

## Terms and Definitions

Choose a definition for each key term.

### Key Terms

- \_\_\_\_\_ Budget constraint
- \_\_\_\_\_ Indifference curve
- \_\_\_\_\_ Marginal rate of substitution
- \_\_\_\_\_ Perfect substitutes
- \_\_\_\_\_ Perfect complements
- \_\_\_\_\_ Normal good
- \_\_\_\_\_ Inferior good
- \_\_\_\_\_ Income effect
- \_\_\_\_\_ Substitution effect
- \_\_\_\_\_ Giffen good

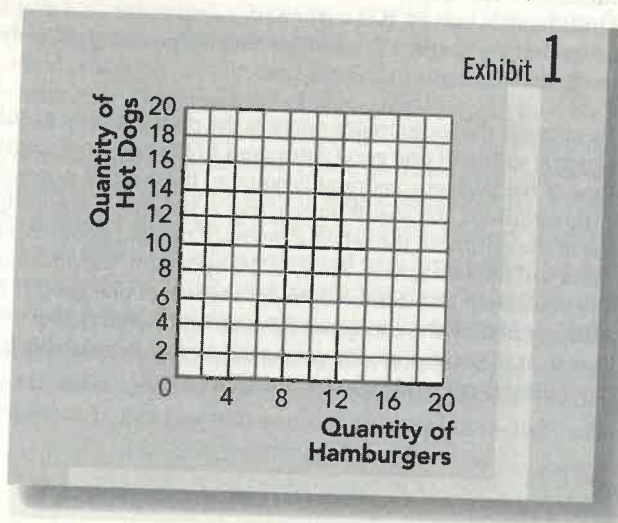
### Definitions

1. The change in consumption that results when a price change moves the consumer to a higher or lower indifference curve
2. The rate at which a consumer is willing to trade one good for another
3. The limit on the consumption bundles that a consumer can afford
4. A good for which an increase in income raises the quantity demanded
5. A good for which an increase in the price raises the quantity demanded
6. Two goods with right-angle indifference curves
7. A curve that shows consumption bundles that give the consumer the same level of satisfaction
8. A good for which an increase in income reduces the quantity demanded
9. Two goods with straight-line indifference curves
10. The change in consumption that results when a price change moves the consumer along a given indifference curve to a point with a new marginal rate of substitution

## Problems and Short-Answer Questions

### Practice Problems

1. Suppose a consumer only buys two goods—hot dogs and hamburgers. Suppose the price of hot dogs is \$1, the price of hamburgers is \$2, and the consumer's income is \$20.
  - a. Plot the consumer's budget constraint in Exhibit 1. Measure the quantity of hot dogs on the vertical axis and the quantity of hamburgers on the horizontal axis. Explicitly plot the points on the budget constraint associated with the even-numbered quantities of hamburgers (0, 2, 4, 6...).



- b. Suppose the individual chooses to consume 6 hamburgers. What is the maximum amount of hot dogs that he can afford? Draw an indifference curve on the figure above that establishes this bundle of goods as the optimum.

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- c. What is the slope of the budget constraint? What is the slope of the consumer's indifference curve at the optimum? What is the relationship between the slope of the budget constraint and the slope of the indifference curve at the optimum? What is the economic interpretation of this relationship?

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- d. Explain why any other point on the budget constraint must be inferior to the optimum.

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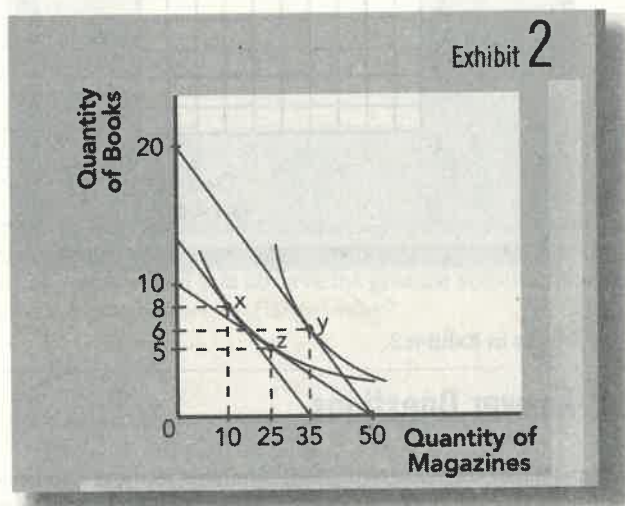


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2. Use Exhibit 2 to answer the following questions.



