TEST-ITEM FILE

Intermediate Microeconomics

Seventh Edition

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Intermediate Microeconomics

SEVENTH EDITION

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PREFACE

The second part of this volume consists of alternative quizzes for the multiple-choice questions in Bergstrom and Varian's *Workouts in Intermediate Microeconomics*. These questions use new parameters and scrambled responses so that an instructor can use them as a quiz or for more formal graded examinations.

A computerized version of this Test-Item File is available at no charge to any instructor who adopts Hal Varian's *Intermediate Microeconomics, Seventh Edition* by contacting your local representative at 1-800-353-9909 or www.wwnorton.com.

Part I

Test Bank

CHAPTER 2 Budget Constraint

TRUE-FALSE

Difficulty: 1

Correct Answer: False

1. If there are two goods with positive prices and the price of one good is reduced, while income and other prices remain constant, then the size of the budget set is reduced.

Difficulty: 1
Correct Answer: False

2. If good 1 is measured on the horizontal axis and good 2 is measured on the vertical axis and if the price of good 1 is p_1 and the price of good 2 is p_2, then the slope of the budget line is $-p_2/p_1$.

Difficulty: 1
Correct Answer: False

3. If all prices are doubled and money income is left the same, the budget set does not change because relative prices do not change.

Difficulty: 1
Correct Answer: True

4. If there are two goods and if one good has a negative price and the other has a positive price, then the slope of the budget line will be positive.

Difficulty: 1
Correct Answer: False

5. If all prices double and income triples, then the budget line will become steeper.

Difficulty: 1
Correct Answer: False

6. If good 1 is on the horizontal axis and good 2 is on the vertical axis, then an increase in the price of good 1 will not change the horizontal intercept of the budget line.

Difficulty: 1
Correct Answer: False

7. If there are two goods and the prices of both goods rise, then the budget line must become steeper.

Difficulty: 1
Correct Answer: True

8. There are two goods. You know how much of good 1 a consumer can afford if she spends all of her income on good 1. If you knew the ratio of the prices of the two goods, then you could draw the consumer's budget line without any more information.

Difficulty: 1
Correct Answer: True

9. A consumer prefers more to less of every good. Her income rises, and the price of one of the goods falls while other prices stay constant. These changes must have made her better off.

Difficulty: 2
Correct Answer: True

10. There are 3 goods. The price of good 1 is -1, the price of good 2 is $+1$, and the price of good 3 is $+2$. It is physically possible for a consumer to consume any commodity bundle with nonnegative amounts of each good. A consumer who has an income of 10 could afford to consume some commodity bundles that include 5 units of good 1 and 6 units of good 2.

Difficulty: 1
Correct Answer: False

11. A decrease in income pivots the budget line around the bundle initially consumed.

MULTIPLE CHOICE

Difficulty: 1
Correct Answer: e

1. If she spends all of her income on breadfruits and melons, Natalie can just afford 9 breadfruits and 10 melons per day. She could also use her entire budget to buy 3 breadfruits and 12 melons per day. The price of breadfruits is 8 yen each. How much is Natalie's income per day?
   a. 313 yen
   b. 317 yen
   c. 309 yen
   d. 303 yen
   e. None of the above.

Difficulty: 1
Correct Answer: c

2. If she spends all of her income on uglifruits and breadfruits, Maria can just afford 11 uglifruits and 4 breadfruits per day. She could also use her entire budget to buy 3 uglifruits and 8 breadfruits per day. The price of uglifruits is 6 pesos each. How much is Maria's income per day?
   a. 115 pesos
   b. 105 pesos
   c. 114 pesos
   d. 119 pesos
   e. None of the above.

Difficulty: 2
Correct Answer: a

3. Harold lives on Doritos and seafood salads. The price of Doritos is 1 dollar per bag and the price of seafood salads is 2 dollars each. Harold allows himself to spend no more than 11 dollars a day on food. He also restricts his consumption to 6,500 calories per day. There are 1,500 calories in a bag of Doritos and 500 calories in a seafood salad. If he spends his entire money budget each day and consumes no more calories than his calorie limit, he can consume up to
   a. 3 bags of Doritos per day but no more.
   b. 1 bag of Doritos per day but no more.
   c. 4 seafood salads per day but no more.
   d. 4 bags of Doritos per day but no more.
   e. None of the above.

Difficulty: 2
Correct Answer: c

4. Quincy lives on pretzels and seafood salads. The price of pretzels is 1 dollar per bag and the price of seafood salads is 2 dollars each. Quincy allows himself to spend no more than 14 dollars a day on food. He also restricts his consumption to 3,400 calories per day. There are 600 calories in a bag of pretzels and 200 calories in a seafood salad. If he spends his entire money budget each day and consumes no more calories than his calorie limit, he can consume up to
   a. 2 bags of pretzels per day but no more.
   b. 5 seafood salads per day but no more.
   c. 4 bags of pretzels per day but no more.
   d. 5 bags of pretzels per day but no more.
   e. None of the above.

Difficulty: 1
Correct Answer: a

5. Clara spends her entire budget and consumes 5 units of x and 13 units of y. The price of x is twice the price of y. Her income doubles and the price of y doubles, but the price of x stays the same. If she continues to buy 13 units of y, what is the largest number of units of x that she can afford?
   a. 10
   b. 5
   c. 12
   d. 14
   e. There is not enough information to say.

Difficulty: 1
Correct Answer: b

6. Maria spends her entire budget and consumes 5 units of x and 6 units of y. The price of x is twice the price of y. Her income doubles and the price of y doubles, but the price of x stays the same. If she continues to buy 6 units of y, what is the largest number of units of x that she can afford?
   a. 12
   b. 10
   c. 14
   d. 5
   e. There is not enough information to say.

Difficulty: 1
Correct Answer: e

7. In year 1, the price of good x was \$3, the price of good y was \$2, and income was \$90. In year 2, the price of x was \$9, the price of good y was \$6, and income was \$90. On a graph with x on the horizontal axis and y on the vertical, the new budget line is
   a. flatter than the old one and lies below it.
   b. flatter than the old one and lies above it.
   c. steeper than the old one and lies below it.
   d. steeper than the old one and lies above it.
   e. None of the above.

Difficulty: 1
Correct Answer: a

8. In year 1, the price of good x was \$4, the price of good y was \$1, and income was \$70. In year 2, the price of x was \$9, the price of good y was \$2, and income was

\$70. On a graph with x on the horizontal axis and y on the vertical, the new budget line is
a. steeper than the old one and lies below it.
b. steeper than the old one and lies above it.
c. flatter than the old one and lies below it.
d. flatter than the old one and lies above it.
e. None of the above.

Difficulty: 1
Correct Answer: d

9. If she spends her entire budget, Betsy can afford 74 peaches and 9 pineapples. She can also just afford 14 peaches and 21 pineapples. The price of peaches is 17 cents. What is the price of pineapples in cents?
a. 95 cents
b. 5 cents
c. 22 cents
d. 85 cents
e. None of the above.

Difficulty: 1
Correct Answer: c

10. If she spends her entire budget, Heidi can afford 39 peaches and 12 pears. She can also just afford 24 peaches and 17 pears. The price of peaches is 9 cents. What is the price of pears in cents?
a. 12 cents
b. 37 cents
c. 27 cents
d. 3 cents
e. None of the above.

Difficulty: 1
Correct Answer: b

11. Isabella thrives on two goods: lemons and tangerines. The cost of lemons is 40 guineas each and the cost of tangerines is 20 guineas each. If her income is 320 guineas, how many lemons can she buy if she spends all of her income on lemons?
a. 6
b. 8
c. 16
d. 11
e. None of the above.

Difficulty: 1
Correct Answer: d

12. Georgina thrives on two goods: pears and bananas. The cost of pears is 30 pesos each and the cost of bananas is 15 pesos each. If her income is 180 pesos, how many pears can she buy if she spends all of her income on pears?
a. 9
b. 12
c. 4
d. 6
e. None of the above.

Difficulty: 1
Correct Answer: b

13. Will spends his entire income on 8 sacks of acorns and 8 crates of butternuts. The price of acorns is 9 dollars per sack and his income is 88 dollars. He can just afford a commodity bundle with A sacks of acorns and B crates of butternuts that satisfies the budget equation
a. $9A + 4B = 88$.
b. $18A + 4B = 176$.
c. $11A + 2B = 88$.
d. $9A + 6B = 90$.
e. None of the above.

Difficulty: 1
Correct Answer: b

14. Eduardo spends his entire income on 9 sacks of acorns and 4 crates of butternuts. The price of acorns is 6 dollars per sack and his income is 90 dollars. He can just afford a commodity bundle with A sacks of acorns and B crates of butternuts that satisfies the budget equation
a. $6A + 13B = 92$.
b. $12A + 18B = 180$.
c. $8A + 9B = 90$.
d. $6A + 11B = 90$.
e. None of the above.

Difficulty: 1
Correct Answer: c

15. Harry thrives on two goods, paperback novels and bananas. The cost of paperback novels is 4 dollars each and the cost of bananas is 3 dollars per bunch. If Harry spent all of his income on bananas, he could afford 12 bunches of bananas per week. How many paperback novels could he buy if he spent all of his income on paperback novels?
a. 36
b. 48
c. 9
d. 16
e. None of the above.

Difficulty: 1
Correct Answer: e

16. Suppose that the prices of good x and good y both double and income triples. On a graph where the budget line is drawn with x on the horizontal axis and y on the vertical axis,
a. the budget line becomes steeper and shifts inward.
b. the budget line becomes flatter and shifts outward.
c. the budget line becomes flatter and shifts inward.
d. the new budget line is parallel to the old budget line and lies below it.
e. None of the above.

Difficulty: 1
Correct Answer: d

17. Suppose that the price of good x triples and the price of good y doubles while income remains constant. On a graph where the budget line is drawn with x on the horizontal axis and y on the vertical axis, the new budget line
    a. is flatter than the old one and lies below it.
    b. is flatter than the old one and lies above it.
    c. crosses the old budget line.
    d. is steeper than the old one and lies below it.
    e. is steeper than the old one and lies above it.

Difficulty: 3
Correct Answer: c

18. While traveling abroad, Tammy spent all of the money in her purse to buy 5 plates of spaghetti and 6 oysters. Spaghetti costs 8 units of the local currency per plate and she had 82 units of currency in her purse. If s denotes the number of plates of spaghetti and o denotes the number of oysters purchased, the set of commodity bundles that she could just afford with the money in her purse is described by the equation
    a. $8s + 6o = 82$.
    b. $6s + 8o = 82$.
    c. $8s + 7o = 82$.
    d. $5s + 6o = 82$.
    e. There is not enough information to determine the answer.

Difficulty: 2
Correct Answer: b

19. Billy Bob wants to gain some weight so that he can play football. Billy consumes only milk shakes and spinach. Milk shakes cost him \$1 each and spinach costs \$2 per serving. A milk shake has 850 calories and a serving of spinach has 200 calories. Billy Bob never spends more than \$20 a day on food and he always consumes at least 8,000 calories per day. Which of the following is necessarily true?
    a. Billy Bob consumes at least 9 milk shakes a day.
    b. Billy Bob never consumes more than 6 servings of spinach a day.
    c. Billy Bob never consumes positive amounts of both goods.
    d. Billy Bob consumes only milk shakes.
    e. None of the above.

