

True/False/Uncertain and *Explain*

Indicate whether the following statements are **True**, **False**, or **Uncertain**, and give a short (2-3 sentences) **explanation**.

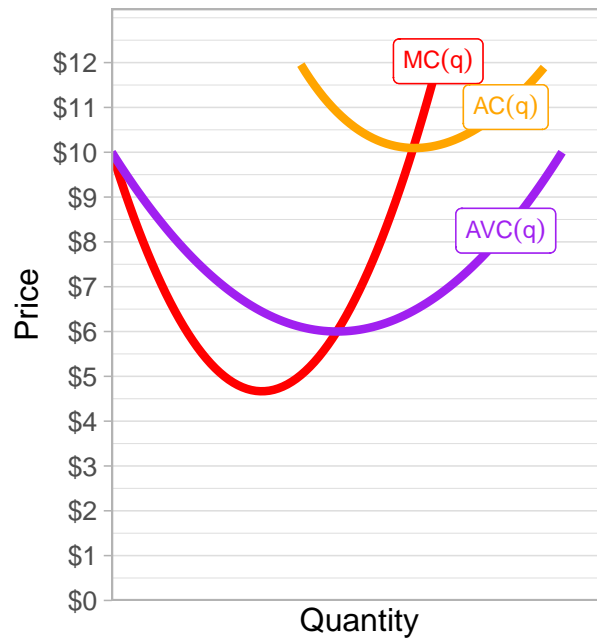
1. An upward-sloping market supply curve implies that the industry faces *external diseconomies*.

2. A firm with the following production function

$$q = 2l + k$$

has technology that exhibits *increasing returns to scale*.

3. The graph below depicts the cost structure for a representative firm in a competitive industry:



According to the graph, the firm will break even at a market price of \$10, and shut down in the short run below a market price of \$6.

4. A firm in a competitive market has lower costs than all of its competitors due to its having the best trained workers. In the long run, this firm can earn positive economic profits.

5. A firm should shut down production in the short run when its variable costs exceed its total revenues at its profit-maximizing quantity.

6. Soybeans are likely to approximate a perfectly competitive industry.

Short Answer (10 points each)

If applicable, show all work and clearly label all graphs.

7. Briefly explain how we derive the long run average cost curve for a firm. Draw an example graph to demonstrate your explanation.

8. Explain the difference between *economies of scale* and *returns to scale*.

9. Explain why fixed costs only exist in the short run.

10. Explain the difference between a fixed cost and a sunk cost.

11. Write a production function and draw two example isoquants that describes the following technology:
an automotive assembly plant can assemble 1 car for every combination of 4 wheels and 1 engine.

Problems

Show all work. You may *not* earn full credit if you only write the answer, even if correct.

12. You have a firm with the following production function:

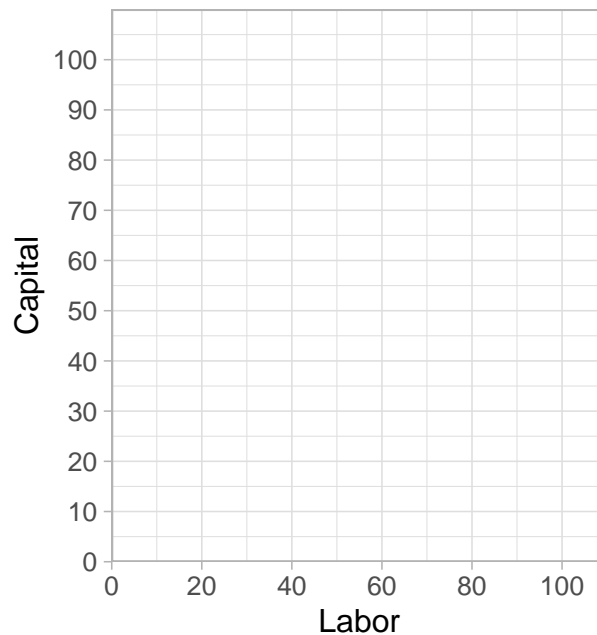
$$y = kl$$

- In the short run, the firm has 5 units of capital. Write out the short-run production function.
- Write down the total product, marginal product, and average product of labor for 0, 1, 2, 3, 4, and 5 workers.
- In the long run, the marginal products of labor and capital, respectively, are:

$$MP_l = k$$

$$MP_k = l$$

Suppose your firm needs to produce 1,000 units of output, the price of labor is \$20, and the price of capital is \$50. Find the optimal (i.e. cost-minimizing) combination of labor and capital that produces 1,000 units.



- What is the total cost of producing with the optimal combination?
- Graph the isoquant, isocost line, and optimum on the graph above.
- In the long run, does this production function exhibit constant, increasing, or decreasing returns to scale?

13. Suppose you are a restaurant operating in the very competitive D.C. brunch market. You have a cost structure as follows, where q is hundreds of meals served per day.

$$C(q) = 2q^2 + 4q + 18$$

$$MC(q) = 4q + 4$$

- a. Write the equations for (i) fixed costs, (ii) variable costs, (iii) average fixed costs, (iv), average variable costs, and (v) average (total) costs.
- b. The market price is currently \$12. Calculate the profit-maximizing quantity of output.
- c. At the profit-maximizing quantity, calculate the average cost.
- d. At the profit-maximizing price and quantity, calculate the total profit. Should this firm stay or exit the market in the long run?
- e. Should this firm produce or shut down in the short run?
- f. What price would the firm need to charge in order to break even?
- g. In the long run, what must the equilibrium market price be for this industry, and why?

Long Answer (10 points each)

Please answer clearly and concisely (2-5 sentences is sufficient). If applicable, show all work and clearly label all graphs.

14. Explain why in a market economy, a firm's profits go to entrepreneurs and shareholders (e.g. and not to workers, etc).
15. Describe, as completely as you can, what the firm's short-run supply curve looks like and what the firm's long-run supply curve looks like. Draw a graph. What are the main differences?
16. Give an example of an economic rent, and how in a competitive industry, economic profits will still fall to zero in the long run.

Formulas

$$wl + rk = C$$

$$\epsilon_{q,p} = \frac{1}{\text{slope}} \times \frac{p}{q}$$

- Two curves are *tangent* at a point \iff two curves have the same slope *at that point*