- a. Suppose the price of a magazine is \$2, the price of a book is \$10, and the consumer's income is \$100. Which point on the graph represents the consumer's optimum—x, y, or z? What are the optimal quantities of books and magazines this individual chooses to consume?

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- b. Suppose the price of books falls to \$5. What are the two optimum points on the graph that represent the substitution effect (in sequence)? What is the change in the consumption of books due to the substitution effect?

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- c. Again, suppose the price of books falls to \$5. What are the two optimum points on the graph that represent the income effect (in sequence)? What is the change in the consumption of books due to the income effect? Is a book a normal good or an inferior good for this consumer? Explain.

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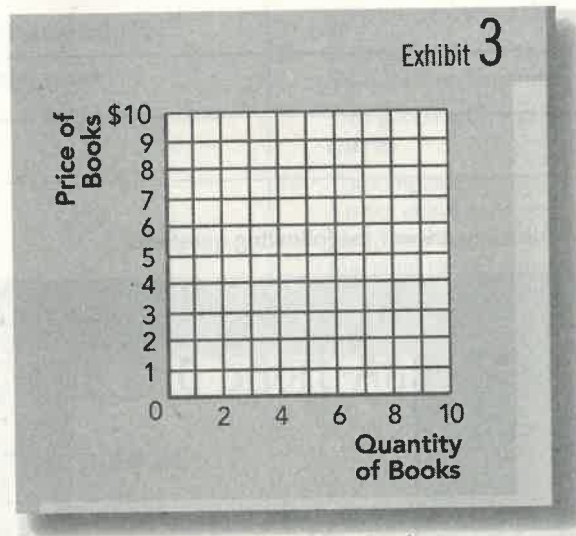
- d. For this consumer, what is the total change in the quantity of books purchased when the price of books fell from \$10 to \$5?

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- e. Use the information in this problem to plot the consumer's demand curve for



books in Exhibit 3.

### Short-Answer Questions

1. Suppose that there are two goods available to the consumer—pens and pencils. Suppose that the price of a pen is \$2.00 while the price of a pencil is \$0.50. If we measure the quantity of pens on the horizontal axis and the quantity of pencils on the vertical axis, what is the slope of the budget constraint? Do you need to know the income of the consumer to answer this question? Why or why not?

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2. If we measure "goods" on each axis, is an indifference curve positively (upward) sloped or negatively (downward) sloped? Why? If we measure a "good" on one axis but a "bad" (such as pollution) on the other axis, what type of slope do you think an indifference curve would have? Why?

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3. Why are most indifference curves bowed inward?

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4. Consider the following two pairs of goods:

- ♦ Graduation caps and graduation gowns
- ♦ Gasoline at an Exxon station and gasoline at a Shell station

Which of the pairs of goods above is likely to be nearly perfect substitutes, and which is likely to be nearly perfect complements? Explain.

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5. Referring to question 4 above, what is the shape of the indifference curves that you would expect each pair of goods to generate, straight-line or right-angle? For which pair of goods would you observe the greatest substitution effect if the relative prices of the two goods were to change? Why?

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6. Suppose there are two goods available to the consumer—coffee and tea. Suppose that the price of coffee decreases. What impact will the substitution effect and income effect have on the quantity demanded of coffee if coffee is a normal good? Explain. What impact will the substitution effect and income effect have on the quantity demanded of coffee if coffee is an inferior good? Explain.

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7. Suppose there are only two goods available to you, apples and oranges. Suppose that the prices of apples and oranges double and that your income also doubles. What will happen to the amount of apples and oranges that you choose to consume? Explain. (Hint: What has happened to the slope of the budget constraint? What has happened to the maximum amount of apples or oranges that you could consume if you allocated all of your income to one good or the other?)

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8. Some people argue that the tax rate should be reduced on interest earned from saving because it will increase the after-tax return to saving, increase the quantity of saving supplied, and increase economic growth. Are we certain that a decrease in the tax rate on interest earned from saving will increase the quantity of saving? Explain.