Difficulty: 2
Correct Answer: d

20. Lars consumes only potatoes and herring. When the price of potatoes was 9 crowns per sack and the price of herring was 5 crowns per crock, he spent his entire income to buy 5 sacks of potatoes and 10 crocks of herring per month. Now the government subsidizes potatoes. Market prices haven't changed, but consumers get a subsidy of 5 crowns for every sack of potatoes consumed. To pay for this subsidy, the government introduced an income tax. Lars pays an income tax of 20 crowns per month. If s is the number of sacks of potatoes and c is the number of crocks of herring, what is Lars's *new* budget equation?
    a. $9s + 5c = 100$.
    b. $14s + 5c = 95$.
    c. $4s + 5c = 95$.
    d. $4s + 5c = 75$.
    e. $14s + 5c = 120$.

Difficulty: 1
Correct Answer: c

21. If you spent your entire income, you could afford either 3 units of x and 9 units of y or 9 units of x and 3 units of y. If you spent your entire income on x, how many units of x could you buy?
    a. 21
    b. 16
    c. 12
    d. There is not enough information to determine the number of x.
    e. None of the above.

Difficulty: 1
Correct Answer: a

22. If you spent your entire income, you could afford either 6 units of x and 13 units of y or 13 units of x and 6 units of y. If you spent your entire income on x, how many units of x could you buy?
    a. 19
    b. 32
    c. 24
    d. There is not enough information to determine the number of x.
    e. None of the above.

Difficulty: 1
Correct Answer: c

23. Bella's budget line for x and y depends on all of the following except
    a. the amount of money she has to spend on x and y.
    b. the price of x.
    c. her preferences between x and y.
    d. the price of y.
    e. None of the above.

Difficulty: 1
Correct Answer: d

24. Your budget constraint for the two goods A and B is $12A + 4B = I$, where I is your income. You are currently consuming more than 27 units of B. In order to get 3

more units of A, how many units of B would you have to give up?

a. 0.33
b. 0.11
c. 3
d. 9
e. None of the above.

Difficulty: 1
Correct Answer: a

25. Your budget constraint for the two goods A and B is $8A + 4B = I$, where I is your income. You are currently consuming more than 18 units of B. In order to get 3 more units of A, how many units of B would you have to give up?

a. 6
b. 0.50
c. 0.17
d. 2
e. None of the above.

Difficulty: 2
Correct Answer: a

26. Young Alasdair loves lollipops and hates oatmeal. To induce him to eat enough oatmeal and to restrain him from eating too many lollipops, his mum pays him 10 pence for every quart of oatmeal that he eats. The only way that he can get lollipops is to buy them at the sweet shop, where lollipops cost 5 pence each. Besides what he earns from eating oatmeal, Alasdair gets an allowance of 10 pence per week. If Alasdair consumes only oatmeal and lollipops and if his consumption bundles are graphed with quarts of oatmeal on the horizontal axis and lollipops on the vertical axis, then Alasdair's budget line has a slope

a. of 2.
b. of less than -2.
c. of -2.
d. of 1/2.
e. greater than 2.

Difficulty: 2
Correct Answer: c

27. The Chuzzlewits have an income of $\$m$ per week. Let x be food and let y be all other goods. Let p_x be the price of food and p_y be the price of other goods. They can use food stamps to buy food at a price of $p_x(1 - s)$ for up to x^* units of food per week. If they buy more food than x^*, they have to pay the full price p_x for additional units. Their weekly income is greater than $p_x(1 - s)x^*$. The maximum amount of food that they can buy per week is

a. $x^* + (m/p_x)$.
b. $(m + x^*)/p_x$.
c. $(m/p_x) + sx^*$.
d. $m/(1 - s)p_x$.
e. $(m + p_x)/(1 - s)p_x$.

Difficulty: 1
Correct Answer: c

28. Edmund must pay \$6 each for punk rock video cassettes, V. If Edmund is paid \$24 per sack for accepting garbage, G, and if his relatives send him an allowance of \$48, then his budget line is described by the equation

a. $6V = 24G$.
b. $6V + 24G = 48$.
c. $6V - 24G = 48$.
d. $6V = 48 - G$.
e. None of the above.

Difficulty: 1
Correct Answer: d

29. Edmund must pay \$6 each for punk rock video cassettes, V. If Edmund is paid \$24 per sack for accepting garbage, G, and if his relatives send him an allowance of \$96, then his budget line is described by the equation

a. $6V = 24G$.
b. $6V + 24G = 96$.
c. $6V = 96 - G$.
d. $6V - 24G = 96$.
e. None of the above.

Difficulty: 1
Correct Answer: c

30. If you have an income of \$40 to spend, commodity 1 costs \$4 per unit, and commodity 2 costs \$8 per unit, then the equation for your budget line can be written

a. $x_1/4 + x_2/8 = 40$.
b. $(x_1 + x_2)/12 = 40$.
c. $x_1 + 2x_2 = 10$.
d. $5x_1 + 9x_2 = 41$.
e. $12(x_1 + x_2) = 40$.

Difficulty: 1
Correct Answer: a

31. If you have an income of \$40 to spend, commodity 1 costs \$2 per unit, and commodity 2 costs \$10 per unit, then the equation for your budget line can be written

a. $x_1 + 5x_2 = 20$.
b. $x_1/2 + x_2/10 = 40$.
c. $(x_1 + x_2)/12 = 40$.
d. $3x_1 + 11x_2 = 41$.
e. $12(x_1 + x_2) = 40$.

Difficulty: 1
Correct Answer: a

32. If you could exactly afford either 4 units of x and 24 units of y, or 9 units of x and 4 units of y, then if you spent all of your income on y, how many units of y could you buy?
    a. 40
    b. 20
    c. 60
    d. 13
    e. None of the above.

Difficulty: 1
Correct Answer: d

33. If you could exactly afford either 5 units of x and 21 units of y, or 9 units of x and 5 units of y, then if you spent all of your income on y, how many units of y could you buy?
    a. 57
    b. 14
    c. 25
    d. 41
    e. None of the above.

Difficulty: 1
Correct Answer: b

34. Murphy used to consume 100 units of X and 50 units of Y when the price of X was \$2 and the price of Y was \$4. If the price of X rose to \$4 and the price of Y rose to \$9, how much would Murphy's income have to rise so that he could still afford his original bundle?
    a. \$700
    b. \$450
    c. \$350
    d. \$1,050
    e. None of the above.

Difficulty: 1
Correct Answer: c

35. Murphy used to consume 100 units of X and 50 units of Y when the price of X was \$2 and the price of Y was \$4. If the price of X rose to \$3 and the price of Y rose to \$8, how much would Murphy's income have to rise so that he could still afford his original bundle?
    a. \$750
    b. \$250
    c. \$300
    d. \$500
    e. None of the above.

Difficulty: 1
Correct Answer: c

36. This weekend, Martha has time to read 40 pages of economics and 30 pages of sociology. Alternatively, she could read 30 pages of economics and 50 pages of sociology. Which of these equations describes all combinations of pages of economics, E, and sociology, S, that she could read over the weekend?
    a. $E + S = 70$.
    b. $E/2 + S = 50$.
    c. $2E + S = 110$.
    d. $E + S = 80$.
    e. All of the above.

Difficulty: 2
Correct Answer: d

37. This weekend, Martha has time to read 40 pages of economics and 30 pages of sociology. Alternatively, she could read 10 pages of economics and 90 pages of sociology. Which of these equations describes all combinations of pages of economics, E, and sociology, S, that she could read over the weekend?
    a. $E/2 + S = 50$.
    b. $E + S = 100$.
    c. $E + S = 70$.
    d. $2E + S = 110$.
    e. All of the above.

Difficulty: 2
Correct Answer: a

38. Ads in a slick business magazine are read by 300 lawyers and 1,000 M.B.A.s. Ads in a consumer publication are read by 250 lawyers and 300 M.B.A.s. If Harry had \$3,000 to spend on advertising, the price of ads in the business magazine were \$500, and the price of ads in the consumer magazine were \$250, then the combinations of M.B.A.s and lawyers whom he could reach with his advertising budget would be represented by the integer values along a line segment that runs between the two points
    a. (3, 000, 3, 600) and (1, 800, 6, 000).
    b. (3, 600, 4, 200) and (1, 800, 7, 200).
    c. (0, 3, 600) and (1, 800, 0).
    d. (3, 600, 0) and (0, 7, 200).
    e. (2, 400, 0) and (0, 6, 000).

Difficulty: 2
Correct Answer: b

39. Ads in a slick business magazine are read by 300 lawyers and 1,000 M.B.A.s. Ads in a consumer publication are read by 250 lawyers and 300 M.B.A.s. If Harry had \$3,750 to spend on advertising, the price of ads in the business magazine were \$500, and the price of ads in the consumer magazine were \$250, then the combinations of M.B.A.s and lawyers whom he could reach with his advertising budget would be represented by the integer values along a line segment that runs between the two points
    a. (4, 500, 0) and (0, 9, 000).
    b. (3, 750, 4, 500) and (2, 250, 7, 500).
    c. (0, 4, 500) and (2, 250, 0).
    d. (4, 500, 5, 250) and (2, 250, 9, 000).
    e. (3, 000, 0) and (0, 7, 500).

Difficulty: 2
Correct Answer: d

40. In the economy of Mungo, discussed in your workbook, there is a third person called Ike. Ike has a red income of 92 rcus and a blue income of 20 bcus. (Recall that red prices are 2 rcus [red currency units] per unit of ambrosia and 6 rcus per unit of bubble gum. Blue prices are 1 bcu [blue currency unit] per unit of ambrosia and 1 bcu per unit of bubble gum. You have to pay twice for what you buy, once in red currency and once in blue currency.) If Ike spends all of his blue income but not all of his red income, then he consumes
    a. at least 13 units of bubble gum.
    b. at least 7 units of ambrosia.
    c. exactly twice as much bubble gum as ambrosia.
    d. at least 17 units of bubble gum.
    e. equal amounts of ambrosia and bubble gum.

Difficulty: 2
Correct Answer: a

41. In the economy of Mungo, discussed in your workbook, there is a third person called Ike. Ike has a red income of 94 rcus and a blue income of 25 bcus. (Recall that red prices are 2 rcus [red currency units] per unit of ambrosia and 6 rcus per unit of bubble gum. Blue prices are 1 bcu [blue currency unit] per unit of ambrosia and 1 bcu per unit of bubble gum. You have to pay twice for what you buy, once in red currency and once in blue currency.) If Ike spends all of his blue income but not all of his red income, then he consumes
    a. at least 14 units of ambrosia.
    b. at least 11 units of bubble gum.
    c. exactly twice as much bubble gum as ambrosia.
    d. at least 15 units of bubble gum.
    e. equal amounts of ambrosia and bubble gum.

Difficulty: 2
Correct Answer: a

42. Deadly Serious, II, studying for his M.B.A., consumes only two goods, Wheaties and pens. Each pen costs $1. Each box of Wheaties costs $2 but has a free pen inside. Pens can be discarded at no cost. If we draw Serious's budget set with pens plotted on the horizontal axis, then his budget set will be bounded by two line segments with slopes
    a. zero and -1.
    b. zero and -2.
    c. zero and -0.5.
    d. zero and infinity.
    e. zero and +2.

