

Test 5 – Competitive supply

Name _____

Group _____

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

- 1) Which of following is a key assumption of a perfectly competitive market? 1) _____
- A) Commodities have few sellers
 - B) Firms can influence market price
 - C) Each seller has a very small share of the market.
 - D) It is difficult for new sellers to enter the market.
 - E) none of the above.
- 2) The textbook for your class was not produced in a perfectly competitive industry because 2) _____
- A) upper-division microeconomics texts are not all alike.
 - B) it is not costless to enter or exit the textbook industry.
 - C) there are so few firms in the industry that market shares are not small, and firms' decisions have an impact on market price.
 - D) of all of the above reasons.
- 3) If current output is less than the profit-maximizing output, then the next unit produced 3) _____
- A) will decrease profit.
 - B) will increase cost more than it increases revenue.
 - C) may or may not increase profit.
 - D) will increase revenue more than it increases cost.
 - E) will increase revenue without increasing cost.
- 4) The demand curve facing a perfectly competitive firm is 4) _____
- A) the same as its marginal revenue curve, but not its average revenue curve.
 - B) the same as its average revenue curve, but not the same as its marginal revenue curve.
 - C) not defined in terms of average or marginal revenue.
 - D) not the same as either its marginal revenue curve or its average revenue curve.
 - E) the same as its average revenue curve and its marginal revenue curve.

- 5) The demand curve facing a perfectly competitive firm is 5) _____
- A) the same as the market demand curve.
 - B) perfectly vertical.
 - C) downward-sloping and more flat than the market demand curve.
 - D) perfectly horizontal.
 - E) downward-sloping and less flat than the market demand curve.
- 6) At the profit-maximizing level of output, marginal profit 6) _____
- A) is also maximized.
 - B) may be positive, negative or zero.
 - C) is zero.
 - D) is positive.
 - E) is increasing.

ESSAY. Write your answer in the space provided or on a separate sheet of paper.

- 7) The following table contains information for a price taking competitive firm. Complete the table and determine the profit maximizing level of output (round your answer to the nearest whole number).

Output	Total Cost	Marginal Cost	Fixed Cost	Average Cost	Total Revenue	Average Revenue	Marginal Revenue
0	5				0		
1	7				10		
2	11				20		
3	17				30		
4	27				40		
5	41				50		
6	61				60		

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

- 8) In the short run, a perfectly competitive firm earning negative economic profit 8) _____
- A) is not operating on its AVC.
 - B) is at the minimum of its AVC.
 - C) is on the downward-sloping portion of its AVC.
 - D) can be at any point on its AVC.
 - E) is on the upward-sloping portion of its AVC.

Table 8.1

Q	P	TR	MR	TC	MC
0	\$30	\$0	---	\$15	---
1	\$30	\$30	\$30	\$25	\$10
2	\$30	\$60	\$30	\$40	\$15
3	\$30	\$90	\$30	\$60	\$20
4	\$30	\$120	\$30	\$85	\$25
5	\$30	\$150	\$30	\$115	\$30
6	\$30	\$180	\$30	\$150	\$35

9) Refer to Table 8.1. That the firm is perfectly competitive is evident from its

9) _____

- A) zero economic profits.
- B) absence of marginal values at $Q = 0$.
- C) constant marginal revenue.
- D) increasing total cost.
- E) increasing marginal cost.

10) If price is between AVC and ATC, the best and most practical thing for a perfectly competitive firm to do is

10) _____

- A) lower prices to gain revenue from extra volume.
- B) shut down immediately and liquidate the business.
- C) shut down immediately, but not liquidate the business.
- D) raise prices.
- E) continue operating, but plan to go out of business.

11) Bette's Breakfast, a perfectly competitive eatery, sells its "Breakfast Special" (the only item on the menu) for \$5.00. The costs of waiters, cooks, power, food etc. average out to \$3.95 per meal; the costs of the lease, insurance and other such expenses average out to \$1.25 per meal. Bette should

11) _____

- A) continue producing in the short run, but plan to go out of business in the long run.
- B) raise her prices above the perfectly competitive level.
- C) continue producing in the short and long run.
- D) lower her output.
- E) close her doors immediately.