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## Self-Test

### True/False Questions

- \_\_\_\_\_ 1. If we measure the quantity of French fries on the horizontal axis and the quantity of hamburgers on the vertical axis, and if the price of French fries is \$0.60 and the price of a hamburger is \$2.40, then the slope of the budget constraint is  $1/4$  (and it is negative).
- \_\_\_\_\_ 2. A budget constraint is a set of commodity bundles that provide the consumer with the same level of satisfaction.
- \_\_\_\_\_ 3. Indifference curves measure the consumer's willingness to trade one good for another good while maintaining a constant level of satisfaction.
- \_\_\_\_\_ 4. When drawn on a graph that measures the quantity of a good on each axis, indifference curves are usually straight lines that slope downward (negatively).
- \_\_\_\_\_ 5. If two goods are perfect complements, indifference curves associated with these two goods would cross each other at the optimum.
- \_\_\_\_\_ 6. Indifference curves tend to be bowed inward because a consumer is willing to trade a greater amount of a good for another if they have an abundance of the good they are trading away.
- \_\_\_\_\_ 7. At the consumer's optimum point, the marginal rate of substitution of apples for oranges is equal to the ratio of the price of oranges to the price of apples.
- \_\_\_\_\_ 8. The more difficult it is to substitute one good for another, the more bowed inward indifference curves become.

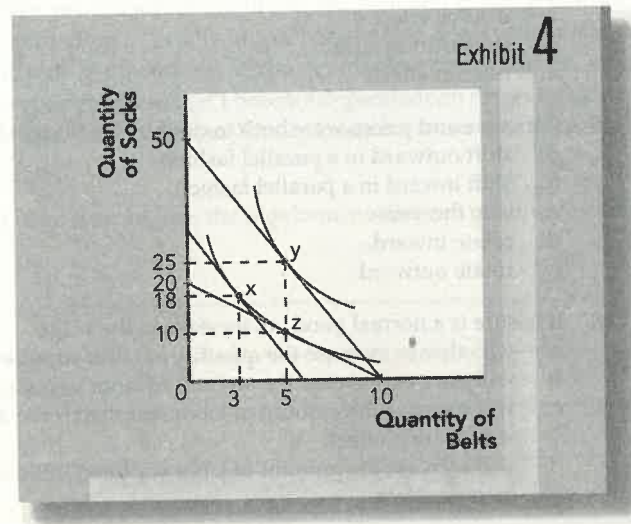
- \_\_\_\_\_ 9. If the price of a good falls, the substitution effect always causes an increase in the quantity demanded of that good.
- \_\_\_\_\_ 10. If the price of a good falls and the good is a normal good, the income effect causes a decrease in the quantity demanded of that good.
- \_\_\_\_\_ 11. If the price of a good falls and the good is an inferior good, the income effect causes a decrease in the quantity demanded of that good.
- \_\_\_\_\_ 12. The income effect is measured as the change in consumption that results when a price change moves the consumer along a given indifference curve to a point with a new marginal rate of substitution.
- \_\_\_\_\_ 13. An increase in the interest rate will always lead to a greater amount of saving.
- \_\_\_\_\_ 14. A Giffen good is an extremely inferior good.
- \_\_\_\_\_ 15. The theory of consumer choice can be used to demonstrate that labor-supply curves must be upward sloping.

### Multiple-Choice Questions

- The limit on the consumption bundles that a consumer can afford is known as
  - an indifference curve.
  - the marginal rate of substitution.
  - the budget constraint.
  - the consumption limit.
- A change in the relative prices of which of the following pairs of goods would likely cause the smallest substitution effect?
  - gasoline from 7-Eleven and gasoline from Quick Stop
  - right shoes and left shoes
  - Coca-Cola and Pepsi
  - Bud Light and Coors Light
- Indifference curves for perfect substitutes are
  - straight lines.
  - bowed inward.
  - bowed outward.
  - right angles.
  - nonexistent.
- Suppose a consumer must choose between the consumption of sandwiches and pizza. If we measure the quantity of pizza on the horizontal axis and the quantity of sandwiches on the vertical axis, and if the price of a pizza is \$10 and the price of a sandwich is \$5, then the slope of the budget constraint is
  - 5.
  - 10.
  - 2.
  - 1/2.
- The slope at any point on an indifference curve is known as
  - the trade-off rate.
  - the marginal rate of substitution.
  - the marginal rate of trade-off.
  - the marginal rate of indifference.

6. Which of the following statements is *not* true with regard to the standard properties of indifference curves?
  - a. Indifference curves are downward sloping.
  - b. Indifference curves do not cross each other.
  - c. Higher indifference curves are preferred to lower ones.
  - d. Indifference curves are bowed outward.
  
7. The consumer's optimal purchase of any two goods is the point where
  - a. the consumer reaches the highest indifference curve subject to remaining on the budget constraint.
  - b. the consumer has reached the highest indifference curve.
  - c. the two highest indifference curves cross.
  - d. the budget constraint crosses the indifference curve.
  