Difficulty: 2
Correct Answer: d

43. Suppose there are two goods, the prices of both goods are positive, and a consumer's income is also positive. If the consumer's income doubles and the price of both goods triple,
    a. the consumer's budget line gets steeper and shifts inward.
    b. the slope of the consumer's budget line does not change but the budget line shifts outward away from the origin.
    c. the consumer's budget line gets steeper and shifts outward.
    d. the slope of the consumer's budget line does not change but the budget line shifts inward toward the origin.
    e. the consumer's budget line gets flatter and shifts inward.

Difficulty: 2
Correct Answer: b

44. Thomas consumes coffee (C) and doughnuts (D). His budget line was described by the equation $D = 20 - 2C$. At a later time, his budget line could be described by the equation $D = 10 - C$. The change between the earlier budget line and the later could be explained by the fact that
    a. the price of coffee and Thomas's income both increased.
    b. the price of coffee increased and Thomas's income decreased.
    c. the price of coffee decreased and Thomas's income increased.
    d. the price of coffee and Thomas's income both decreased.
    e. Thomas's utility for doughnuts decreased.

PROBLEMS

Difficulty: 1

1. Perry lives on avocados and beans. The price of avocados is $10, the price of beans is $5, and his income is $40. Show Perry's budget line on a graph with avocados on the horizontal axis and beans on the vertical axis. Label the point where the budget line hits the horizontal axis *A* and the point where the budget line hits the vertical axis *B*. Next to these labels, write down the number of avocados purchased at *A* and the number of beans purchased at *B*. Draw another budget line showing what Perry's budget would be if his income doubled, the price of avocados doubled, and the price of beans stayed the same. Label the point where this line hits the vertical axis *C* and the point where it hits the horizontal axis *D*. Next to these labels write the number of avocados at *C* and the number of beans at *D*.

Answer: At A there are 4 avocados and at B there are 8 units of beans. At C there are 4 avocados and at D there are 16 units of beans.

Difficulty: 2

2. Brenda likes hot dogs and Coca-Cola. Hot dogs cost \$1 each and Cokes cost \$.50 per bottle. There is a special promotion for Coke that will last for one month. If Brenda sends in the bottle tops from the Cokes she drinks during the next month, she will get a refund of \$.20 for every bottlecap beyond the first 12 that she returns. For example, if she returns 25 bottle caps she will get back \$2.60 = \$.20(25 − 12). Brenda has \$40 to spend on hot dogs and Coke during the next month. Draw her budget line with Coke on the horizontal axis and hot dogs on the vertical axis. Find the points where the budget line hits the axes and the point where it has a kink. At each of these three points write down the quantities of each good consumed.

Answer: The budget line runs from (0, 40) on the vertical axis to a kink point (12, 34) and from (12, 34) to about (125.3, 0).

Difficulty: 2

3. Felicity is studying economics and political science. She can read 30 pages of political science per hour but only 5 pages of economics per hour. This week she has a 50-page assignment in economics and a 150-page assignment in political science. Because of sorority rush, she cannot devote more than 10 hours to studying these subjects this week. She realizes she cannot complete all of her assignments but is determined to complete at least 30 pages of her economics reading. Draw a graph with pages of economics on the horizontal axis and pages of political science on the vertical axis. On this graph, show the possibilities that are consistent with the constraints that Felicity has imposed on herself. (She is allowed to read ahead in either subject.) Label key points on your graph with their numerical values.

Answer: Anything in the triangle bounded by (0, 300), (30, 120), and (30, 0) satisfies these constraints.

Difficulty: 3

4. Ed Moore and his family live in a city with many private schools and one public school. The Moores are thinking of sending their only child to private school because they would like a school that has more teachers and other resources per student than the local public school. The Moores must pay taxes to support local public schools whether or not their child goes to private school. There is such a variety of private schools that the Moores can get just about any level of inputs per student by choosing the appropriate private school. Tuition in the private schools equals expenditure per student. Draw a diagram to show the Moores' budget constraint. Put expenditures per student in the child's school on the horizontal axis and other goods on the vertical.

Answer: One point is (x, d), where x is expenditures per pupil in public school and d is disposable income. The rest of the budget is a line with slope −1 from (2s, d − x) to the x axis.

CHAPTER 3 Preferences

TRUE-FALSE

Difficulty: 1
Correct Answer: False

1. If preferences are transitive, more is always preferred to less.

Difficulty: 1
Correct Answer: False

2. A person with reflexive preferences is someone who does not shop carefully.

Difficulty: 2
Correct Answer: True

3. If someone has the utility function $U = 1{,}000 + 2 \min\{x, y\}$, then x and y are perfect complements for that person.

Difficulty: 1
Correct Answer: False

4. A consumer with convex preferences who is indifferent between the bundles (5, 2) and (11, 6) will like the bundle (8, 4) at least as well as either of the first two bundles.

Difficulty: 1
Correct Answer: False

5. A consumer with convex preferences who is indifferent between the bundles (5, 1) and (11, 3) will like the bundle (8, 2) at least as well as either of the first two bundles.

Difficulty: 2
Correct Answer: True

6. If there are two goods, if a consumer prefers more of each good to less, and if she has a diminishing marginal rate of substitution, then her preferences are convex.

Difficulty: 2
Correct Answer: False

7. If preferences are convex, then for any commodity bundle x, the set of commodity bundles that are worse than x is a convex set.

Difficulty: 2
Correct Answer: False

8. Bill Katz prefers more of good 1 to less and he prefers less of good 2 to more. Bill has convex preferences. If we draw his indifference curves with good 1 on the horizontal axis and good 2 on the vertical axis, then his indifference curves have positive slope but get steeper as they rise.

Difficulty: 1
Correct Answer: False

9. The marginal rate of substitution measures the distance between one indifference curve and the next one.

Difficulty: 1
Correct Answer: False

10. Ambrose has an indifference curve with equation $x_2 = 20 - 4x^{1/2}{}_1$. When Ambrose is consuming the bundle (4, 16), his marginal rate of substitution is $-5/4$.

Difficulty: 1
Correct Answer: False

11. Nancy's psychology teacher will give her a course grade that is the maximum of her scores on three midterm examinations. Nancy has convex preferences over the possible combinations of midterm scores.

Difficulty: 3
Correct Answer: False

12. If Melody has more classical records than rock and roll records, she is willing to exchange exactly 1 classical record for 2 rock and roll records, but if she has more rock and roll records than classical records, then she is willing to exchange exactly 1 rock and roll record for 2 classical records. Melody has convex preferences.

Difficulty: 1
Correct Answer: False

13. Josephine buys 3 quarts of milk and 2 pounds of butter when milk sells for \$2 a quart and butter sells for \$1 a pound. Wilma buys 2 quarts of milk and 3 pounds of butter at the same prices. Josephine's marginal rate of substitution between milk and butter is greater than Wilma's.

Difficulty: 2
Correct Answer: True

14. A consumer who is unable to detect small differences in the amount of water in her beer could have a transitive strict preference relation but is unlikely to have a transitive indifference relation.

MULTIPLE CHOICE

Difficulty: 1
Correct Answer: b

1. Colette consumes goods x and y. Her indifference curves are described by the formula $y = k/(x + 7)$. Higher values of k correspond to better indifference curves.
   a. Colette likes good y and hates good x.
   b. Colette prefers bundle (12, 16) to bundle (16, 12).
   c. Colette prefers bundle (8, 5) to bundle (5, 8).
   d. Colette likes good x and hates good y.
   e. More than one of the above statements are true.

Difficulty: 1
Correct Answer: a

2. Angela consumes goods x and y. Her indifference curves are described by the formula $y = k/(x + 3)$. Higher values of k correspond to better indifference curves.
   a. Angela prefers bundle (8, 9) to bundle (9, 8).
   b. Angela likes good y and hates good x.
   c. Angela prefers bundle (11, 9) to bundle (9, 11).
   d. Angela likes good x and hates good y.
   e. More than one of the above statements are true.

Difficulty: 1
Correct Answer: d

3. Nick's indifference curves are circles, all of which are centered at (12, 12). Of any two indifference circles, he would rather be on the inner one than the outer one.
   a. Nick's preferences are not complete.
   b. Nick prefers (16, 17) to (10, 10).
   c. Nick prefers (10, 17) to (10, 10).
   d. Nick prefers (8, 8) to (17, 21).
   e. More than one of the above statements are true.

Difficulty: 1
Correct Answer: c

4. Steven's indifference curves are circles, all of which are centered at (15, 13). Of any two indifference circles, he would rather be on the inner one than the outer one.
   a. Steven prefers (19, 22) to (13, 7).
   b. Steven prefers (13, 22) to (13, 7).
   c. Steven prefers (12, 10) to (22, 18).
   d. Steven's preferences are not complete.
   e. More than one of the above statements are true.

Difficulty: 1
Correct Answer: b

5. Tim consumes only apples and bananas. He prefers more apples to fewer, but he gets tired of bananas. If he consumes fewer than 29 bananas per week, he thinks that 1 banana is a perfect substitute for 1 apple. But you would have to pay him 1 apple for each banana beyond 29 that he consumes. The indifference curve that passes through the consumption bundle with 30 apples and 39 bananas also passes through the bundle with A apples and 21 bananas, where A equals
   a. 25.
   b. 28.
   c. 34.
   d. 36.
   e. None of the above.

Difficulty: 1
Correct Answer: d

6. Leo consumes only apples and bananas. He prefers more apples to fewer, but he gets tired of bananas. If he consumes fewer than 24 bananas per week, he thinks that 1 banana is a perfect substitute for 1 apple. But you would have to pay him 1 apple for each banana beyond 24 that he consumes. The indifference curve that passes through the consumption bundle with 31 apples and 36 bananas also passes through the bundle with A apples and 18 bananas, where A equals
   a. 29.
   b. 23.
   c. 31.
   d. 25.
   e. None of the above.

Difficulty: 1
Correct Answer: e

7. If two goods are both desirable and preferences are convex, then
   a. there must be a kink in the indifference curves.
   b. indifference curves must be straight lines.
   c. if two bundles are indifferent, then an average of the two bundles is worse than either one.
   d. the marginal rate of substitution is constant along indifference curves.
   e. None of the above.

Difficulty: 2
Correct Answer: b

8. If there are only two goods, if more of good 1 is always preferred to less, and if less of good 2 is always preferred to more, then indifference curves
   a. slope downward.
   b. slope upward.
   c. may cross.
   d. could take the form of ellipses.
   e. None of the above.

Difficulty: 2
Correct Answer: d

9. If two goods are perfect complements,
   a. there is a bliss point and the indifference curves surround this point.
   b. consumers will only buy the cheaper of the two goods.
   c. indifference curves have a positive slope.
   d. None of the above.

Difficulty: 2
Correct Answer: c

10. The relation "is preferred to" between commodity bundles is just one example of a binary relation. Another example is the relation "is a full brother of" defined over the set of all human beings. Let *xRy* mean person *x* is a full brother of person *y*.
   a. The relation *R* is reflexive, transitive, and complete.
   b. The relation *R* is transitive and complete but not reflexive.
   c. The relation *R* is transitive but not complete or reflexive.
   d. The relation *R* is complete but not transitive or reflexive.
   e. The relation *R* is not reflexive, transitive, or complete.

