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## Final Exam

You have until 8pm to complete the exam, be certain to use your time wisely. For multiple choice questions, mark your answer on your scantron sheet. Choose only the single best answer for each multiple choice question; if more than one letter is filled in for a question it will be marked wrong. For the short answer questions, write your answers directly on the exam. Show your work clearly, place a box around final answers and be certain to label any graphs you draw. Final answers may be left as fractions. Non-graphing calculators may be used. Good luck!

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**Name:**

**ID Number:**

**Section:**

### SECTION I: MULTIPLE CHOICE (60 points)

1. If a firm's cost function exhibits increasing returns to scale:
  - (a) Total costs will be lower as the level of output gets larger.
  - (b) Average costs will be lower as the level of output gets larger.
  - (c) Both (a) and (b).
  - (d) Neither (a) nor (b).
2. If  $AC(10) < AC(11)$ , then (note: the numbers represent units of output):
  - (a)  $MC(10) < AC(10)$ .
  - (b)  $MC(10) > AC(10)$ .
  - (c)  $MC(10) = AC(10)$ .
  - (d)  $MC(10) = MC(11)$ .
3. The slope of a consumer's budget line depends on:
  - (a) The prices of the goods and income.
  - (b) Income only.
  - (c) The marginal utilities of the goods.
  - (d) The relative prices of the goods.
4. If two inputs are perfect substitutes in production, a profit-maximizing firm will:
  - (a) Use them in fixed proportions.
  - (b) Use only the input with the larger marginal product relative to its price.
  - (c) Use only the input with the smaller marginal product relative to its price.
  - (d) Use equal amounts of the inputs.
5. Which of the following statements is true?
  - (a) Profits for a competitive firm are positive in the long run.
  - (b) Profits for a monopoly are always negative at the socially efficient price and quantity.
  - (c) Profits for a monopoly are always positive at the socially efficient price and quantity.
  - (d) None of the above.

6. A monopolist will tend to earn higher profits under \_\_\_\_\_ than it would under \_\_\_\_\_.
- (a) First degree price discrimination, third degree price discrimination.
  - (b) Third degree price discrimination, first degree price discrimination.
  - (c) Second degree price discrimination, first degree price discrimination.
  - (d) Both (b) and (c).
7. If two bundles are on the same indifference curve, they:
- (a) Both give a consumer the same level of utility.
  - (b) Both cost the same amount.
  - (c) Are both in a consumer's budget set.
  - (d) Both have the same marginal utility for  $x$  and the same marginal utility for  $y$ .
8. If a firm uses only capital and labor as inputs and the level of capital is fixed in the short run, the firm will choose a short run level of labor for which:
- (a) The marginal product of labor is equal to the price of output divided by the wage.
  - (b) The marginal product of labor is equal to the wage divided by the price of output.
  - (c) The marginal product of labor is equal to the marginal product of capital.
  - (d) The marginal rate of substitution is equal to the ratio of the input prices.
9. In a perfectly competitive industry where firms all have upward sloping marginal cost curves, the short run industry supply curve is \_\_\_\_\_ while the long run industry supply curve is \_\_\_\_\_.
- (a) A positively sloped line, horizontal line.
  - (b) A negatively sloped line, horizontal line.
  - (c) A positively sloped line, a positively sloped line.
  - (d) A horizontal line, a positively sloped line.
10. If two identical firms compete with each other by choosing quantities, individual firm profits at the resulting equilibrium:
- (a) Will be equal to one half of the monopoly profits.
  - (b) Will be zero.
  - (c) Will be positive but less than one half of the monopoly profits.
  - (d) Will be negative.
11. If goods  $x$  and  $y$  are both ordinary goods and complements, an increase in the price of good  $x$  will:
- (a) Increase consumption of both goods.
  - (b) Decrease consumption of both goods.
  - (c) Increase consumption of  $x$  and decrease consumption of  $y$ .
  - (d) Increase consumption of  $y$  and decrease consumption of  $x$ .
12. Marginal revenue for a firm in a competitive industry:
- (a) Increases as the firm increases output.
  - (b) Decreases as the firm increases output.
  - (c) Remains constant as the firm increases output.
  - (d) The answer depends on the firm's cost function.

13. Indifference curves are:
- (a) Always downward sloping.
  - (b) Always upward sloping.
  - (c) Downward sloping if one or both of the goods are 'bads'.
  - (d) Downward sloping if both of the goods are 'bads'.
14. Charging an annual membership fee for a CD club and then allowing members to buy as many CD's as they want at a low price per CD is an example of:
- (a) Third degree price discrimination.
  - (b) Bundling.
  - (c) A two-part tariff.
  - (d) Second degree price discrimination.
15. In which of the following cases would a quantity tax not lead to deadweight loss?
- (a) When demand and supply are both unit elastic.
  - (b) When the tax is set such that tax revenue is maximized.
  - (c) When tax revenues are spent efficiently.
  - (d) When the supply curve is perfectly inelastic.
16. A firm with no fixed costs in a competitive industry:
- (a) Will produce output at all positive prices.
  - (b) Will produce at a level of output where marginal revenue equals marginal cost (if they decide to produce a positive amount of output).
  - (c) Will have profits that are less than producer surplus.
  - (d) Both (a) and (b).
17. On a graph with capital on the vertical axis and labor on the horizontal axis, the slope of an isocost line will be:
- (a) Steeper the larger the wage is.
  - (b) Steeper the larger the rental rate of capital is.
  - (c) Steeper the larger the marginal product of labor is.
  - (d) Steeper the larger the marginal product of capital is.
18. If two identical firms compete with each other by choosing prices, the equilibrium quantity (the combined output of both firms):
- (a) Will tend to be between the monopoly quantity and the efficient quantity.
  - (b) Will be equal to the monopoly quantity.
  - (c) Will be equal to the efficient quantity.
  - (d) Will maximize total combined profits of the firms.
19. If a firm's average cost curve is a horizontal line, a graph of total costs as a function of output will be (note: you can assume total costs are positive for positive quantities of output):
- (a) A vertical line.
  - (b) A horizontal line.
  - (c) A straight line but not horizontal.
  - (d) Not enough information.