8. Which of the following is *true* about the consumer's optimum consumption bundle? At the optimum,
  - a. the indifference curve is tangent to the budget constraint.
  - b. the slope of the indifference curve equals the slope of the budget constraint.
  - c. the relative prices of the two goods equals the marginal rate of substitution.
  - d. all of the above are true.
  - e. none of the above is true.
  
9. Suppose we measure the quantity of good X on the horizontal axis and the quantity of good Y on the vertical axis. If indifference curves are bowed inward, as we move from having an abundance of good X to having an abundance of good Y, the marginal rate of substitution of good Y for good X (the slope of the indifference curve)
  - a. rises.
  - b. falls.
  - c. stays the same.
  - d. could rise or fall depending on the relative prices of the two goods.
  
10. If an increase in a consumer's income causes the consumer to increase his quantity demanded of a good, then the good is
  - a. an inferior good.
  - b. a normal good.
  - c. a substitute good.
  - d. a complementary good.
  
11. If an increase in a consumer's income causes the consumer to decrease her quantity demanded of a good, then the good is
  - a. an inferior good.
  - b. a normal good.
  - c. a substitute good.
  - d. a complementary good.

Suppose that the consumer must choose between buying socks and belts. Also, suppose that the consumer's income is \$100. Use Exhibit 4 to answer questions 12 through 15.



12. If the price of a belt is \$10 and the price of a pair of socks is \$5, the consumer will choose to buy the commodity bundle represented by point
  - a. x.
  - b. y.
  - c. z.
  - d. The optimal point cannot be determined from this graph.
  
13. Suppose that the price of a pair of socks falls from \$5 to \$2. The substitution effect is represented by the movement from point
  - a. y to point x.
  - b. x to point y.
  - c. z to point x.
  - d. x to point z.
  
14. Suppose that the price of a pair of socks falls from \$5 to \$2. The income effect is represented by the movement from point
  - a. y to point x.
  - b. x to point y.
  - c. z to point x.
  - d. x to point z.
  
15. A pair of socks is
  - a. an inferior good.
  - b. a normal good.
  - c. a Giffen good.
  - d. none of the above.



16. The change in consumption that results when a price change moves the consumer along a given indifference curve is known as the
  - a. complementary effect.
  - b. normal effect.
  - c. income effect.
  - d. substitution effect.
  - e. inferior effect.
17. If income and prices were both to double, the budget line would
  - a. shift outward in a parallel fashion.
  - b. shift inward in a parallel fashion.
  - c. stay the same.
  - d. rotate inward.
  - e. rotate outward.
18. If leisure is a normal good, an increase in the wage
  - a. will always increase the quantity of labor supplied.
  - b. will always decrease the amount of labor supplied.
  - c. will increase the amount of labor supplied if the income effect outweighs the substitution effect.
  - d. will increase the amount of labor supplied if the substitution effect outweighs the income effect.
19. If consumption when young and when old are both normal goods, an increase in the interest rate
  - a. will always increase the quantity of saving.
  - b. will always decrease the quantity of saving.
  - c. will increase the quantity of saving if the substitution effect outweighs the income effect.
  - d. will increase the quantity of saving if the income effect outweighs the substitution effect.
20. Which of the following is *not* true regarding the outcome of a consumer's optimization process?
  - a. The consumer has reached his highest indifference curve subject to his budget constraint.
  - b. The marginal utility per dollar spent on each good is the same.
  - c. The consumer is indifferent between any two points on his budget constraint.
  - d. The marginal rate of substitution between goods is equal to the ratio of the prices between goods.
  - e. The consumer's indifference curve is tangent to his budget constraint.

## Advanced Critical Thinking

Suppose you have a wealthy aunt. Your aunt dies and leaves you a great deal of money (potentially). When you attend the reading of the will, you discover that she has bequeathed her millions to a "family incentive trust." As the lawyer reads the will, you discover that you only get the money if you get married, have children, stay with your spouse and raise your children, don't become dependent on drugs or alcohol, and if you *continuously have a full-time job*. (Note: Family incentive trusts are real and becoming very common.)

1. Why might your aunt include the requirement that you continuously have a full-time job?

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2. Does the evidence about how people behave after they receive an inheritance suggest that your aunt's concerns are well founded, or is she just a control freak who wants to control the lives of her relatives even after she is gone? Explain.

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3. What does this evidence suggest about the slope of the labor-supply curve? Explain.

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