Assume that profit = economic profit, and that costs include opportunity costs, except when otherwise stated.

1. A competitive firm will maximize profit in the short run when:
   A. total revenue = total cost
   B. price = average cost
   C. price = marginal cost
   D. marginal revenue = price
   E. price is greater than average cost

2. Which of the answers in the last question is true at ANY level of output?
   For a competitive firm, MR = P

3. Which of the answers from question 1 indicates the long-run equilibrium of a competitive industry?
   If P > AC, firms enter, driving down price; if P < AC, firms exist, driving up price

4. Which answer from question 1 indicates that the firm is definitely making a positive total profit?
   Total profit = (Price - Avg.Cost) / Q

5. Which of the following situations is possible? A competitive firm can have:
   A. A positive operating profit and a negative total profit
   B. A positive accounting profit and a negative economic profit.
   C. Price lower than average cost and a positive operating profit.
   D. Price equal to marginal cost and a negative total profit.
   E. All the above situations are possible

6. If an average competitive firm finds that price is higher than its average economic cost, it should expect:
   A. Firms to exit the industry.
   B. Firms to enter the industry.
   C. Firms will neither enter nor exit the industry.
   D. It is not possible to tell whether more firms will enter or exit the industry.

7. The “long run” in microeconomics refers to:
   A. Time periods of more than one year.
   B. Any period longer than the length of a business cycle.
   C. The period of time needed to construct new production facilities.
   D. The time it would take to hire a worker.

8. The “long run” in macroeconomics refers to:
   [same options as the previous question]

9. If an industry operating on a larger scale produces goods more cheaply per unit than a
   industry operating on a smaller scale, we refer to the industry as a:
   A. constant cost industry
   B. increasing cost industry
   C. decreasing cost industry
   D. there is no term for this situation, because it never occurs in reality.
__E__10. The U.S. steel and automobile industry can be classified as:
   A. constant cost industries in both the late 19th - early 20th century and now
   B. increasing cost industries in both the late 19th - early 20th century and now
   C. increasing cost industries in both the late 19th - early 20th century and now
   D. increasing cost industries in the late 19th - early 20th century but decreasing cost industries now.
   E. decreasing cost industries in the late 19th - early 20th century but increasing cost industries now.

__B__11. Average total cost is computed by:
   A. Dividing the sum of marginal and variable costs by the quantity produced.
   B. Dividing the sum of fixed and variable costs by the quantity produced.
   C. Dividing the sum of fixed and marginal costs by the quantity produced.
   D. Dividing the sum of accounting and economic costs by the quantity produced.
   E. Dividing the change in variable costs by the change in quantity.

__E__11. Marginal cost is computed by: [same options as the previous question]
   \[ MC = \frac{\text{change in } TC}{\text{change in } Q} = \frac{\text{change in } VC}{\text{change in } Q} \] (since fixed cost does not change)

__D__12. If a competitive firm finds that the price of its products is less than its marginal cost, it should:
   A. Raise its price to increase its revenue per item.
   B. Lower its price to increase its sales.
   C. Increase its output.
   D. Decrease its output.
   E. Continue charging the same price and producing the same amount.
   Note that the marginal cost will decline when the firm reduces output.

__A__13. Of the options above, the one which will decrease sales and profits the most is:
   If a competitive firm raises its price, its sales will be zero.

__B__14. We know that the total variable cost for a firm producing 10 million items of output is $2 million dollars. When it increases its output to 20 million items, it finds that its total cost is $5 million dollars. This means that the marginal cost of a unit of output must have:
   A. increased
   B. decreased
   C. stayed the same.
   D. it is not possible to compute marginal costs with the information given.
   Output doubled and cost more than doubled, so marginal costs increased.

__A__15. The accounting profit of a firm:
   A. Will always be greater than the economic profit of the firm.
   B. Will always be less than the economic profit of the firm.
   C. May be either greater or less than the economic profit of the firm.
   D. Will always be equal to the economic profit of the firm.

__C__16. In a constant cost industry, if demand decreases:
   A. Price and quantity will both fall in both the short run and the long run.
   B. Price and quantity will both fall in the short run, but quantity will get back to its original level in the long run.
   C. Price and quantity will both fall in the short run, but price will get back to its original level in the long run.
   D. Price and quantity will both fall in the short run, but both will get back to their original level in the long run.
17. In a decreasing cost industry, if demand decreases:
A. Price and quantity will both fall in both the short run and the long run.
B. Price and quantity will both fall in the short run, but quantity will get back to its original level in the long run.
C. Price and quantity will both fall in the short run, but price will rise above to its original level in the long run.
D. Price and quantity will both fall in the short run, but quantity will get back to its original level in the long run.

Given the following table for a competitive firm which is absolutely at the average of the industry:
Given values are in *bold italics*, for example the variable cost of **1800** at Q = 50

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18. What is the price of the firm's products?
Since Revenue = P Q,  \( P = \frac{Revenue}{Q} = \frac{1500}{30} \)
We can now fill in the entire revenue column as above

19. What is the level of output at which P = MC?
This is the really difficult problem. You might want to go on to the other problems first.

Start from MC = change in VC (or in TC) / change in Q
Note that as cost rises from 100 to 200, we have change in TC = 100, change in Q = 10
We must fill in the VC column, and we can by using MC = change in VC / change in Q
or change in VC = MC * change in Q

Given a MC of 20 at Q = 20, we must have had a change in VC of 10 * 20 or 200;
since VC at 10 was already 100, the change in VC will bring us up to $300 for VC.
Hence at 20, TC = 400, operating profit = 1000 - 300 = 700, total profit = 1000 - 400 = 600

The other easy rows to fill in are Q = 30 and Q = 50
At Q = 30, we are given VC = 600, so TC = 700, and with revenue of 1500, Op.Profit = 800
Since the change in TC was 700 - 400, and change in Q = 10, we have MC = 300 / 10 = 30

At Q = 50, VC = 1800, so TC = 1900, and with revenue = 2500, Op. profit = 2500 - 1800 = 700
Since the MC at Q = 50 is 70, the change in variable costs from Q = 40 must be 700
and hence VC at Q = 40 must be 1100

With this information, we can find that MC at Q = 40 must be \((1100 - 600) / 10 = $50\)
Hence at this level, \( P = MC \)
20. What is fixed cost at 0 units of output?
Fixed cost is the only cost at no output (you can produce nothing hiring no workers, or buying no raw materials)

$100

21. What is fixed cost at 60 units of output?
Fixed cost stays FIXED!

40 units

22. What is the optimal level of output for this firm in the short run?
P = MC holds at Q = 40; note that the operating profit and total profit are also highest here.

$1100

23. What is variable cost at 40 units of output?
See problem 19 for an explanation.

$2900

24. What is total cost at 50 units of output?
Since total profit is given at 100, and revenue = $3000, total cost must have been $2900

A

25. Should the firm expect that:
A. more firms will enter this industry?
B. some firms will exit this industry?
C. The number of firms in the industry will remain the same.

At the optimal output, the firm is making a total profit of $800, so firms will enter.

$800

26. What is the maximum possible total profit made by this firm?

To complete the table by filling in the final row (Q = 60)
Since profit in the final row was $100, and revenue was $3000, total costs must have been $2900 so variable costs must be $2800