Difficulty: 1
Correct Answer: c

11. Preferences are said to be monotonic if
   a. all goods must be consumed in fixed proportions.
   b. all goods are perfect substitutes.
   c. more is always preferred to less.
   d. there is a diminishing marginal rate of substitution.
   e. None of the above.

Difficulty: 3
Correct Answer: c

12. Toby Talkalot subscribes to a local phone service that charges a fixed fee of $10 per month and allows him to place as many local phone calls as he likes without further charge. Let good 1 be an aggregate of commodities other than local phone use and let good 2 be local phone use. (Measure good 1 on the horizontal axis and good 2 on the vertical axis.) On Monday, Toby didn't use the telephone at all. The slope *m* of his indifference curve at the consumption bundle he chose on Monday was
   a. positive.
   b. less than or equal to 0.
   c. 0.
   d. greater than or equal to 0.
   e. negative.

Difficulty: 3
Correct Answer: b

13. Professor Goodheart's colleague Dr. Kremepuff gives 3 midterm exams. He drops the lowest score and gives each student her average score on the other two exams. Polly Sigh is taking his course and has a 60 on her first exam. Let x_2 be her score on the second exam and x_3 be her score on the third exam. If we draw her indifference curves for scores on the second and third exams with x_2 represented by the horizontal axis and x_3 represented by the vertical axis, then her indifference curve through the point $(x_2, x_3) = (50, 70)$ is
   a. L-shaped with a kink where $x_2 = x_3$.
   b. three line segments, one vertical, one horizontal, and one running from (70, 60) to (60, 70).
   c. a straight line, running from (0, 120) to (120, 0).
   d. three line segments, one vertical, one horizontal, and one running from (70, 50) to (50, 70).
   e. a V-shaped curve with its point at (50, 70).

Difficulty:
Correct Answer: e

14. Charlie's indifference curves have the equation $x_B = constant/x_A$, where larger constants denote better indifference curves. Charlie strictly prefers the bundle (6, 16) to
   a. the bundle (16, 6).
   b. the bundle (7, 15).
   c. the bundle (10, 11).
   d. more than one of these bundles.
   e. none of these bundles.

Difficulty:
Correct Answer: e

15. Charlie's indifference curves have the equation $x_B = constant/x_A$, where larger constants denote better indifference curves. Charlie strictly prefers the bundle (10, 17) to
   a. the bundle (11, 16).
   b. the bundle (17, 10).
   c. the bundle (12, 15).
   d. more than one of these bundles.
   e. none of these bundles.

Difficulty: 2
Correct Answer: c

16. Ambrose has indifference curves with the equation $x_2 = constant - 4x^{1/2}{}_1$, where larger constants correspond to higher indifference curves. If good 1 is drawn on the horizontal axis and good 2 on the vertical axis, what is the slope of Ambrose's indifference curve when his consumption bundle is (16, 17)?
    a. $-16/17$
    b. $-17/16$
    c. -0.50
    d. -21
    e. -4

Difficulty: 2
Correct Answer: a

17. Ambrose has indifference curves with the equation $x_2 = constant - 4x^{1/2}{}_1$, where larger constants correspond to higher indifference curves. If good 1 is drawn on the horizontal axis and good 2 on the vertical axis, what is the slope of Ambrose's indifference curve when his consumption bundle is (9, 5)?
    a. -0.67
    b. -8
    c. $-9/5$
    d. $-5/9$
    e. -3

Difficulty: 2
Correct Answer: a

18. Nancy Lerner is taking a course from Professor Goodheart who will count only her best midterm grade and from Professor Stern who will count only her worst midterm grade. In one of her classes, Nancy has scores of 30 on her first midterm and 50 on her second midterm. When the first midterm score is measured on the horizontal axis and her second midterm score on the vertical, her indifference curve has a slope of zero at the point (30, 50). Therefore this class could
    a. be Professor Goodheart's but could not be Professor Stern's.
    b. be Professor Stern's but could not be Professor Goodheart's.
    c. not be either Professor Goodheart's or Professor Stern's.
    d. be either Professor Goodheart's or Professor Stern's.
    e. None of the above.

Difficulty: 2
Correct Answer: a

19. Nancy Lerner is taking a course from Professor Goodheart who will count only her best midterm grade and from Professor Stern who will count only her worst midterm grade. In one of her classes, Nancy has scores of 20 on her first midterm and 70 on her second midterm. When the first midterm score is measured on the horizontal axis and her second midterm score on the vertical, her indifference curve has a slope of zero at the point (20, 70). Therefore this class could
    a. be Professor Goodheart's but could not be Professor Stern's.
    b. not be either Professor Goodheart's or Professor Stern's.
    c. be either Professor Goodheart's or Professor Stern's.
    d. be Professor Stern's but could not be Professor Goodheart's.
    e. None of the above.

Difficulty: 2
Correct Answer: d

20. If we graph Mary Granola's indifference curves with avocados on the horizontal axis and grapefruits on the vertical axis, then whenever she has more grapefruits than avocados, the slope of her indifference curve is -2. Whenever she has more avocados than grapefruits, the slope is $-1/2$. Mary would be indifferent between a bundle with 22 avocados and 37 grapefruits and another bundle that has 37 avocados and
    a. 27 grapefruits.
    b. 32 grapefruits.
    c. 17 grapefruits.
    d. 22 grapefruits.
    e. 24.5 grapefruits.

Difficulty: 2
Correct Answer: a

21. If we graph Mary Granola's indifference curves with avocados on the horizontal axis and grapefruits on the vertical axis, then whenever she has more grapefruits than avocados, the slope of her indifference curve is -2. Whenever she has more avocados than grapefruits, the slope is $-1/2$. Mary would be indifferent between a bundle with 14 avocados and 20 grapefruits and another bundle that has 26 avocados and
    a. 11 grapefruits.
    b. 18 grapefruits.
    c. 6 grapefruits.
    d. 16 grapefruits.
    e. 13.5 grapefruits.

Difficulty: 2
Correct Answer: b

22. Recall that Tommy Twit's mother measures the departure of any bundle from her favorite bundle for Tommy by the sum of the absolute values of the differences. Her favorite bundle for Tommy is (2, 7),

that is, 2 cookies and 7 glasses of milk. Tommy's mother's indifference curve that passes through the point $(c, m) = (4, 5)$ also passes through

a. the point (6, 3).
b. the points (2, 3), (6, 7), and (4, 9).
c. the point (2, 7).
d. the points (4, 7), (2, 5), and (2, 9).
e. None of the above.

Difficulty: 2
Correct Answer: b

23. Recall that Tommy Twit's mother measures the departure of any bundle from her favorite bundle for Tommy by the sum of the absolute values of the differences. Her favorite bundle for Tommy is (2, 7), that is, 2 cookies and 7 glasses of milk. Tommy's mother's indifference curve that passes through the point $(c, m) = (5, 4)$ also passes through

a. the points (5, 7), (2, 4), and (2, 10).
b. the points (2, 1), (8, 7), and (5, 10).
c. the point (8, 1).
d. the point (2, 7).
e. None of the above.

Difficulty: 2
Correct Answer: d

24. Scholastica is taking a class from Professor Chaos. Professor Chaos gives two tests in this course and determines a student's grade as follows. He determines the smaller of the following two numbers: half of the score on the first test (which is a relatively easy test) and the total score on the second test. He gives each student a numerical score equal to the smaller number and then ranks the students. Scholastica would like to be ranked as high as possible in Professor Chaos's rankings. If we represent her score on the first exam on the horizontal axis and her score on the second exam on the vertical axis, then her indifference curves

a. are L-shaped with kinks where the two exam scores are equal.
b. have sections with a slope -2 and sections with a slope 1/2.
c. are positively sloped.
d. are L-shaped with kinks where the exam 1 score is twice the exam 2 score.
e. are straight lines with a slope of $-1/2$.

Difficulty: 2
Correct Answer: d

25. In Professor Meanscore's class, the first midterm exam and the second midterm exam are weighted equally toward the final grade. With the first midterm's score on the horizontal axis, and the second midterm's score on the vertical axis, indifference curves between the two exam scores are

a. L-shaped with lines extending upward and to the right.
b. L-shaped with lines extending downward and to the left.
c. parabola shaped.
d. straight lines with slope -1.
e. straight lines with slope 2.

Difficulty: 2
Correct Answer: c

26. Professor Stern's colleague, Dr. Schmertz, gives one midterm exam and a final exam. He weights the final twice as heavily as the midterm to determine the course grade. No grades can be dropped. If the midterm score is represented on the horizontal axis and the final score on the vertical axis, and if a student in Dr. Schmertz's class cares only about her course grade, her indifference curve is

a. a line with slope -2.
b. a line with slope -1.
c. a line with slope -0.5.
d. L-shaped with the kink at $(x, 2x)$.
e. L-shaped with the kink at $(2x, x)$.

Difficulty: 2
Correct Answer: e

27. I prefer 6 apples and 1 orange to 5 apples and 2 oranges. My preferences

a. are transitive.
b. are complete.
c. are convex.
d. obey the Law of Demand.
e. None of the above.

PROBLEMS

Difficulty: 3

1. Draw graphs with quantities of pepperoni pizza on the horizontal axis and quantities of anchovy pizza on the vertical axis to illustrate the following situations. In each case draw two different indifference curves and make a little arrow pointing in the direction of greater preference.

a. Marvin loves pepperoni pizza and hates anchovy pizza.
b. Mavis hates anchovy pizza and is completely indifferent about pepperoni pizza.

Answer:

a. Indifference curves slope up and to the right. Arrow points down and to the left.
b. Indifference curves are horizontal lines. Arrow points down.

Difficulty: 3

2. Coach Steroid likes his players to be big, fast, and obedient. If player A is better than player B in two of these three characteristics, Steroid will prefer A to B. Three players try out for quarterback. Wilbur Westinghouse weighs 320 pounds, runs very slowly, and is quite obedient. Harold Hotpoint weighs 240 pounds, runs extremely fast, and is extremely disobedient. Jerry Jacuzzi weighs 150 pounds, runs at average speed, and is extremely obedient. Does Coach Steroid have transitive preferences? Explain your answer.

Answer: No. Steroid prefers W to H because W is heavier and more obedient. He prefers H to J because H is heavier and faster. But he prefers J to W because J is more obedient and faster than W. Since his preferences have a cycle, they cannot be transitive.

Difficulty: 3

3. Belinda loves chocolate and always thinks that more is better than less. Belinda thinks that a few piano lessons would be worse than none at all, but if she had enough piano lessons to get good at playing the piano, she would prefer more lessons to less. Draw a graph with piano lessons on the horizontal axis and chocolate on the vertical axis. On your graph sketch two indifference curves for Belinda that would be consistent with this story. Label the better of the two indifference curves AA and the worse one BB.

Answer: The indifference curves would look something like inverted U's. (The area under these curves needn't be necessarily convex.) The better of the two curves drawn is the higher one.

Difficulty: 3

4. Mac Rowe doesn't sweat the petty stuff. In fact, he just cannot detect small differences. He consumes two goods, x and y. He prefers the bundle (x, y) to the bundle (x', y') if and only if $xy - x'y' > 1$. Otherwise he is indifferent between the two bundles.
   a. Show that the relation of indifference is not transitive for Mac. (Hint: Give an example.)
   b. Show that the preferred relation is transitive for Mac.

