
Midterm 2

You have until 1:50pm to complete this exam. Be certain to put your name, id number and section on both the exam and your scantron sheet and fill in test form A on the scantron. Answer all multiple choice questions on your scantron sheet. Choose the single best answer for each question; if you fill in multiple answers for a question you will be marked wrong. Answer the long answer questions directly on the exam. You must show your work for full credit. Answers may be left as fractions. Please place a box around final answers when appropriate. Good luck!

Name:

ID Number:

Section:

SECTION I: MULTIPLE CHOICE (60 points)

1. If the market demand curve is downward sloping and the market supply curve is upward sloping, a quantity tax placed on producers will:
 - (a) Increase the price paid by consumers by the amount of the tax.
 - (b) Increase the price received by producers by the amount of the tax.
 - (c) Increase the price paid by consumers by an amount less than the tax.
 - (d) Increase the price received by producers by an amount less than the tax.
2. Suppose a firm produces chairs using an increasing returns to scale technology for which wood is the only input. Suppose it takes 10 units of wood to produce 10 chairs. It will take:
 - (a) 40 units of wood to produce 40 chairs.
 - (b) More than 40 units of wood to produce 40 chairs.
 - (c) Fewer than 40 units of wood to produce 40 chairs.
 - (d) None of the above.
3. Suppose that the demand curve for toys is linear and downward sloping. At the current price, the price elasticity of demand for toys is -2 . If toystores raise their prices by a small amount:
 - (a) The number of toys sold will increase and revenues will increase.
 - (b) The number of toys sold will decrease and revenues will increase.
 - (c) The number of toys sold will decrease and revenues will decrease.
 - (d) The number of toys sold will increase and revenues will decrease.
4. When the price of apples increases, demand for bananas decreases. When the price of apples goes up, which of the following statements is definitely true?
 - (a) The substitution and income effects for bananas have opposite signs.
 - (b) The substitution and income effects for bananas have the same signs.
 - (c) The magnitude of the substitution effect is larger than the magnitude of the income effect for bananas.
 - (d) The magnitudes of the substitution and income effects for bananas are equal.

5. Milk is the only input used to make butter and butter-making technology exhibits constant returns to scale. If 30 cups of milk produce 2 pounds of butter, how many pounds of butter will 45 cups of milk make?
- (a) 5 pounds.
 - (b) 4 pounds.
 - (c) 3 pounds.
 - (d) 2 pounds.
6. Assume the market demand curve is downward sloping and the market supply curve is upward sloping. As the size of a quantity tax placed on consumers increases, which of the following is definitely true? (Assume we are only considering a range of taxes for which the quantity sold will still be positive.)
- (a) Consumer surplus increases.
 - (b) Tax revenue increases.
 - (c) Producer surplus increases.
 - (d) Deadweight loss increases.
7. Suppose that the quantity of x demanded does not depend on the price of y , demand for x and demand for y are always positive, and a consumer spends all of his money on x and y . If the price of y goes up:
- (a) The substitution effect for x will be zero and the income effect for x will be negative.
 - (b) Both the substitution and income effects for x will be zero.
 - (c) The income and substitution effects for y will have opposite signs but be equal in magnitude.
 - (d) The income and substitution effects for x will have opposite signs but be equal in magnitude.
8. Suppose that the demand function for good x is given by $x = \frac{I}{4p_x}$. The income elasticity of demand for x is:
- (a) Constant.
 - (b) Increasing as income gets larger.
 - (c) Decreasing as income gets larger.
 - (d) None of the above.
9. All of the consumers in the market for bagels have downward sloping, linear demand curves. On a graph with price on the vertical axis and bagels on the horizontal axis, the market demand curve hits the vertical axis at a price of \$20, hits the horizontal axis at a quantity of 500 bagels, and has kinks at the points (\$15, 50), (\$10, 150) and (\$5, 300). Which of the following statements is definitely true?
- (a) There are four consumers in the market for bagels.
 - (b) There are more than four consumers in the market for bagels.
 - (c) There are four or more consumers in the market for bagels.
 - (d) There may be fewer than four consumers in the market for bagels.

10. A firm uses screws (S) and nails (N) to produce widgets and the firm's production technology exhibits a diminishing technical rate of substitution. The firm can produce 10 widgets with either 2 screws and 10 nails or 10 screws and 2 nails. Which of the following is true? (Assume the firm can use fractions of screws and nails and produce fractions of widgets.)
- (a) If the firm uses 6 screws and 6 nails, it can produce 10 widgets.
 - (b) If the firm uses 6 screws and 6 nails, it can produce more than 10 widgets.
 - (c) If the firm uses 6 screws and 6 nails, it will produce less than 10 widgets.
 - (d) (a) or (c) may be true.
11. Demand for donuts is given by a downward sloping, linear demand curve. Supply of donuts is perfectly elastic. Before a tax on donuts, the equilibrium price of a donut was \$2 and the equilibrium quantity was 500. A quantity tax of \$1 is placed on consumers. This tax will:
- (a) Lead to a new price paid by consumers greater than \$2 but less than \$3.
 - (b) Lead to a new price paid by consumers of \$3.
 - (c) Leave the price paid by consumers unchanged.
 - (d) Leave the quantity of donuts sold unchanged.
12. As the number of workers used by a firm gets larger but the level of capital stays the same, each additional worker the firm adds increases output but by a smaller amount than the previous worker. Which of the following equations could describe the firm's production function (K represents units of capital, L represents units of labor)?
- (a) $f(K, L) = K^2 L^2$.
 - (b) $f(K, L) = K^2 + L^2$.
 - (c) $f(K, L) = KL^{-\frac{1}{2}}$.
 - (d) $f(K, L) = KL^{\frac{1}{2}}$.