12) The supply curve for a competitive firm is

12) _____

- A) its MC curve above the minimum point of the ATC curve.
- B) its entire MC curve.
- C) its MC curve above the minimum point of the AVC curve.
- D) its MR curve.
- E) the upward-sloping portion of its MC curve.

- 13) If a competitive firm's marginal costs always increases with output, then at the profit maximizing output level, producer surplus is 13) _____
- A) positive because price exceeds average total costs.
 - B) positive because price exceeds average variable costs.
 - C) zero because price equals marginal costs.
 - D) zero because marginal costs equal marginal revenue.
 - E) positive because revenues are increasing faster than variable costs.

- 14) In a supply-and-demand graph, producer surplus can be pictured as the 14) _____
- A) area between the demand curve and the supply curve to the left of equilibrium output.
 - B) area between the equilibrium price line and the supply curve to the left of equilibrium output.
 - C) area under the demand curve to the left of equilibrium output.
 - D) vertical intercept of the supply curve.
 - E) area under the supply curve to the left of equilibrium output.

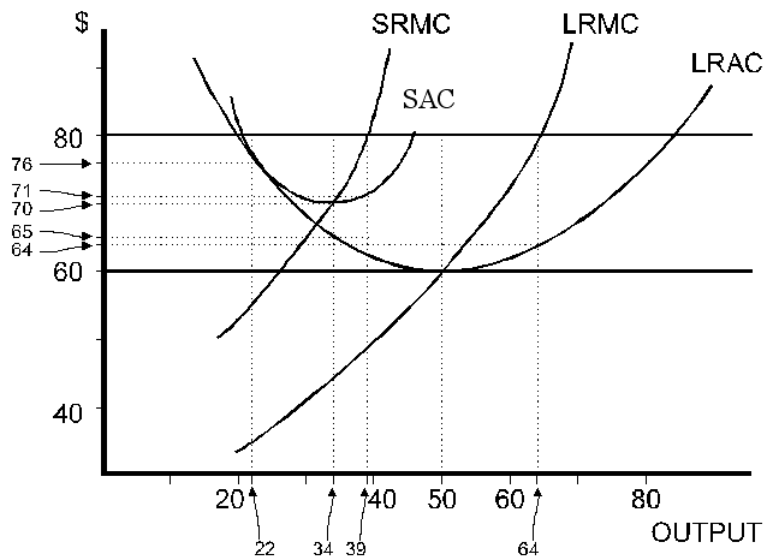


Figure 8.2

- 15) Refer to Figure 8.2. If the firm expects \$80 to be the long run price, how many units of output will it plan to produce in the long run? 15) _____
- A) 64.
 - B) 22.
 - C) 34.
 - D) 50.
 - E) 38.

- 16) What happens in a perfectly competitive industry when economic profit is greater than zero? 16) _____
- A) There may be pressure on prices to fall.
 - B) New firms may enter the industry.
 - C) Existing firms may get larger.
 - D) Firms may move along their LRAC curves to new outputs.
 - E) All of the above may occur.
- 17) In long-run competitive equilibrium, a firm that owns factors of production will have an 17) _____
- A) economic profit $>$ \$0 and accounting profit = \$0.
 - B) economic and accounting profit can take any value.
 - C) economic and accounting profit = \$0.
 - D) economic and accounting profit $>$ \$0.
 - E) economic profit = \$0 and accounting profit $>$ \$0.
- 18) Consider the following statements when answering this question 18) _____
- I. If the cost of producing each unit of output falls \$5, then the short run market price falls \$5.
 - II. If the cost of producing each unit of output falls \$5, then the long run market price falls \$5.
- A) I is true, and II is false.
 - B) I is false, and II is true.
 - C) I and II are true.
 - D) I and II are false.
- 19) An increasing-cost industry is so named because of the positive slope of which curve? 19) _____
- A) Each firm's short-run marginal cost curve
 - B) The industry's long-run supply curve
 - C) Each firm's long-run marginal cost curve
 - D) Each firm's long-run average cost curve
 - E) Each firm's short-run average cost curve
- 20) In a constant-cost industry, price always equals 20) _____
- A) minimum LRAC, but not LRMC.
 - B) LRMC and minimum LRAC.
 - C) LRAC and minimum LRMC.
 - D) LRMC and LRAC, but not necessarily minimum LRAC.
 - E) minimum LRAC and minimum LRMC.