Answer:
   a. Consider the bundles $A = (1, 1)$, $B = (1, 1.75)$, and $C = (1, 2.5)$. Then A is indifferent to B and B to C, but C is preferred to A.
   b. To see that strict preference is transitive, suppose we have any three bundles, (x, y), (x', y'), and (x'', y''). If the first is preferred to the second and the second to the third, then $xy - x'y' > 1$ and $x'y' - x''y'' > 1$. Simple algebra shows that $xy - x''y'' > 1$. Therefore the first must be preferred to the third.

Difficulty: 3

5. Blanche Carter has devised a system for rating the males in her economics class. She cares about their intelligence and their looks. She has ranked each male on a scale of 1 to 5 for intelligence and 1 to 3 for looks. She defines a preference relation, R, as follows: xRy if boy x scores at least as high as boy y in either looks or intelligence. Give an example to show that Blanche's method of determining preferences might not lead to transitive preferences.

Answer: Suppose boy x has rankings 1 and 2, boy y has rankings 3 and 1, and boy z has rankings 2 and 3. Then xRy because x is better looking than y and yRz because y is smarter than z. But it is not true that xRz. In fact z is both smarter and better looking than x.

Difficulty: 2

6. Explain how it would be possible to cheat someone who had intransitive preferences. Be explicit about what you would offer him if you were trying to exploit his intransitivity and what he would do in response.

Answer: Suppose that he has bundle C right now and prefers A to B, B to C, and C to A. If you offer him a trade that leaves him at B instead of C, he will accept the deal. If you now offer him a trade that leaves him at A instead of B, he will accept that. But he will prefer to be back where he originally was to where he is. So you could offer to give him back his original bundle, minus a reward to you for your efforts, and he would accept the deal.

Difficulty: 1

7. If good X is measured on the horizontal axis and good Y on the vertical, what can you say about the preferences of someone whose indifference curves are
   a. parallel to the Y axis?
   b. positively sloped with more desirable indifference curves as one moves to the right?
   c. negatively sloped with more desirable indifference curves as one moves to the left?

Answer:
   a. This person doesn't care how much X he has.
   b. This person likes X but hates Y.
   c. This person hates both goods.

Difficulty: 2

8. Suppose that there are two commodities and a consumer prefers more to less of each good. If the consumer has transitive preferences, can her indifference curves cross? Sketch a brief proof of your answer, and illustrate with a diagram.

Answer: See the textbook.

CHAPTER 4 Utility

TRUE-FALSE

Difficulty: 2
Correct Answer: False

1. With quasilinear preferences, the slope of indifference curves is constant along all rays through the origin.

Difficulty: 2
Correct Answer: False

2. Wanda Lott has the utility function $U(x, y) = \max\{x, y\}$. Wanda's preferences are convex.

Difficulty: 1
Correct Answer: True

3. If someone has a utility function $U = 2 \min\{x, y\}$, then x and y are perfect complements for that person.

Difficulty: 1
Correct Answer: False

4. Maximilian consumes two goods, x and y. His utility function is $U(x, y) = \max\{x, y\}$. Therefore x and y are perfect substitutes for Max.

Difficulty: 3
Correct Answer: False

5. A person with the utility function $U(x, y) = y + x^2$ has convex preferences.

Difficulty: 3
Correct Answer: True

6. Mr. Surly consumes only two goods and hates them both. His utility function is $U(x, y) = -\max\{x, y\}$. Mr. Surly has (*weakly*) convex preferences.

Difficulty: 2
Correct Answer: True

7. Angela's utility function is $U(x_1, x_2) = (x_1 + x_2)^3$. Her indifference curves are downward-sloping, parallel straight lines.

Difficulty: 2
Correct Answer: True

8. Henrietta's utility function is $U(x_1, x_2) = x_1x_2$. She has diminishing marginal rate of substitution between goods 1 and 2.

Difficulty: 2
Correct Answer: False

9. Alice's utility function is $U(x, y) = x^2y$. Steve's utility function is $U(x, y) = x^2y + 2x$. Alice and Steve have the same preferences since Steve's utility function is a monotonic transformation of Alice's.

Difficulty: 3
Correct Answer: False

10. Jean's utility function is $U(x, y) = x + y^2 - y$. If we draw her indifference curves with x on the horizontal axis and y on the vertical axis, then these indifference curves are everywhere downward sloping and get flatter as one moves from left to right.

Difficulty: 1
Correct Answer: True

11. The utility function $U(x_1, x_2) = 2\ln x_1 + 3\ln x_2$ represents Cobb-Douglas preferences.

Difficulty: 1
Correct Answer: False

12. Fiery Demon is a rotgut whisky made in Kentucky. Smoothy is an unblended malt whisky imported from Scotland. Ed regards these brands as perfect substitutes. When he goes into a bar, he sometimes buys only Fiery Demon. Other times he buys only Smoothy. This shows that Ed has unstable preferences.

Difficulty: 1
Correct Answer: False

13. Mark strictly prefers consumption bundle A to consumption bundle B and weakly prefers bundle B to bundle A. These preferences can be represented by a utility function.

Difficulty: 3
Correct Answer: True

14. A consumer has preferences represented by the utility function $U(x_1, x_2) = 10(x_1^2 + 2x_1x_2 + x_2^2) - 50$. For this consumer, goods 1 and 2 are perfect substitutes.

Difficulty: 1
Correct Answer: True

15. A person with utility function $U(x, y) = 5 + y^2 + 2x$ has nonconvex preferences.

Difficulty: 2
Correct Answer: False

16. A person with the utility function $U(x, y) = 10 + y^2 + x$ has convex preferences.

Difficulty: 2
Correct Answer: True

17. A person with the utility function $U(x_1, x_2) = \min\{x_1 + 2x_2, 2x_1 + x_2\}$ has convex but not strictly convex preferences.

Difficulty: 2
Correct Answer: False

18. If one utility function is a monotonic transformation of another, then the former must assign a higher utility number to every bundle than the latter.

Difficulty: 2
Correct Answer: False

19. Quasilinear preferences are homothetic when the optimal amount of good 1 is not affordable.

MULTIPLE CHOICE

Difficulty: 2
Correct Answer: a

1. Ike's utility function is $U(x, y) = 25xy$. He has 12 units of good x and 8 units of good y. Ben's utility function for the same two goods is $U(x, y) = 4x + 4y$. Ben has 9 units of x and 13 units of y.
   a. Ike prefers Ben's bundle to his own bundle, but Ben prefers his own bundle to Ike's.
   b. Ben prefers Ike's bundle to his own, but Ike prefers his own bundle to Ben's.
   c. Each prefers the other's bundle to his own.
   d. Neither prefers the other's bundle to his own.
   e. Since they have different preferences, there is not enough information to determine who envies whom.

Difficulty: 2
Correct Answer: d

2. Ernie's utility function is $U(x, y) = 32xy$. He has 10 units of good x and 8 units of good y. Waldo's utility function for the same two goods is $U(x, y) = 3x + 5y$. Waldo has 9 units of x and 13 units of y.
   a. Waldo prefers Ernie's bundle to his own, but Ernie prefers his own bundle to Waldo's.
   b. Each prefers the other's bundle to his own.
   c. Neither prefers the other's bundle to his own.
   d. Ernie prefers Waldo's bundle to his own bundle, but Waldo prefers his own bundle to Ernie's.
   e. Since they have different preferences, there is not enough information to determine who envies whom.

Difficulty: 2
Correct Answer: c

3. Tim has preferences represented by the utility function $U(x, y) = \min\{6x + y, x + 2y\}$. If x is on the horizontal axis and y is on the vertical axis, what is the slope of his indifference curve at the point (8, 9)?
   a. -6
   b. $-2/6$
   c. $-1/2$
   d. $-1/6$
   e. $-8/9$

Difficulty: 2
Correct Answer: d

4. Jean-Pierre has preferences represented by the utility function $U(x, y) = \min\{2x + y, x + 6y\}$. If x is on the horizontal axis and y is on the vertical axis, what is the slope of his indifference curve at the point (7, 7)?
   a. $-1/2$
   b. $-6/2$
   c. $-1/6$
   d. -2
   e. $-7/7$

Difficulty: 1
Correct Answer: c

5. Doreen has preferences represented by the utility function $U(x, y) = 10x + 5y$. She consumes 10 units of good x and 9 units of good y. If her consumption of good x is lowered to 1, how many units of y must she have in order to be exactly as well off as before?
   a. 30
   b. 30
   c. 27
   d. 18
   e. None of the above.

Difficulty: 1
Correct Answer: c

6. Angela has preferences represented by the utility function $U(x, y) = 2x + 2y$. She consumes 10 units of good x and 6 units of good y. If her consumption of good x is lowered to 4, how many units of y must she have in order to be exactly as well off as before?

a. 14
b. 13
c. 12
d. 15
e. None of the above.

Difficulty: 3
Correct Answer: b

7. Mac's utility function is $U(x, y) = \max\{2x - y, 2y - x\}$.
   a. Mac's preferences are quasilinear.
   b. If Mac has more x than y, any increase in his consumption of y would lower his utility.
   c. If Mac has more x than y, a decrease in his consumption of y would raise his utility.
   d. Mac always prefers more of each good to less.
   e. Goods x and y are perfect substitutes.

Difficulty: 2
Correct Answer: c

8. Charles's utility function is $U(x, y) = xy$. Anne's utility function is $U(x, y) = 1{,}000xy$. Diana's utility function is $-xy$. Elizabeth's utility function is $U(x, y) = -1/(xy + 1)$. Fergie's utility function is $xy - 10{,}000$. Margaret's utility function is x/y. Philip's utility function is $x(y + 1)$. (The goods x and y are two very expensive goods. We leave you to speculate about what they are.) Which of these persons have the same preferences as Charles?
   a. Everybody except Diana
   b. Anne and Fergie
   c. Anne, Fergie, and Elizabeth
   d. None of them
   e. All of them

Difficulty: 3
Correct Answer: e

9. Raymond's preferences are represented by the utility function $U(x, y) = x/y$ if $y > 0$ and $U(x, y) = 0$ if $y = 0$.
   a. Raymond has indifference curves that are rectangular hyperbolas.
   b. Raymond prefers more of each good to less.
   c. Raymond has quasilinear preferences.
   d. Raymond has a bliss point.
   e. Raymond has indifference curves that are upward-sloping straight lines if $y > 0$.

Difficulty: 2
Correct Answer: c

10. Molly's utility function is $U(x, y) = y + 4x^{.5}$. She has 25 units of x and 12 units of y. If her consumption of x is reduced to 0, how many units of y would she need in order to be exactly as well off as before?
   a. 48
   b. 37
   c. 32
   d. 112
   e. None of the above.

Difficulty: 2
Correct Answer: e

11. Waldo's utility function is $U(x, y) = xy$. Waldo consumes 5 units of x and 25 units of y.
   a. Waldo would be willing to make small exchanges of x for y in which he would give up 5 units of x for every unit of y he got.
   b. Waldo would be willing to trade away all of his x for y as long as he got more than 5 units of y for every unit of x he gave up.
   c. Waldo likes x and y equally well so he is always willing to exchange 1 unit of either good for more than 1 unit of the other.
   d. Waldo will always be willing to make trades at any price if he does not have equal amounts of the two goods.
   e. None of the above.

