



Chapter 8 Exercises

Self-Check Questions

1. A firm had sales revenue of \$1 million last year. It spent \$600,000 on labor, \$150,000 on capital, and \$200,000 on materials. What was the firm's accounting profit?
2. Continuing from Exercise 1, the firm's factory sits on land owned by the firm that could be rented out for \$30,000 per year. What was the firm's economic profit last year?
3. The WipeOut Ski Company manufactures skis for beginners. Fixed costs are \$30. Fill in the following table for total cost, average variable cost, average total cost, and marginal cost.

Quantity	Variable Cost	Fixed Cost	Total Cost	Average Variable Cost	Average Total Cost	Marginal Cost
0	0	\$30				
1	\$10	\$30				
3	\$25	\$30				
3	\$45	\$30				
4	\$70	\$30				
5	\$100	\$30				
6	\$135	\$30				

4. Based on your answers to the prior question, now imagine a situation where WipeOut Ski Company produces a quantity of 5 units that it sells for a price of \$25 each.
 - a. What will be the company's profits or losses?
 - b. How can you tell at a glance whether the company is making or losing money at this price by looking at average cost?
 - c. At the given quantity and price, is the marginal unit produced adding to profits?
5. If 2 painters can paint 200 square feet of wall in an hour, and 3 painters can paint 275 square feet, what is the marginal product of the third painter?
6. Consider the following tables. If the cost of labor remains at \$40, but the cost of a machine decreases from \$80 to \$40, what would be the total cost of each method of production? Which method should the firm use, and why?

Production Technology 1	10 workers	2 machines
Production Technology 2	7 workers	4 machines
Production Technology 3	3 workers	7 machines

Example A: Workers cost \$40, machines cost \$80

	Labor Cost	Machine Cost	Total Cost
Cost of Technology 1	$10 \times \$40 = \400	$2 \times \$80 = \160	\$560
Cost of Technology 2	$7 \times \$40 = \280	$4 \times \$80 = \320	\$600
Cost of Technology 3	$3 \times \$40 = \120	$7 \times \$80 = \560	\$680

Example B: Workers cost \$55, machines cost \$80

	Labor Cost	Machine Cost	Total Cost
Cost of Technology 1	$10 \times \$55 = \550	$2 \times \$80 = \160	\$710
Cost of Technology 2	$7 \times \$55 = \385	$4 \times \$80 = \320	\$705
Cost of Technology 3	$3 \times \$55 = \165	$7 \times \$80 = \560	\$725

Example C: Workers cost \$90, machines cost \$80

	Labor Cost	Machine Cost	Total Cost
Cost of Technology 1	$10 \times \$90 = \900	$2 \times \$80 = \160	\$1600
Cost of Technology 2	$7 \times \$90 = \630	$4 \times \$80 = \320	\$950
Cost of Technology 3	$3 \times \$90 = \270	$7 \times \$80 = \560	\$830

7. Suppose the cost of machines increases to \$55, while the cost of labor stays at \$40. How would that affect the total cost of the three methods? Which method should the firm choose now?
8. Automobile manufacturing is an industry subject to significant economies of scale. Suppose there are 4 domestic car manufacturers, but the demand for domestic cars is no more than 2.5 times the quantity produced at the bottom of the long-run average cost curve. What do you expect will happen to the domestic car industry in the long run?

Review Questions

9. What are explicit and implicit costs?
10. Would you consider an interest payment on a loan to be an explicit or implicit cost?
11. What is the difference between accounting and economic profit?
12. What is a production function?
13. What is the difference between a fixed input and a variable input?
14. How do we calculate marginal product?
15. What shapes would you generally expect a total product curve and a marginal product curve to have?
16. What are the factor payments for land, labor, and capital?
17. What is the difference between fixed costs and variable costs?
18. How do we calculate each of the following: marginal cost, average total cost, and average variable cost?
19. What shapes would you generally expect each of the following cost curves to have: fixed costs, variable costs, marginal costs, average total costs, and average variable costs?
20. Are there fixed costs in the long run? Explain briefly.
21. Are fixed costs also sunk costs? Explain.
22. What are diminishing marginal returns as they relate to costs?
23. Which costs are measured on a per-unit basis: fixed costs, average cost, average variable cost, variable costs, and marginal cost?
24. What is a production technology?
25. In choosing a production technology, how will firms react if one input becomes relatively more expensive?
26. What is a long-run average cost curve?
27. What is the difference between economies of scale, constant returns to scale, and diseconomies of scale?
28. What shape of a long-run average cost curve illustrates economies of scale, constant returns to scale, and diseconomies of scale?
29. Why will firms in most markets be located at or close to the bottom of the long-run average cost curve?

Critical Thinking Questions

30. Small mom-and-pop firms, like inner city grocery stores, sometimes exist even though they do not earn economic profits. How can you explain this?
31. A common name for fixed cost is *overhead*. If you divide fixed cost by the quantity of output produced, you get average fixed cost. Supposed fixed cost is \$1,000. What does the average fixed cost curve look like? Use your response to explain what “spreading the overhead” means.
32. How does fixed cost affect marginal cost? Why is this relationship important?
33. Average cost curves (except for average fixed cost) tend to be U-shaped, decreasing and then increasing. Marginal cost curves have the same shape, though this may be harder to see since most of the marginal cost curve is increasing. Why do you think that average and marginal cost curves have the same general shape?
34. What is the relationship between marginal product and marginal cost? (*Hint: look at the curves.*) Why do you suppose that is?
35. It is clear that businesses operate in the short run, but do they ever operate in the long run? Discuss.

36. Consider the following table. In the top half of the table (for $K = 1$ PC), at what point does diminishing marginal productivity kick in? What about in the bottom half of the table (for $K = 3$ PC)? How do you explain this?

# Typists (L)	1	2	3	4	5	5	
Letters/hr (TP)	5	6	8	8	8	8	For $K = 1$ PC
MP	5	2	1	0	0	0	
Letters/hr (TP)	5	10	15	17	18	18	For $K = 3$ PC
MP	5	5	5	2	1	0	

37. How would an improvement in technology, like the high-efficiency gas turbines or Pirelli tire plant, affect the long-run average cost curve of a firm? Can you draw the old curve and the new one on the same axes? How might such an improvement affect other firms in the industry?
38. Do you think that the taxicab industry in large cities would be subject to significant economies of scale? Why or why not?

Problems

39. A firm is considering an investment that will earn a 6% rate of return. If it were to borrow the money, it would have to pay 8% interest on the loan, but it currently has the cash, so it will not need to borrow. Should the firm make the investment?
40. Return to Table 3 and Figure 2 in Lesson 8.3. What is the marginal gain in output from increasing the number of barbers from 4 to 5 and from 5 to 6? Does it continue the pattern of diminishing marginal returns?
41. Return to Table 3 in Lesson 8.3. Compute the average total cost, average variable cost, and marginal cost of producing 60 and 72 haircuts. Draw the graph of the three curves between 60 and 72 haircuts.
42. A small company that shovels sidewalks and driveways has 100 homes signed up for its services this winter. It can use various combinations of capital and labor: lots of labor with hand shovels, less labor with snow blowers, and still less labor with a pickup truck that has a snowplow on front. To summarize, the method choices are:
- Method 1: 50 units of labor, 10 units of capital
- Method 2: 20 units of labor, 40 units of capital
- Method 3: 10 units of labor, 70 units of capital
- If hiring labor for the winter costs \$100/unit and a unit of capital costs \$400, what production method should be chosen? What method should be chosen if the cost of labor rises to \$200/unit?