ESSAY. Write your answer in the space provided or on a separate sheet of paper.

- 21) Bud Owen operates Bud's Package Store in a small college town. Bud sells six packs of beer for offpremises consumption. Bud has very limited store space and has decided to limit his product line to one brand of beer, choosing to forego the snack food lines that normally accompany his business. Bud's is the only beer retailer physically located within the town limits. He faces considerable competition, however, from sellers located outside of town. Bud regards the market as highly competitive and considers the current \$2.50 per six pack selling price to be beyond his control. Bud's total and marginal cost functions are:

$$TC = 2000 + 0.0005Q^2$$

$$MC = 0.001Q,$$

where Q refers to six packs per week. Included in the fixed cost figure is a \$750 per week salary for Bud, which he considers to be his opportunity cost.

- a. Calculate the profit maximizing output for Bud. What is his profit?
Is this an economic profit or an accounting profit?
- b. The town council has voted to impose a tax of \$.50 per six pack sold in the town, hoping to discourage beer consumption.
What impact will the tax have on Bud? Should Bud continue to operate?
What impact will the tax have on Bud's outoftown competitors?

- 22) In the long-run equilibrium of a competitive market, the market supply and demand are:

$$\text{Supply: } P = 30 + 0.50Q$$

$$\text{Demand: } P = 100 - 1.5Q,$$

where P is dollars per unit and Q is rate of production and sales in hundreds of units per day. A typical firm in this market has a marginal cost of production expressed as:

$$MC = 3.0 + 15q.$$

- a. Determine the market equilibrium rate of sales and price.
- b. Determine the rate of sales by the typical firm.
- c. Determine the economic rent that the typical firm enjoys.
(Hint: Note that the marginal cost function is linear.)
- d. If an output tax is imposed on ONE firm's output such that the ONE firm has a new marginal cost (including the tax) of:

$$MC_t = 5 + 15q,$$

what will the firm's new rate of production be after the tax is imposed? How does this new production rate compare with the pre-tax rate? Is it as expected? Explain. Would the effect have been the same if the tax had been imposed on all firms equally? Explain.

23) The market demand for a type of carpet known as KS-12 has been estimated as

$$P = 75 - 1.5Q,$$

where P is price (\$/yard), and Q is output per time period (thousands of yards per month). The market supply is expressed as $P = 25 + 0.50Q$. A typical competitive firm that markets this type of carpet has a marginal cost of production of

$$MC = 2.5 + 10q.$$

- Determine the market equilibrium price for this type of carpet. Also determine the production rate in the market.
- Determine how much the typical firm will produce per week at the equilibrium price.
- If all firms had the same cost structure, how many firms would compete at the equilibrium price computed in (a) above?
- Determine the producer surplus the typical firm has under the conditions described above. (Hint: Note that the marginal cost function is linear.)

24) The market for wheat consists of 500 identical firms, each with the total and marginal cost functions shown:

$$TC = 90,000 + 0.00001Q^2$$

$$MC = 0.00002Q,$$

where Q is measured in bushels per year. The market demand curve for wheat is $Q = 90,000,000 - 20,000,000P$, where Q is again measured in bushels and P is the price per bushel.

- Determine the short-run equilibrium price and quantity that would exist in the market.
- Calculate the profit maximizing quantity for the individual firm. Calculate the firm's shortrun profit (loss) at that quantity.
- Assume that the short-run profit or loss is representative of the current long-run prospects in this market. You may further assume that there are no barriers to entry or exit in the market. Describe the expected long-run response to the conditions described in part b. (The TC function for the firm may be regarded as an economic cost function that captures all implicit and explicit costs.)

25) A competitive firm sells its product at a price of \$.10 per unit. Its total and marginal cost functions are:

$$TC = 5 - 0.5Q + 0.001Q^2$$

$$MC = -0.5 + 0.002Q,$$

where TC is total cost (\$) and Q is output rate (units per time period).