Difficulty: 2
Correct Answer: e

12. Ike's utility function is $U(x, y) = xy$. Ike consumes 2 units of x and 8 units of y.
   a. Ike would be willing to make small exchanges of x for y in which he would give up 4 units of x for every unit of y he got.
   b. Ike would be willing to trade away all of his x for y as long as he got more than 4 units of y for every unit of x he gave up.
   c. Ike will always be willing to make trades at any price if he does not have equal amounts of the two goods.
   d. Ike likes x and y equally well so he is always willing to exchange 1 unit of either good for more than 1 unit of the other.
   e. None of the above.

Difficulty: 2
Correct Answer: b

13. Henry's utility function is $x^2 + 16xw + 64w^2$, where x is his consumption of x and w is his consumption of w.
   a. Henry's preferences are nonconvex.
   b. Henry's indifference curves are straight lines.
   c. Henry has a bliss point.
   d. Henry's indifference curves are hyperbolas.
   e. None of the above.

Difficulty: 1
Correct Answer: d

14. Josephine's utility function is $U(x, y) = y + 5x^{.5}$. She has 1 unit of x and 2 units of y. If her consumption of x is reduced to zero, how much y must she have in order to be exactly as well off as before?
   a. 14 units
   b. 9 units
   c. 11 units
   d. 7 units
   e. None of the above.

Difficulty: 2
Correct Answer: c

15. Jim's utility function is $U(x, y) = xy$. Jerry's utility function is $U(x, y) = 1{,}000xy + 2{,}000$. Tammy's utility function is $U(x, y) = xy(1 - xy)$. Oral's utility function is $-1/(10 + xy)$. Billy's utility function is $U(x, y) = x/y$. Pat's utility function is $U(x, y) = -xy$.
   a. No two of these people have the same preferences.
   b. They all have the same preferences except for Billy.
   c. Jim, Jerry, and Pat all have the same indifference curves, but Jerry and Oral are the only ones with the same preferences as Jim.
   d. Jim, Tammy, and Oral all have the same preferences.
   e. None of the above.

Difficulty: 1
Correct Answer: a

16. Harmon's utility function is $U(x_1, x_2) = x_1x_2$. His income is \$100. The price of good 2 is $p_2 = 4$. Good 1 is priced as follows. The first 15 units cost \$4 per unit and any additional units cost \$2 per unit. What consumption bundle does Harmon choose?
   a. (12.5, 12.5)
   b. (25, 12.5)
   c. (12.5, 25)
   d. (15, 10)
   e. None of the above.

Difficulty: 1
Correct Answer: e

17. Janet consumes x_1 and x_2 together in fixed proportions. She always consumes 2 units of x_1 for every unit x_2. One utility function that describes her preferences is
   a. $U(x_1, x_2) = 2x_1x_2$.
   b. $U(x_1, x_2) = 2x_1 + x_2$.
   c. $U(x_1, x_2) = x_1 + 2x_2$.
   d. $U(x_1, x_2) = \min\{2x_1, x_2\}$.
   e. $U(x_1, x_2) = \min\{x_1, 2x_2\}$.

Difficulty: 3
Correct Answer: c

18. Oswald Odd consumes only goods 1 and 2. His utility function is $U(x_1, x_2) = x_1 + x_2 + \min\{x_1, x_2\}$. Each of Oswald's indifference curves is
   a. L-shaped.
   b. made up of three line segments with slopes -2, -1, and $-1/2$.
   c. made up of two line segments with slopes -2 and $-1/2$.
   d. is smooth and has no kinks.
   e. is a diamond-shaped figure consisting of four line segments.

Difficulty: 3
Correct Answer: a

19. The absolute value of Mar's MRS at his current consumption bundle is greater than 3. (That is, $MU_1/MU_2 > 3$). Mars has convex preferences and is currently consuming positive amounts of both goods.
   a. Taking away some of good 1 and giving Mars 3 units of good 2 for each unit of good 1 taken away will necessarily make him worse off.
   b. Taking away some of good 1 and giving Mars 3 units of good 2 for each unit of good 1 taken away will necessarily make him better off.
   c. Giving Mars some of good 1 and taking away 3 units of good 2 for each unit of good 1 he is given will necessarily make him worse off.
   d. Giving Mars some of good 1 and taking away 3 units of good 2 for each unit of good 1 he is given will necessarily make him better off.
   e. More than one of the above is true.

Difficulty: 3
Correct Answer: b

20. Isabella's utility function is $U(x, y) = 4\min\{x, y\} + y$. If we draw her indifference curves with x on the horizontal axis and y on the vertical axis, these indifference curves are
   a. L-shaped with kinks where $x = y$.
   b. made up of two line segments that meet where $x = y$. One of these line segments is horizontal and the other has slope -4.
   c. L-shaped with kinks where $x = 5y$.
   d. made up of two line segments that meet where $x = 5y$. One of these line segments is vertical and the other has slope -1.
   e. V-shaped with kinks where $x = 4y$.

Difficulty: 3
Correct Answer: d

21. Emily's utility function is $U(x, y) = 3\min\{x, y\} + y$. If we draw her indifference curves with x on the horizontal axis and y on the vertical axis, these indifference curves are
   a. made up of two line segments that meet where $x = 4y$. One of these line segments is vertical and the other has slope -1.
   b. L-shaped with kinks where $x = 4y$.
   c. L-shaped with kinks where $x = y$.
   d. made up of two line segments that meet where $x = y$. One of these line segments is horizontal and the other has slope -3.
   e. V-shaped with kinks where $x = 3y$.

Difficulty: 1
Correct Answer: e

22. Charlie has the utility function $U(x_A, x_B) = x_A x_B$. His indifference curve passing through 32 apples and 8 bananas will also pass through the point where he consumes 4 apples and
    a. 16 bananas.
    b. 32 bananas.
    c. 68 bananas.
    d. 72 bananas.
    e. 64 bananas.

Difficulty: 1
Correct Answer: e

23. Charlie has the utility function $U(x_A, x_B) = x_A x_B$. His indifference curve passing through 35 apples and 18 bananas will also pass through the point where he consumes 5 apples and
    a. 131 bananas.
    b. 137 bananas.
    c. 21 bananas.
    d. 42 bananas.
    e. 126 bananas.

Difficulty:
Correct Answer: b

24. Charlie's utility function is $U(A, B) = AB$, where A and B are the numbers of apples and bananas, respectively, that he consumes. When Charlie is consuming 15 apples and 90 bananas, if we put apples on the horizontal axis and bananas on the vertical axis, the slope of his indifference curve at his current consumption is
    a. −15.
    b. −6.
    c. −12.
    d. −1/6.
    e. −1/12.

Difficulty: 2
Correct Answer: d

25. Charlie's utility function is $U(A, B) = AB$, where A and B are the numbers of apples and bananas, respectively, that he consumes. When Charlie is consuming 20 apples and 80 bananas, if we put apples on the horizontal axis and bananas on the vertical axis, the slope of his indifference curve at his current consumption is
    a. −8.
    b. −1/4.
    c. −20.
    d. −4.
    e. −1/8.

Difficulty: 2
Correct Answer: c

26. Ambrose has the utility function $U(x_1, x_2) = 4x^{1/2}{}_1 + x_2$. If Ambrose is initially consuming 64 units of nuts and 10 units of berries, then what is the largest number of berries that he would be willing to give up in return for an additional 17 units of nuts?
    a. 9
    b. 19
    c. 4
    d. 2
    e. 1

Difficulty: 2
Correct Answer: b

27. Ambrose has the utility function $U(x_1, x_2) = 4x^{1/2}{}_1 + x_2$. If Ambrose is initially consuming 25 units of nuts and 17 units of berries, then what is the largest number of berries that he would be willing to give up in return for an additional 39 units of nuts?
    a. 8
    b. 12
    c. 25
    d. 6
    e. 3

Difficulty: 2
Correct Answer: c

28. Joe Bob's cousin Leonard consumes goods 1 and 2. Leonard thinks that 2 units of good 1 is always a perfect substitute for 3 units of good 2. Which of the following utility functions is the only one that would *not* represent Leonard's preferences?
    a. $U(x_1, x_2) = 3x_1 + 2x_2 + 1{,}000$.
    b. $U(x_1, x_2) = 9x^2{}_1 + 12x_1x_2 + 4x^2{}_2$.
    c. $U(x_1, x_2) = \min\{3x_1, 2x_2\}$.
    d. $U(x_1, x_2) = 30x_1 + 20x_2 - 10{,}000$.
    e. More than one of the above does *not* represent Leonard's preferences.

Difficulty: 2
Correct Answer: a

29. Joe Bob's cousin Peter consumes goods 1 and 2. Peter thinks that 4 units of good 1 is always a perfect substitute for 2 units of good 2. Which of the following utility functions is the only one that would *not* represent Peter's preferences?
    a. $U(x_1, x_2) = \min\{2x_1, 4x_2\}$.
    b. $U(x_1, x_2) = 20x_1 + 40x_2 - 10{,}000$.
    c. $U(x_1, x_2) = 2x_1 + 4x_2 + 1{,}000$.
    d. $U(x_1, x_2) = 4x^2{}_1 + 16x_1x_2 + 16x^2{}_2$.
    e. More than one of the above does *not* represent Peter's preferences.

Difficulty: 2
Correct Answer: e

30. Harry Mazzola has the utility function $U(x_1, x_2) = \min\{x_1 + 2x_2, 2x_1 + x_2\}$. He has \$40 to spend on corn chips and french fries. If the price of corn chips is \$3 per unit and the price of french fries is \$4, then Harry will
   a. definitely spend all of his income on corn chips.
   b. definitely spend all of his income on french fries.
   c. consume at least as many corn chips as french fries but might consume both.
   d. consume at least as many french fries as corn chips but might consume both.
   e. consume equal amounts of french fries and corn chips.

Difficulty: 2
Correct Answer: c

31. Harry Mazzola has the utility function $U(x_1, x_2) = \min\{x_1 + 2x_2, 2x_1 + x_2\}$. He has \$40 to spend on corn chips and french fries. If the price of corn chips is \$1 per unit and the price of french fries is \$4, then Harry will
   a. consume at least as many french fries as corn chips but might consume both.
   b. consume at least as many corn chips as french fries but might consume both.
   c. definitely spend all of his income on corn chips.
   d. definitely spend all of his income on french fries.
   e. consume equal amounts of french fries and corn chips.

Difficulty: 2
Correct Answer: c

32. Phil Rupp's sister Ethel has the utility function $U(x, y) = \min\{4x + y, 5y\}$. Where x is measured on the horizontal axis and y on the vertical axis, her indifference curves consist of a
   a. vertical line segment and a horizontal line segment which meet in a kink along the line $y = 4x$.
   b. vertical line segment and a horizontal line segment which meet in a kink along the line $x = 4y$.
   c. horizontal line segment and a negatively sloped line segment which meet in a kink along the line $x = y$.
   d. positively sloped line segment and a negatively sloped line segment which meet along the line $x = y$.
   e. horizontal line segment and a positively sloped line segment which meet in a kink along the line $x = 4y$.

Difficulty: 2
Correct Answer: a

33. Phil Rupp's sister Ethel has the utility function $U(x, y) = \min\{5x + y, 6y\}$. Where x is measured on the horizontal axis and y on the vertical axis, her indifference curves consist of a
   a. horizontal line segment and a negatively sloped line segment which meet in a kink along the line $x = y$.
   b. vertical line segment and a horizontal line segment which meet in a kink along the line $y = 5x$.
   c. positively sloped line segment and a negatively sloped line segment which meet along the line $x = y$.
   d. vertical line segment and a horizontal line segment which meet in a kink along the line $x = 5y$.
   e. horizontal line segment and a positively sloped line segment which meet in a kink along the line $x = 5y$.

