

Quiz #3 – Week 03/22/2009 to 03/28/2009

You have 30 minutes to answer the following 15 multiple choice questions. Record your answers in the bubble sheet. Your grade in this quiz will count for 1% of your total grade in this course.

1. The process of transforming inputs into output is described by the firm's

- a. cost function.
- b. revenue function.
- c. production function.
- d. marginal product of labor.

Use the following table about the production function for Terry's Widget Shoppe to answer the next four questions. Assume labor is the only variable input Terry uses in the production of widgets.

Quantity of labor hired (workers)	Quantity of widgets per month
0	0
1	100
2	250
3	450
4	600
5	700

2. The marginal product of labor from hiring the third worker is

- a. 450 widgets per worker.
- b. 200 widgets per worker.
- c. 150 widgets per worker.
- d. 250 widgets per worker.

3. Diminishing returns to labor begins when Terry hires the

- a. second worker. c. fourth worker.
- b. third worker. d. fifth worker.

4. Terry spends \$200 a month to rent a building for his company, \$600 a month for the capital he employs to produce widgets, and \$10 per hour for every worker he employs. Terry's fixed cost per month equals

- a. \$200.
- b. \$600.
- c. \$800.
- d. \$810.

5. Terry spends \$200 a month to rent a building for his company, \$600 a month for the capital he employs to produce widgets, and \$10 per hour for every unit of labor he employs. Terry distinguishes between his fixed cost and his variable cost by

- a. deciding whether or not he is producing in the short run or the long run.
- b. whether or not the cost varies as his level of production changes.
- c. whether or not the cost exceeds \$500.
- d. recognizing that capital is always a fixed cost while rent and labor are variable costs.

6. In the short run, as the level of total production for a firm increases, the firm's total product curve

- a. increases but at a decreasing rate.
- b. increases but at an increasing rate.
- c. decreases but at a decreasing rate.
- d. decreases but at an increasing rate.

7. Larry's Auto Shop's total cost can be expressed by the equation $TC = 50 + 10Q^2$, where Q is the quantity of repairs made by Larry's Auto Shop. Which of the following statements is true for Larry's Auto Shop?

- I. When Larry's Auto Shop produces 0 repairs, its fixed cost equals its total costs.
- II. Larry's Auto Shop's fixed cost equals \$50.
- III. Larry's Auto Shop's fixed cost depends on the level of output that is produced.

- a. Statement I is true.
- b. Statements I and II are true.
- c. Statements I and III are true.
- d. Statements I, II, and III are true.

8. Larry's Auto Shop's total cost can be expressed by the equation $TC = 50 + 10Q^2$, where Q is the quantity of repairs made by Larry's Auto Shop. Larry's variable cost equals

- a. \$10 when 1 unit of output is produced and \$40 when 2 units of output are produced.
- b. \$60 when 1 unit of output is produced and \$90 when 2 units of output are produced.

9. The marginal cost curve is upward sloping as output increases due to

- a. increasing returns to scale.
- b. decreasing returns to scale.
- c. diminishing marginal returns to the variable input.
- d. increasing marginal returns to the variable input.

10. In the short run, a firm's fixed cost while the firm's average fixed cost.

- a. stays constant as output increases; increases as the firm produces higher levels of output
- b. stays constant as output increases; decreases as the firm produces higher levels of output
- c. increases as the firm produces higher levels of output; stays constant as output increases
- d. decreases as the firm produces higher levels of output; stays constant as output increases

11. The spreading effect refers to the

- a. decrease in AVC as the firm produces greater levels of output.
- b. decrease in AFC as the firm produces greater levels of output.
- c. combined effect on AVC and AFC of the firm producing higher levels of output.
- d. combined effect on AVC , AFC , and MC of the firm producing higher levels of output.

12. The diminishing returns effect causes the AVC to

- a. decline initially as output increases.
- b. decline at all levels of output.
- c. increase eventually as output increases.
- d. increase at all levels of output.

13. At the minimum-cost output

- a. average variable cost must equal marginal cost.
- b. average fixed cost must equal marginal cost.
- c. average total cost must equal marginal cost.
- d. Answers (a), (b), and (c) are all true.

14. The firm's *LRATC* curve illustrates the relationship between output and

- a. average total cost when fixed cost has been chosen to minimize average total cost for each level of output.
- b. marginal cost when fixed cost has been chosen to minimize average total cost for each level of output.
- c. average total cost when variable cost has been chosen to minimize average total cost for each level of output.
- d. average total cost when marginal cost has been chosen to minimize average total cost for each level of output.

