts?

2. What determined the answer to the previous question (# 1)? i.e. What was the definitive piece of evidence that allowed you to determine the time period?

3. What type of market is this firm in?

4. What determined the answer the previous question (# 3)? i.e. What was the definitive piece of evidence that allowed you to determine the type of market the firm is in?

5. What is the production rule for a perfectly competitive firm?

6. What is the short-run shutdown rule for a perfectly competitive firm?

7. What is the long-run exit rule for a perfectly competitive firm?

8. What is the production rule for a monopolist?

9. What is the short-run shutdown rule for a monopolist?

10. What is the long-run exit rule for a monopolist?

¹ Note: There are 2 ways to MC, 1) in between the quantities or 2) in line with the quantity with which the change ends (the way the text does). Graphing MC in between the quantities is best for illustrating the relationships between the curves (ex. MC hits AVC at AVC_{Min}). Graphing MC in line with the quantity with which the change ends (the way the text does) is the best way to precisely determine the optimal level of output.
Answer questions # 11 – 18 based the **High Demand** situation.

11. **Production Rule.** Start from the output at which MC is at its lowest. i.e. Do not consider the range over which MC is falling. What level of output should the firm produce if it decides to produce over this range?

12. At the above level of output, is the firm covering its variable costs?

13. At the above level of output, is the firm covering its total costs?

14. At the above level of output, is the firm earning (economic) profits?

15. **Short-run Shut-down Rule.** Assume the firm must choose between: 1) producing at the level you chose in question # 11, or 2) temporarily closing done. We are not considering going out of business here, just whether or not to temporarily shut the gravel pit down. What should the firm do?

16. **Long-Run Exit Rule.** Assume the level of demand (highest) your costs are not going to change. i.e. the conditions you are experiencing can be expected to continue into the long-run. What should your firm do?

17. Fill in the profits columns for the Highest Demand situation. Do the production, shut-down, and leave the business rules serve to maximize the firm’s profits or minimize its losses?

18. Assume there are no externalities involved in the production or consumption of this good. If the firm produces its profit maximizing amount, is it also producing the socially optimal (socially efficient) amount?

Answer questions # 19 – 26 based the **Medium Demand** situation.

19. **Production Rule.** Start from the output at which MC is at its lowest. i.e. Do not consider the range over which MC is falling. What level of output should the firm produce if it decides to produce over this range?

20. At the above level of output, is the firm covering its variable costs?

21. At the above level of output, is the firm covering its total costs?

22. At the above level of output, is the firm earning (economic) profits?

23. **Short-run Shut-down Rule.** Assume the firm must choose between: 1) producing at the level you chose in question # 19, or 2) temporarily closing done. We are not considering going out of business here, just whether or not to temporarily shut the gravel pit down. What should the firm do?
24. **Long-Run Exit Rule.** Assume the level of demand (medium) your costs are not going to change. i.e. the conditions you are experiencing can be expected to continue into the long-run. What should your firm do?

25. Fill in the profits columns for the Medium Demand situation. Do the production, shut-down, and leave the business rules serve to maximize the firm’s profits or minimize its losses?

26. Assume there are no externalities involved in the production or consumption of this good. If the firm produces its profit maximizing amount, is it also producing the socially optimal (socially efficient) amount?

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**Answer questions # 27 – 34 based the LOW Demand situation.**

27. **Production Rule.** Start from the output at which MC is at its lowest. i.e. Do not consider the range over which MC is falling. What level of output should the firm produce if it decides to produce over this range?

28. At the above level of output, is the firm covering its variable costs?

29. At the above level of output, is the firm covering its total costs?

30. At the above level of output, is the firm earning (economic) profits?

31. **Short-run Shut-down Rule.** Assume the firm must choose between: 1) producing at the level you chose in question # 27, or 2) temporarily closing down. We are not considering going out of business here, just whether or not to temporarily shut the gravel pit down. What should the firm do?

32. **Long-Run Exit Rule.** Assume the level of demand (low) your costs are not going to change. i.e. the conditions you are experiencing can be expected to continue into the long-run. What should your firm do?

33. Fill in the profits columns for the Low Demand situation. Do the production, shut-down, and leave the business rules serve to maximize the firm’s profits or minimize its losses?

34. Assume there are no externalities involved in the production or consumption of this good. If the firm produces its profit maximizing amount, is it also producing the socially optimal (socially efficient) amount?


High Demand

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### Medium Demand

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Graph showing the relationship between quantity (q) and price (P) with various levels of fixed costs (TFC), variable costs (TVC), total costs (TC), marginal costs (MC), average fixed costs (AFC), average variable costs (AVC), average total costs (ATC), total revenue (TR), marginal revenue (MR), and profit ($\pi$).
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- **TFC**: Total Fixed Cost
- **TVC**: Total Variable Cost
- **TC**: Total Cost
- **MC**: Marginal Cost
- **AFC**: Average Fixed Cost
- **AVC**: Average Variable Cost
- **ATC**: Average Total Cost
- **P**: Price
- **TR**: Total Revenue
- **MR**: Marginal Revenue
- **π**: Profit

### Graph

The graph shows the relationship between quantity (q) and total cost (TC) with a price (P) of $40.25 at 20 tons, $37.75 at 40 tons, $35.25 at 60 tons, $32.75 at 80 tons, $30.25 at 100 tons, $27.75 at 120 tons, and $25.25 at 140 tons.