PROBLEMS

Difficulty: 1

1. Jim's utility function is $U(x, y) = xy$. Jerry's utility function is $U(x, y) = 1{,}000xy + 2{,}000$. Tammy's utility function is $U(x, y) = xy(1 - xy)$. Oral's utility function is $U(x, y) = -1/(10 + 2xy)$. Marjoe's utility function is $U(x, y) = x(y + 1{,}000)$. Pat's utility function is $U(x, y) = 0.5xy - 10{,}000$. Billy's utility function is $U(x, y) = x/y$. Francis's utility function is $U(x, y) = -xy$.
   a. Who has the same preferences as Jim?
   b. Who has the same indifference curves as Jim?
   c. Explain why the answers to (a) and (b) differ.

Answer:
   a. Jerry, Pat and Oral have the same preferences as Jim since their utility functions are monotonic transformations of Jim's.
   b. Jerry, Pat, Oral, Tammy, and Francis have the same indifference curves as Jim, but Tammy and Francis have different preferences.
   c. Francis's utility function is a decreasing transformation of Jim's, so he orders his indifference curves in the opposite way. Tammy's utility function is a transformation of Jim's but is sometimes increasing and sometimes decreasing.

Difficulty: 3

2. A consumer has a utility function of the form $U(x, y) = x^a + y^b$, where both a and b are nonnegative. What additional restrictions on the values of the parameters a and b are imposed by each of the following assumptions?
   a. Preferences are quasilinear and convex, and x is a normal good.
   b. Preferences are homothetic.
   c. Preferences are homothetic and convex.
   d. Goods x and y are perfect substitutes.

Answer:
   a. $a = 1$ and b is between 0 and 1.

b. $a = b$.
c. $a = b$ and a is between 0 and 1.
d. $a = b = 1$.

Difficulty: 3

3. Victor Finick likes to have the same amount of x as he has of y. His utility function is $U(x, y) = \min\{2x - y, 2y - x\}$.
   a. Draw the indifference curve for Victor that passes through the bundle (0, 0) and the indifference curve that passes through (4, 4). (Hint: Each indifference curve is the intersection of two line segments.)
   b. If Victor has a bundle that he likes better than (0, 0) and his consumption of both goods is doubled, is Victor better off?
   c. Does Victor always prefer more of either good to less?

Answer:
   a. Victor's indifference curves are V-shaped. The one through the origin consists of the two rays $y = 2x$ and $x = 2y$. The one through (2, 2) has two rays going out from (2, 2), one with slope 1/2 and the other with slope 2.
   b. Yes.
   c. No. If $x > y$, then an increase in x by itself makes Victor worse off, and if $y > x$, an increase in y by itself makes him worse off.

Difficulty: 1

4. Use separate graphs to sketch two indifference curves for people with each of the following utility functions:
   a. $U(x, y) = x + 2y$.
   b. $U(x, y) = \min\{x, 2y\}$.
   c. $U(x, y) = \max\{x, 2y\}$.

Answer:
   a. These are straight lines with slope $-1/2$.
   b. These are L-shaped. The corners lie along the locus $x = 2y$.
   c. A typical indifference curve consists of a horizontal line from the y axis to the locus $x = 2y$ and then a vertical line to the y axis from the point where the horizontal line met the line $x = 2y$.

Difficulty: 2

5. Use separate graphs to draw indifference curves for each of the following utility functions:
   a. $U(x, y) = \min\{2x + y, 2y + x\}$.
   b. $U(x, y) = \max\{2x + y, 2y + x\}$.
   c. $U(x, y) = x + \min\{x, y\}$.

   In which of these cases are preferences convex?

Answer: If you take a point on the line $x = y$ and draw two lines through it, one with a slope of $-1/2$ and the other with a slope of -2, the outer envelope of these lines will be an indifference curve for (a) and the inner envelope will be an indifference curve for (b). The indifference curves for (c) passing through a point on the line $x = y$ consist of a line segment going down and to the right with slope -1 and a line segment going up and to the left with slope -2. Cases (a) and (c) display convex preferences, and case (b) does not.

CHAPTER 5 Choice

TRUE-FALSE

Difficulty: 1
Correct Answer: False

1. At a boundary optimum, a consumer's indifference curve must be tangent to her budget line.

Difficulty: 2
Correct Answer: False

2. Max Gross has the utility function $U(x, y) = \max\{x, y\}$. If the price of x is the same as the price of y, Max will buy equal amounts of x and y.

Difficulty: 2
Correct Answer: False

3. If a consumer does not have convex preferences, then a point of tangency between her indifference curve and her budget line must be an optimal consumption point.

Difficulty: 2
Correct Answer: True

4. Sharon spends all of her income on peaches and strawberries. Peaches are a normal good for her. Her income increased by 20 percent and prices did not change. Her consumption of strawberries could not have increased by more than 20 percent.

Difficulty: 2
Correct Answer: False

5. Clara's utility function is $U(x, y) = (x + 2)(y + 1)$. If her consumption of both x and y are doubled, then her marginal rate of substitution between x and y remains constant.

Difficulty: 1
Correct Answer: True

6. Charlie's utility function is $U(x, y) = xy^2$. His marginal rate of substitution between x and y does not change if the amount of both goods doubles.

Difficulty: 2
Correct Answer: True

7. Ambrose's utility function is $U(x, y) = x + 4y^{1/2}$. The price of x is \$1 and the price of y is \$2. If his income rises from \$100 to \$150, his consumption of y increases by more than 10% but less than 50%.

Difficulty: 2
Correct Answer: False

8. Linus has utility function $U(x, y) = x + 2y$. If the price of x is \$1 and the price of y is .50 cents then Linus must consume equal amounts of both goods in order to maximize his utility.

Difficulty: 3
Correct Answer: True

9. Mary Granola's utility function is $U(x, y) = \min\{x + 2y, y + 2x\}$. Mary maximizes her utility subject to a budget constraint. If she chooses the bundle (5, 6), then the price of x must be exactly twice the price of y.

Difficulty: 2
Correct Answer: True

10. Millie's utility function is $U(x, y) = \min\{x, y\}$. She maximizes her utility subject to a budget constraint. The price of x is the same as the price of y. If the price of x rises and the price of y and her income remain constant, then her consumption of y will certainly decrease.

Difficulty: 2
Correct Answer: True

11. Other things being equal, a lump sum tax is at least as good for a consumer as a sales tax that collects the same revenue from him.

Difficulty: 2
Correct Answer: False

12. If a consumer doesn't consume any snails but does consume Big Macs, then his marginal rate of substitution between snails and Big Macs when his snail consumption is zero must be equal to the ratio of the price of snails to the price of Big Macs.

MULTIPLE CHOICE

Difficulty: 1
Correct Answer: b

1. Hans has \$27 which he decides to spend on x and y. Commodity x costs \$16 per unit and commodity y costs \$10 per unit. He has the utility function $U(x, y) = 5x^2 + 2y^2$ and he can purchase fractional units of x and y. Hans will choose
   a. only x.
   b. only y.
   c. some of each commodity but more y than x.
   d. some of each commodity but more x than y.
   e. equal amounts of the two commodities.

Difficulty: 1
Correct Answer: c

2. George has \$49 which he decides to spend on x and y. Commodity x costs \$5 per unit and commodity y costs \$11 per unit. He has the utility function $U(x, y) = 3x^2 + 6y^2$ and he can purchase fractional units of x and y. George will choose
   a. only y.
   b. some of each commodity but more x than y.
   c. only x.
   d. some of each commodity but more y than x.
   e. equal amounts of the two commodities.

Difficulty: 2
Correct Answer: e

3. Wanda Littlemore's utility function is $U(x, y) = x + 46y - 2y^2$. Her income is \$135. If the price of x is \$1 and the price of y is \$18, how many units of good x will Wanda demand?
   a. 5
   b. 12
   c. 16
   d. 0
   e. 9

Difficulty: 2
Correct Answer: e

4. Wanda Littlemore's utility function is $U(x, y) = x + 47y - 3y^2$. Her income is \$107. If the price of x is \$1 and the price of y is \$23, how many units of good x will Wanda demand?
   a. 11
   b. 19
   c. 0
   d. 18
   e. 15

Difficulty: 3
Correct Answer: b

5. Henri's utility function is $\min\{x, 5y + 2z\}$. The price of x is \$1, the price of y is \$15, and the price of z is \$7. Henri's income is \$44. How many units of x does Henri demand?
   a. 9.78
   b. 11
   c. 5
   d. 3
   e. None of the above.

Difficulty: 3
Correct Answer: a

6. Leo's utility function is $\min\{x, 3y + 2z\}$. The price of x is \$1, the price of y is \$9, and the price of z is \$8. Leo's income is \$8. How many units of x does Leo demand?
   a. 2
   b. 1.60
   c. 5
   d. 7
   e. None of the above.

Difficulty: 2
Correct Answer: a

7. Peter consumes no commodities other than Miller Lite and Bud Light. His annual budget for these two commodities is described by the equation $5x + 30y = 300$, where x is sixpacks of Miller Lite and y is cases of Bud Light. Peter considers 2 cases of Bud Light to be perfect substitutes for 6 sixpacks of Miller Lite.
   a. He will consume 60 sixpacks of Miller Lite per year.
   b. He will consume 10 cases of Bud Light per year.
   c. He will consume 14 cases of Bud Light per year.
   d. He will consume 12 sixpacks of Miller Lite per year.
   e. He is indifferent between any two bundles that use up his entire income.

Difficulty: 2
Correct Answer: d

8. Roger consumes no commodities other than Miller Lite and Bud Light. His annual budget for these two commodities is described by the equation $5x + 25y = 300$, where x is sixpacks of Miller Lite and y is cases of Bud Light. Roger considers 2 cases of Bud Light to be perfect substitutes for 6 sixpacks of Miller Lite.
   a. He will consume 12 cases of Bud Light per year.
   b. He will consume 12 sixpacks of Miller Lite per year.
   c. He will consume 16 cases of Bud Light per year.
   d. He will consume 60 sixpacks of Miller Lite per year.
   e. He is indifferent between any two bundles that use up his entire income.

Difficulty: 1
Correct Answer: a

9. Paul's utility function is $\min\{x + 3y, 3x + y\}$. Simon's utility function is $\min\{3x + 9y, 9x + 3y\}$. Paul and Simon have the same income and face the same prices.
   a. Paul and Simon will demand the same amount of good x.
   b. Paul will demand more of good y than Simon.
   c. Simon will demand more of good y than Paul.
   d. Each will prefer the other's consumption bundle to his own.
   e. None of the above.

Difficulty: 3
Correct Answer: c

10. Mary Granola consumes tomatoes and nectarines. Mary's indifference curves are kinky. When she is consuming more tomatoes than nectarines, she is just willing to trade 3 tomatoes for 1 nectarine. When she is consuming more nectarines than tomatoes, she is just willing to trade 4 nectarines for 1 tomato. Let P_1 be the price of nectarines, and P_2 the price of tomatoes. Mary maximizes her utility subject to her budget constraint. (Hint: Sketch one of her indifference curves.)
    a. When $P_1 > P_2$, she must consume only tomatoes.
    b. When $P_1 > P_2$, she must consume 3 times as many tomatoes as nectarines.
    c. When $P_1 > 3P_2$, she must consume only tomatoes.
    d. When $4P_1 > P_2$, she must consume only nectarines.
    e. She must consume equal numbers of both.