- Determine the output rate that maximizes profit or minimizes losses in the shortterm.
- If input prices increase and cause the cost functions to become

$$TC = 5 - 0.10Q + 0.002Q^2$$

$$MC = -0.10 + 0.004Q,$$

what will the new equilibrium output rate be? Explain what happened to the profit maximizing output rate when input prices were increased.

Answer Key

Testname: TEST 5 - COMPETITIVE SUPPLY

- 1) C
- 2) D
- 3) D
- 4) E
- 5) D
- 6) C
- 7)

Output	Total Cost	Marginal Cost	Fixed Cost	Average Cost	Total Revenue	Average Revenue	Marginal Revenue
0	5	-	5	-	0	-	-
1	7	2	5	7	10	10	10
2	11	4	5	5.5	20	10	10
3	17	6	5	6	30	10	10
4	27	10	5	7	40	10	10
5	41	14	5	8	50	10	10
6	61	20	5	10	60	10	10

The profit maximizing level of output is either 3 or 4. Note that at $Q = 4$ the profit-maximizing condition $MR = MC$ is satisfied. Since this problem is discrete, the profit at $Q = 3$ happens to be the same as the profit at $Q = 4$, so either of these answers is correct.

- 8) E
- 9) C
- 10) E
- 11) A
- 12) C
- 13) B
- 14) B
- 15) A
- 16) E
- 17) E
- 18) B
- 19) B
- 20) B

Answer Key

Testname: TEST 5 - COMPETITIVE SUPPLY

21) *a.*

Given the competitive nature of the market, Bud should equate P to MC.

$$2.50 = 0.001Q$$

$$Q = 2500$$

$$TR = 2.5 \times 2500 = 6250$$

$$TC = 2000 + 0.0005(2500)^2$$

$$TC = 2000 + 3125$$

$$TC = 5125$$

$$\pi = 6250 - 5125$$

$$\pi = 1,125$$

Since the cost function is an economic cost function, we can conclude that this is an economic profit.

b.

Tax shifts total cost curve to:

$$TC = 2000 + 0.0005Q^2 + 0.5Q$$

MC becomes

$$MC = 0.001Q + 0.5$$

setting $P = MC$

$$\$2.50 = 0.001Q + 0.5$$

$$2.00 = 0.001Q$$

$$Q = 2000$$

$$TR = 2.50 \times 2000$$

$$TR = 5000$$

$$TC = 2000 + 0.0005(2000)^2 + 0.5(2000)$$

$$TC = 2000 + 2000 + 1000$$

$$TC = 5000$$

$$\pi = 5000 - 5000$$

$$\pi = 0$$

Given that this is zero economic profit, Bud should continue operating.

The impact upon Bud's competitors will be favorable or neutral. As he curtails output, 500 six packs worth of business will either shift elsewhere or choose temperance.

Answer Key

Testname: TEST 5 - COMPETITIVE SUPPLY

22) *a.*

The market equilibrium price and sales rate are determined as follows:

$$\text{Supply} = \text{Demand}$$

$$30 + 0.50Q = 100 - 1.5Q$$

$$Q = 70/2 = 35 \text{ (hundred per day)}$$

$$P = 30 + 0.50(35) = \$47.5 / \text{unit}$$

b.

The rate of sales by the typical firm is determined from the firm's MC curve.

$$MC = 47.5 = 3 + 15q$$

$$q = 2.967 \quad \text{(hundred per day)}$$

c.

The economic rent that the firm earns in the long-run is equal to the producer surplus that it generates. The producer surplus is the area of the triangle bounded by price, MC, and production rate, a triangle.

$$P = 47.5 \quad q = 2.833 \quad MC \text{ (lower point)} = 3$$

$$\begin{aligned} \text{Economic rent} &= (1/2)b \cdot h = (0.5)(2.967)(47.5 - 3) \\ &= \$66.016 \text{ (hundreds)} \end{aligned}$$

d.