Use the following information to answer questions 13 and 14. A firm produces widgets using labor as the only input. The firm has two different technologies, A and B , available. The production functions for the two technologies are:

$$f_A(L) = L^2$$

$$f_B(L) = 10L$$

13. Suppose that the firm wants to minimize the amount of money they spend on labor. Which of the following statements is true?
- (a) The firm will always use technology A .
 - (b) The firm will always use technology B .
 - (c) When producing less than 100 widgets, the firm will use technology A . When producing more than 100 widgets, the firm will use technology B .
 - (d) When producing less than 100 widgets, the firm will use technology B . When producing more than 100 widgets, the firm will use technology A .

14. At what level of labor would the slopes of the two production functions be the same (in other words, at what level of labor would the output of an additional worker be the same under either technology)?
- (a) When L equals 0.
 - (b) When L equals 5.
 - (c) When L equals 10.
 - (d) (a) and (c).
15. Market demand for comic books is given by $D(p) = 100 - 2p$. At the current price, if a store raised the price by a small amount there would be no change in the store's revenue. What is the current quantity of comic books being sold?
- (a) 25.
 - (b) 50.
 - (c) 100.
 - (d) 150.
16. There are two consumers in the market for oranges. They both have identical, linear demand curves with a slope of -4 . What is the slope of the market demand curve for oranges? (Assume we are referring to demand curves plotted with price on the vertical axis and quantity on the horizontal axis).
- (a) -2 .
 - (b) -4 .
 - (c) -8 .
 - (d) -16 .
17. On a graph with capital on the vertical axis and labor on the horizontal axis, a firm's isoquants are parallel straight lines with a negative slope. Which of the following is definitely true?
- (a) Capital and labor are perfect substitutes.
 - (b) The technical rate of substitution is diminishing.
 - (c) One unit of capital produces the same amount of output as one unit of capital.
 - (d) Capital and labor must be used in fixed proportions.
18. When the demand curve is downward sloping and the supply curve is upward sloping, as a quantity tax gets larger:
- (a) Both tax revenue and deadweight loss will increase but deadweight loss will increase at a faster rate.
 - (b) Tax revenue will increase at first but then decrease while deadweight loss will continue to increase at a constant rate.
 - (c) Deadweight loss will continue to increase but at a decreasing rate.
 - (d) Deadweight loss will continue to increase and do so at an increasing rate.

19. A person consumes only candy and soda. If the income elasticity of candy is greater than one:
- (a) The income elasticity of soda must be negative.
 - (b) The income elasticity of soda must be less than one.
 - (c) The income elasticity of soda must be between zero and one.
 - (d) Soda may be a luxury good.
20. Suppose a firm uses only capital and labor as inputs, the marginal product of capital is constant and independent of the level of labor and the marginal product of labor is constant and independent of the level of capital. We can say for certain that:
- (a) The firm's technical rate of substitution will be diminishing.
 - (b) A firm can substitute one unit of capital for one unit of labor and output will stay the same.
 - (c) The firm's isoquants will be straight lines.
 - (d) Output plotted as a function of capital would be a horizontal line (assume capital is on the horizontal axis).

SECTION II: SHORT ANSWER (40 points)

1. (16 points) Milk and tea are normal, ordinary goods. Bill likes to have milk with his tea so for him, the two goods are complements. Hillary likes to drink either milk or tea so for her, the two goods are substitutes. Suppose that the price of tea decreases.
 - (a) On a graph with milk on the vertical axis and tea on the horizontal axis, show the overall effect of the change in the price of tea on milk consumption and the effect decomposed into the part due to the income effect and the part due to the substitution effect. Be certain to clearly label the effects (including their directions) as well as any relevant budget lines, indifference curves and consumption bundles. Note that you do not have to show the income and substitution effects for tea.
 - (b) Repeat part (a) for Hillary using a second graph. Assume that Hillary has the same income as Bill and sees the same prices.

2. (9 points) For each scenario described below, write down a production function consistent with the description of the firm's technology.
- (a) A firm uses bolts (B) and screws (S) to produce output. The firm can always use two screws in place of one bolt. If no bolts are used, it takes ten screws to produce one unit of output.
 - (b) A firm uses capital (K) and labor (L) as its only inputs. The marginal product of capital is diminishing as the amount of capital gets larger and the marginal product of labor is diminishing as the amount of labor gets larger.
 - (c) The only input used by a firm is labor (L). The firm's production technology exhibits increasing returns to scale.

3. (15 points) There are ten consumers in the market for concert tickets (T). Five of the consumers are of type A and five are of type B . The individual inverse demand function for a type A consumer is:

$$p(T) = 10 - T$$

The individual inverse demand function for a type B consumer is:

$$p(T) = 10 - 2T$$

The market supply of concert tickets is fixed and equal to the number of seats in the theater which is 15. The theater will sell 15 and only 15 tickets no matter what the market price is.

- (a) Derive the market demand equation and graph it with price on the vertical axis and quantity on the horizontal axis. Also include the market supply curve on your graph.
- (b) Find the equilibrium price and quantity of tickets sold.
- (c) Suppose that a \$1 quantity tax is placed on consumers. Find the new equilibrium price paid by consumers, the new equilibrium price received by the theater, and the new quantity of tickets sold.
- (d) What is the change in consumer surplus resulting from the tax?