Practice questions on theory of cost (Chapter 7)

MCQs. Choose the one alternative that best completes the statement or answers the question.

1) The total cost (TC) of producing sports shoes (Q) is given as: TC = 200 +5Q. What is the variable cost?
   A) 5Q
   B) 5
   C) 5 + (200/Q)
   D) 200
   E) none of the above

2) The total cost (TC) of producing store shoes (Q) is given as: TC = 200 +5Q. What is the fixed cost?
   A) 5
   B) 5 + (200/Q)
   C) 5Q
   D) 200
   E) none of the above

3) Sara knows average total cost and average variable cost for a given level of output. Which of the following costs can she not determine given this information?
   A) fixed cost
   B) average fixed cost
   C) total cost
   D) variable cost
   E) Carolyn can determine all of the above costs given the information provided.

Scenario 1:
The average total cost to produce 100 cookies is $0.25 per cookie. The marginal cost is constant at $0.10 for all cookies produced.

4) Refer to Scenario 1. The total cost to produce 100 cookies is
   A) $100.00
   B) $0.10
   C) $0.25
   D) $25.00
   E) indeterminate

5) Refer to Scenario 1. The total cost to produce 50 cookies is
   A) $25
   B) $20
   C) $60
   D) $50
   E) indeterminate

6) Refer to Scenario 1. Which piece of information would NOT be helpful in calculating the marginal cost of the 75th unit of output?
   A) The variable cost of 74 units.
   B) The variable cost of 75 units.
   C) The firm's fixed cost.
D) The total cost of 75 units.
E) The total cost of 74 units.

7) Consider the following statements when answering this question;
I. A firm's marginal cost curve does not depend on the level of fixed costs.
II. As output increases the difference between a firm's average total cost and average variable cost curves cannot rise.
A) I is false, and II is true.  
B) I and II are both true.  
C) I and II are both false.  
D) I is true, and II is false.

8) The LAC and LMC curves in the diagram below are consistent with a production function that exhibits

![Cost Output Graph]

A) increasing returns to scale.  
B) increasing returns to scale for small levels of output, then constant returns to scale, and eventually decreasing returns to scale as output increases.  
C) constant returns to scale.  
D) decreasing returns to scale.  
E) decreasing returns to scale for small levels of output, then constant returns to scale, and eventually increasing returns to scale as output increases.

**Scenario 3:**
Use the production function: \( Q = 4L^{1/2}K^{1/2} \).

9) The production function in Scenario 3 exhibits:
A) constant returns to scale.  
B) decreasing returns to scale.  
C) increasing returns to scale.  
D) all of the above at various levels of output.

10) The production function in Scenario 3 exhibits:
A) diminishing returns to capital.  
B) diminishing returns to labor.  
C) decreasing returns to scale.  
D) all of the above.  
E) A and B, but not C.
11) If the marginal product of labor is less than the average product of labor, then
   A) the marginal product must be increasing.       B) the average product must be increasing.
   C) the marginal product must be decreasing.      D) the average product must be decreasing.

12) A firm's total cost function is given by the equation:
    \[ TC = 4000 + 5Q + 10Q^2 \]
    (a) Write an expression for each of the following cost concepts:
    
    a. Total Fixed Cost
    b. Average Fixed Cost
    c. Total Variable Cost
    d. Average Variable Cost
    e. Average Total Cost
    f. Marginal Cost
    
    (b) Determine the quantity that minimizes average total cost. Demonstrate that the predicted
    relationship between marginal cost and average cost holds.
12) (a)
   a. \[ TFC = 4000 \]
   b. \[ AFC = \frac{4000}{Q} \]
   c. \[ TVC = TC - TFC = 5Q + 10Q^2 \]
   d. \[ AVC = \frac{TVC}{Q} = \frac{(5Q + 10Q^2)}{Q} = 5 + 10Q \]
   e. \[ ATC = \frac{TC}{Q} (or AFC + AVC) = \frac{(4000 + 5Q + 10Q^2)}{Q} = \frac{4000}{Q} + 5 + 10Q \]
   f. \[ MC = \frac{dTC}{dQ} (or \frac{dTVC}{dQ}) = 5 + 20Q \]

12) (b)
   ATC is minimized where MC is equal to ATC. That is when:
   \[ (4000 + 5Q + 10Q^2)/Q = 5 + 20Q \]
   Or
   \[ 4000 + 5Q + 10Q^2 = 5Q + 20Q^2 \Rightarrow 4000 = 10Q^2 \Rightarrow Q = 20 \]

   ATC is minimized @ Q = 20. Up to 20, ATC falls, while beyond 20 ATC rises. MC should be less than ATC for any Q less than 20. e.g.
   For Q =10: MC = 205, While ATC = 505, more than MC.
   For Q greater than 20, MC should be more than ATC. For example if Q = 25, MC would be equal to 505, while ATC is 415, less than MC