The market price is expected to stay the same since the tax is imposed on the one firm. Thus, the production rate for the firm is determined at the intersection of price and MC of the firm.

$$47.5 = 5 + 15q$$

$$q = 2.833 \quad \text{(hundreds of units per day)}$$

This production rate is slightly less than the pre-tax rate, as expected. The tax had the effect of shifting the MC curve vertically upward. This resulted in an intersection with the price line at 2.833 instead of 2.967.

The effect would not have been the same if the tax had been imposed equally on all firms. With the tax on all firms, the equilibrium market price would have increased. The industry supply curve would have shifted upward and total industry output would have decreased. Instead of the one firm being affected with one firm being taxed, the industry equilibrium price and output would be affected when the tax was imposed on all firms.

Answer Key

Testname: TEST 5 - COMPETITIVE SUPPLY

23) *a.*

Market equilibrium price is found by equating S and D.

$$75 - 1.5Q = 25 + 0.50Q$$

$$50 = 2Q$$

$$Q = 25 \text{ (thousand yards per month)}$$

The equilibrium selling price is

$$P = 75 - 1.5(25) = \$37.5/\text{yard.}$$

b.

Since the firm's supply is based on its MC curve, we can use MC to determine production rate.

$$P = 37.5 = MC = 2.5 + 10q$$

$$q = \frac{35}{10} = 3.5 \text{ (thousand yards / month)}$$

c.

Since each firm produces 3.5 thousand yards per month and total production is at 25 thousand yards per month, a total of 7.14 firms would be needed.

d.

Producer surplus is the area between the price of \$37.5 and MC, bounded by zero and 3.5 units of output for the typical firm. The bounded area is a triangle.

$$\text{Area} = \frac{1}{2}b \cdot h = (0.5)(3.5)(37.5 - 2.5) = \$61.25 \text{ (thousand)}$$

Answer Key

Testname: TEST 5 - COMPETITIVE SUPPLY

24) *a.*

Market supply is horizontal sum of individual firm supply (firms MC curve).

$$\text{Firm's TC} = 90,000 + 0.00001Q^2$$

$$\text{MC} = 0.00002Q = P.$$

Solve for Q in terms of P to express as supply curve

$$P = 0.00002Q$$

$$Q = 50,000P$$

Market supply curve is horizontal sum of firm supply curve or N-times the firm supply curve (N is the number of firms).

$$Q_S = 500(50,000)P$$

$$Q_S = 25,000,000P$$

equate Q_S and Q_D to determine price and quantity

$$25,000,000P = 90,000,000 - 20,000,000P$$

$$45,000,000P = 90,000,000$$

$$P = \$2.00$$

$$Q = 25,000,000P$$

$$Q = 25,000,000(2)$$

$$Q = 50,000,000$$

b.

To determine the firm's output, equate price and marginal cost - Firm's $\text{MC} = 0.00002Q$.

$$P = 2 = 0.00002Q$$

$$Q = 100,000$$

Firm's $\pi = \text{TR} - \text{TC}$

$$\text{TR} = 2.00(100,000)$$

$$\text{TR} = 200,000$$

$$\text{TC} = 90,000 + 0.00001Q^2$$

$$\text{TC} = 90,000 + 0.00001(100,000)^2$$

$$\text{TC} = 190,000$$

$$\pi = 200,000,000 - 190,000 = 10,000$$

c.

Firms are earning economic profit so we would expect entry to occur, causing the market supply curve to shift rightward. As the market supply curve shifts rightward, price falls, which in turn causes each firm to reduce its output. This will continue until we reach long-run equilibrium at zero profit.

25) *a.*

$$\text{TR} = PQ = 0.10Q \quad \text{MR} = 0.10$$

$$\text{TC} = 5 - 0.5Q + 0.001Q^2$$

$$\text{MC} = -0.5 + 0.002Q = 0.10 = \text{MR}$$

$$Q = 75$$

b.

$$\text{MC} = -0.10 + 0.004Q = 0.10 = \text{MR}$$

$$Q = 50$$

As a result of the increase in input costs, the firm's marginal cost increased. This caused the intersection of MC to occur at the lower production rate, 50 vs. 75. This also reduced the firm's level of profit.