20. If firms in a competitive industry are earning positive profits in the short run:
- (a) The number of firms will increase and the industry supply curve will get flatter.
  - (b) The number of firms will increase and the industry supply curve will get steeper.
  - (c) The number of firms will decrease and the industry supply curve will get flatter.
  - (d) The number of firms will decrease and the industry supply curve will get steeper.
21. If the price of a normal, ordinary good goes up, the income and substitution effects for that good:
- (a) Will both be positive.
  - (b) Will both be negative.
  - (c) Will have opposite signs.
  - (d) The answer depends on whether the other good is a complement or substitute.
22. Which of the following is true at any level of output  $y$ ?
- (a) Short run average costs are less than long run average costs.
  - (b) Short run average costs are greater than long run average costs.
  - (c) Short run average costs are less than or equal to long run average costs.
  - (d) Short run average costs are greater than or equal to long run average costs.
23. If a consumer has well-behaved indifference curves (the optimal bundle is at a point of tangency between the indifference curve and the budget line), then at the consumer's optimal bundle  $(x^*, y^*)$ :
- (a) A dollar spent on  $x$  will increase utility by the same amount as a dollar spent on  $y$ .
  - (b) The marginal utility of  $x$  is equal to the marginal utility of  $y$ .
  - (c) An increase in both  $x$  and  $y$  would lead to a decrease in utility.
  - (d) A movement along the budget line could lead to an increase in utility.
24. Which of the following is true?
- (a) The marginal cost curve intersects the average fixed cost curve at its minimum.
  - (b) The average variable cost curve intersects the average cost curve at its minimum.
  - (c) The average cost curve lies below the average variable cost curve.
  - (d) The marginal cost curve intersects the average variable cost curve at its minimum.
25. If the demand curve is downward sloping and the supply curve is upward sloping, a quantity tax will:
- (a) Increase the price paid by consumers and decrease the price received by producers.
  - (b) Decrease consumer surplus and decrease producer surplus.
  - (c) Decrease consumer and producer surplus by an amount greater than the revenue generated by the tax.
  - (d) All of the above.

## SECTION II: SHORT ANSWER (40 points)

For this section, be certain to show your work and clearly label any graphs you draw. Give complete answers but keep them concise. Please place a box around final answers where appropriate.

1. (18 points total) Suppose there is only one bookstore in town and it acts as a monopolist. The bookstore can get books from publishers at a price of \$5 a book and can order as many or as few books as it wants at this price. The inverse market demand curve for books is given:

$$p(b) = 10 - \frac{1}{100}b \quad (1)$$

- (a) Derive an expression for the revenue of the bookstore in terms of the number of books sold ( $b$ ) and an expression for the total costs of the bookstore as a function of the number of books sold ( $b$ ). (4 points)
- (b) If the bookstore is maximizing profits, what price will each charge per book, how many books will it sell and what will total profits be? (4 points)
- (c) What would be the socially efficient price and quantity of books sold? (3 points)
- (d) Calculate the deadweight loss associated with the monopoly outcome. (3 points)
- (e) Explain one alternative pricing strategy the bookstore could use to earn even higher profits than what you found in part (b). Your answer should be specific to the information given in the problem, you cannot assume that there are different types of customers or other types of products not mentioned in the problem. (Note: You do not need to calculate exact numbers but you do need to fully describe the pricing strategy and explain why it would generate greater profits. You may include a graph if it helps illustrate your explanation.) (4 points)

2. (10 points total) A firm in a perfectly competitive industry uses ten identical factories to produce a total amount of output  $y$ . The cost function for an individual factory  $i$  is given by:

$$C_i(y_i) = 10y_i^2 \quad (2)$$

- (a) Suppose that the factory wants to produce 20 total units of output. How many units of output will the firm produce at each factory and what will the firm's total costs be? (3 points)
- (b) Derive an expression for the firm's total costs as a function of the total amount of output produced,  $y$ . (4 points)
- (c) If the market price is \$40, how many units will the firm produce and what will the firm's profits be? (3 points)

3. (12 points total) A fast food restaurant operates in a competitive industry and has the total costs for producing hamburgers given by:

$$C(h) = h^3 - 10h^2 + 35h \quad (3)$$

where  $h$  is the total number of hamburgers produced.

- (a) Derive expressions for average costs as a function of  $h$  and marginal costs as a function of  $h$ . (3 points)
- (b) What is the lowest price at which the restaurant will still produce a positive quantity of hamburgers? (3 points)
- (c) Will the restaurant ever produce at quantity at which profits are negative? Why or why not? (3 points)
- (d) Suppose market demand for hamburgers is given by:

$$D(p) = 2000 - 50p \quad (4)$$

If all other fast food restaurants have the same cost function, what will the total number of restaurants be in the long run? (3 points)