15. When the firm's *LRATC* curve is downward sloping over its range of production, this implies that

- a. when all of the firm's inputs are increased proportionately, the firm's level of production will increase, but by a smaller factor than the increase in the firm's inputs.
- b. when all of the firm's inputs are doubled, the firm's level of production will more than double.
- c. when all of the firm's inputs are tripled, the firm's level of production may or may not increase.
- d. the firm is experiencing decreasing returns to scale over this range of production.

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1. Answer c. This is a definitional statement. Inputs are combined together to produce output, and the production function describes this relationship.

2. Answer b. The marginal product of labor is the change in output divided by the change in labor. In this example, labor changes by 1 unit at a time, so we can simply calculate the change in output to find the marginal product of labor. The total product when two workers are hired equals 250 widgets, while the total product when three workers are hired equals 450 widgets; therefore, the marginal product of hiring the third worker is 200 widgets per worker.

3. Answer c. Diminishing returns to labor begin when the marginal product of labor falls as the quantity of labor increases. The marginal product of labor for the first worker is 100 widgets per worker; the marginal product of labor for the second worker is 150 widgets per worker; the marginal product of labor for the third worker is 200 widgets per worker; and the marginal product of labor for the fourth worker is 150 widgets per worker. Hiring of the fourth worker increases output, but at a diminishing rate.

4. Answer c. Fixed costs are those costs that do not vary as output varies. Terry's fixed costs include his capital costs of \$600 a month and his rent of \$200 a month: neither of these costs change for Terry no matter what level of output he produces. In contrast, Terry's use of labor varies as he changes his level of production, and when he hires additional labor his variable costs are altered.

5. Answer b. There are no fixed costs in the long run, only variable costs; there isn't some dollar amount that exists as a limit to variable costs; and capital or labor can be variable in the short run. What distinguishes variable costs from fixed costs is that variable costs vary as the level of output varies: a firm wishing to produce more of a good in the short run does so by hiring more units of the variable input.

6. Answer a. In the short run, the firm has at least one fixed input. To increase its production, it must hire additional units of the variable input, but the addition to total output from hiring an additional unit of the variable input eventually decreases due to the diminishing returns to the variable input. This means that output increases, but at a decreasing rate.

7. Answer b. Larry's Auto Shop's fixed cost equals his total cost when output is zero, since the firm does not hire any of the variable input if it decides to not produce any output. When Q equals zero, Larry's total cost equals \$50, and therefore Larry's fixed cost must equal \$50. Fixed cost does not change as the level of output produced by the firm changes.

8. Answer a. When output is zero, fixed cost equals total cost and Larry's fixed cost is therefore \$50. Larry's variable cost can therefore be expressed as $10Q^2$ since $TC = FC + VC$. When Q equals 1, VC is \$10; when Q equals 2, VC is \$40.

9. Answer c. As output increases, the marginal cost of producing that level of output also increases because the marginal product of the variable input is falling. This is due to the diminishing marginal returns to the variable input.

10. Answer b. FC does not vary as the level of production varies, but average fixed cost declines as output increases since $AFC = FC/Q$ and Q is increasing.

11. Answer b. The spreading effect refers to the idea that since fixed costs are constant at all short-run levels of output this implies that the AFC will decline as output increases, since those constant fixed costs will be spread over a larger number of units of output. The spreading effect does not impact the AVC or the MC.

12. Answer c. The diminishing returns effect refers to the idea that as the firm increases its production in the short run it must hire additional units of the variable input, but that as the firm's usage of the variable input increases it finds that additional units of the variable input are less productive than the preceding unit. This means that the firm's AVC eventually rises due to the variable cost of production increasing faster than the increase in the level of output.

13. Answer c. At the minimum-cost output, average total cost equals marginal cost since the minimum-cost output is the level of output at which average total cost is minimized. At outputs lower than the minimum-cost output, average total cost is falling as output increases, which implies that the marginal cost of producing an additional unit of output is less than the average total cost of producing that output. At outputs greater than the minimum-cost output, average total cost is rising as output increases, which implies that the marginal cost of producing an additional unit of output is greater than the average total cost of producing that output. The average variable cost is not at its minimum point at the minimum-cost output, and the average fixed cost does not have a minimum point since it declines as the level of output increases.

14. Answer a. This is the definition of the LRATC curve, which identifies the lowest average total cost of production for every level of output, assuming that the firm has the freedom to set its fixed input at the optimal level for each level of output.

15. Answer b. As the firm increases its production the firm's cost rises, but if the LRATC curve is downward sloping this implies that the increase in output must be proportionately greater than the increase in total cost. In this range of output, the firm has increasing returns to scale.