Difficulty: 3
Correct Answer: a

11. Mary Granola consumes apples and uglifruits. Mary's indifference curves are kinky. When she is consuming more apples than uglifruits, she is just willing to trade 3 apples for 1 uglifruit. When she is consuming more uglifruits than apples, she is just willing to trade 4 uglifruits for 1 apple. Let P_1 be the price of uglifruits and P_2 the price of apples. Mary maximizes her utility subject to her budget constraint. (Hint: Sketch one of her indifference curves.)
    a. When $P_1 > 3P_2$, she must consume only apples.
    b. When $P_1 > P_2$, she must consume 3 times as many apples as uglifruits.
    c. When $4P_1 > P_2$, she must consume only uglifruits.
    d. When $P_1 > P_2$, she must consume only apples.
    e. She must consume equal numbers of both.

Difficulty: 3
Correct Answer: c

12. Badger Madison consumes only beer and sausages. His income is \$100. Beer costs him \$.50 per can and sausages cost \$1 each. Where x is the number of cans of beer and y the number of sausages he consumes per week, Badger's utility function is $U(x, y) = -[(x - 50)^2 + (y - 40)^2]$.
    a. Badger must always be unhappy since whatever he consumes, his utility is negative.
    b. He has monotonic preferences.
    c. If his income increases, he won't change the commodity bundle that he buys.
    d. If the price of beer goes down, he will buy more beer.
    e. More than one of the above statements is true.

Difficulty: 3
Correct Answer: d

13. Janet consumes two commodities x and y. Her utility function is $\min\{x + 2y, y + 2x\}$. She chooses to buy 10 units of good x and 20 units of good y. The price of good x is \$1. Janet's income is
    a. \$40.
    b. \$50.
    c. \$30.
    d. \$20.
    e. There is not enough information in the problem to determine her income because we are not told the price of good y.

Difficulty: 2
Correct Answer: a

14. Martha's utility function is $U(x, y) = \min\{x + 2y, 2x + y\}$. George's utility function is $U(x, y) = \min\{2x + 4y, 4x + 2y\}$. If George and Martha have the same income and face the same prices for the goods x and y,
    a. George and Martha will both demand the same amount of y.
    b. Martha will always prefer George's consumption bundle to her own.
    c. George will always prefer Martha's consumption bundle to his own.
    d. George will demand more x than Martha demands.
    e. None of the above.

Difficulty: 2
Correct Answer: b

15. Ollie has a utility function $U(x, y) = (x + 2)(y + 3)$. The price of x is \$1 and the price of y is \$1. When he maximizes his utility subject to his budget constraint, he consumes positive amounts of both goods. Ollie consumes
    a. exactly as many units of x as of y.
    b. 1 more unit of x than he consumes of y.
    c. 1 more unit of y than he consumes of x.
    d. 2 more units of x than he consumes of y.
    e. None of the above.

Difficulty: 2
Correct Answer: b

16. Charlie has a utility function $U(x, y) = (x + 3)(y + 4)$. The price of x is \$1 and the price of y is \$1. When he maximizes his utility subject to his budget constraint, he consumes positive amounts of both goods. Charlie consumes
   a. 2 more units of x than he consumes of y.
   b. 1 more unit of x than he consumes of y.
   c. exactly as many units of x as of y.
   d. 1 more unit of y than he consumes of x.
   e. None of the above.

Difficulty: 1
Correct Answer: a

17. Danny Featherweight is taking a tough course in law school. His professor agreed to give him a course grade of $\max\{2x, 3y\}$ where x and y are the number of answers he gets right on the first and second midterms, respectively. Danny needs a course grade of 150 to pass. He finds that for the first midterm, for every A minutes of study, he will get one more answer right. For the second midterm, for every B minutes that he studies, he will get one more answer right. If he doesn't study at all, Danny will get nothing right on either exam. All Danny cares about is passing. He doesn't want to waste any time getting a higher grade than he needs.
   a. If $A/B < 2/3$, then Danny will not study for the second exam.
   b. The ratio of the time Danny spends on exam 1 to the time he spends on exam 2 will be $2A/3B$.
   c. The ratio of the time Danny spends on exam 2 to the time he spends on exam 1 will be $3A/2B$.
   d. If $A < B$, then Danny will not study for the first exam.
   e. Danny will spend $150/(2A + 3B)$ minutes studying for each exam.

Difficulty: 2
Correct Answer: a

18. Isobel consumes positive quantities of both jam and juice. The price of jam is 5 cents per unit and the price of juice is 10 cents per unit. Her marginal utility of jam is 10 and her marginal utility of juice is 5.
   a. Without changing her total expenditures, she could increase her utility by consuming more jam and less juice.
   b. Without changing her total expenditures, she could increase her utility by consuming more juice and less jam.
   c. Without changing her total expenditures on jam and juice, she could not increase her utility.
   d. She should spend more money on both jam and juice.
   e. We can't tell whether any of the other statements are true or false without knowing the quantities she consumes.

Difficulty: 2
Correct Answer: a

19. Harold's utility function is $U(x, y) = (x + 3)(y + 2)$. The price of x is \$1. The price of y is \$2. At all incomes for which Harold consumes positive amounts of both goods, he will consume
   a. more than twice as many units of x as of y.
   b. more than twice as many units of y as of x.
   c. 1 more unit of x than of y.
   d. 1 more unit of y than of x.
   e. 2/3 as many units of y as of x.

Difficulty: 3
Correct Answer: c

20. Jane's utility function is $U(x, y) = x + 2y$, where x is her consumption of good X and y is her consumption of good Y. Her income is \$2. The price of Y is \$2. The cost per unit of X depends on how many units she buys. The total cost of x units of X is the square root of x.
   a. The bundle (1/4, 3/4) is Jane's utility maximizing choice, given her budget.
   b. The bundle (1, 1/2) is Jane's utility maximizing choice, given her budget.
   c. Given her budget, Jane would maximize her utility by spending all of her income on good X.
   d. Given her budget, Jane would maximize her utility by spending all of her income on good Y.
   e. None of the above.

Difficulty: 2
Correct Answer: a

21. As you may know, Mungoites each have two left feet and one right foot. Their preferences for left and right shoes display perfect complementarity. Mungoites find shoes useful only in trios of two lefts and a right. The price of each type of shoe is \$10 a shoe, and Mungoites consume nothing other than shoes. A Mungoite's Engel curve for right shoes has the equation
   a. $R = m/30$.
   b. $R = m - 10$.
   c. $R = 2m$.
   d. $R = 10m$.
   e. $R = m/10$.

Difficulty: 2
Correct Answer: c

22. Howard has the utility function $U(x, y) = x - (1/y)$. His income is \$30.
   a. Howard does not like good y.

b. Howard has a bliss point.
c. If the price of good x is \$4 and the price of good y is \$1, Howard will buy 2 units of y.
d. Howard will buy good y only if it is cheaper than good x.
e. None of the above.

Difficulty: 3
Correct Answer: a

23. Minnie Applesauce is shopping for a summer lake cottage. Minnie hates mosquito bites, but the cheapest lake cottages have the most mosquitos. The price of a lake cabin is related to b, the number of mosquito bites you can expect per hour, according to the formula $p = \$20{,}000 - 100b$. Minnie's utility function is $u = x - 5b^2$, where x is her expenditure on all goods other than her lake cabin. If Minnie makes her best choice of lake cabin, how many mosquito bites per hour will she get?
    a. 10
    b. 5
    c. 20
    d. 25
    e. None of the above.

Difficulty: 2
Correct Answer: b

24. The prices of goods x and y are each \$1. Jane has \$20 to spend and is considering choosing 10 units of x and 10 units of y. Jane has nice convex preferences and more of each good is better for her. Where x is drawn on the horizontal axis and y is drawn on the vertical axis, the slope of her indifference curve at the bundle (10, 10) is -2.
    a. The bundle (10, 10) is the best she can afford.
    b. She would be better off consuming more of good x and less of good y.
    c. She would be better off consuming more of good y and less of good x.
    d. She must dislike one of the goods.
    e. More than one of the above is true.

Difficulty: 1
Correct Answer: c

25. Which of the following could possibly change a rational consumer's demand?
    a. Changing his utility function by cubing it
    b. Changing his utility function by multiplying it by 3 and subtracting 100 from it
    c. Increasing all prices and his income by \$3
    d. Multiplying all prices and income by 2.2
    e. More than one of the above

Difficulty: 1
Correct Answer: c

26. Coke and Pepsi are perfect substitutes for Mr. Drinker and the slope of his indifference curves is -1. One day he bought 2 cans of Coke and 20 cans of Pepsi. (The cans of both drinks are the same size.)
    a. Coke is less expensive than Pepsi.
    b. Coke is more expensive than Pepsi.
    c. Coke and Pepsi cost the same.
    d. Mr. Drinker prefers Pepsi to Coke.
    e. None of the above.

Difficulty: 1
Correct Answer: c

27. Ed and Al both consume only bread and cheese. Both of them always choose to have some bread and some cheese, and both have strictly convex preferences. However, Ed likes to have a great deal of bread with a little cheese, and Al likes lots of cheese with a little bread. Both face the same prices for both goods and have chosen bundles to maximize their utilities subject to their budgets.
    a. Al's marginal rate of substitution is larger in absolute value than Ed's.
    b. Ed's marginal rate of substitution is larger in absolute value than Al's.
    c. Their marginal rates of substitution are the same.
    d. Who has the larger marginal rate of substitution depends on income levels.
    e. There is not enough information for us to be able to tell who has the larger marginal rate of substitution.

Difficulty: 2
Correct Answer: c

28. If his wage rate increases, then a utility maximizing consumer will necessarily
    a. increase (or leave constant) his labor supply.
    b. increase (or leave constant) his labor supply if leisure is a normal good but otherwise might reduce his labor supply.
    c. increase (or leave constant) his labor supply if leisure is an inferior good but otherwise might reduce his labor supply.
    d. decrease (or leave constant) his labor supply.
    e. none of the above.

Difficulty: 2
Correct Answer: e

29. Angela consumes only two goods, x and y. Her income doubles and the prices of the two goods remain unchanged. Assuming that she is a utility maximizer and likes both goods,
    a. she will consume more of both goods.
    b. the ratio of her consumption of x to y remains constant.

c. her utility doubles.
d. if her preferences are convex, she must consume more x.
e. None of the above.

Difficulty: 2
Correct Answer: b

30. Arthur's preferences are defined over two basic food groups, beer, x_1, and ice cream, x_2. His utility function is $u(x_1, x_2) = x^2_1 + x_2$. He has \$100 to spend, and each of these goods costs \$10 per quart.
a. Arthur will consume 5 quarts of ice cream and 5 quarts of beer.
b. Arthur will find that 10 quarts of beer and no ice cream is the best bundle.
c. Arthur will find that 10 quarts of ice cream and no beer is the best bundle.
d. Arthur is indifferent between any two points on the line that connects (5, 5) and (10, 10).
e. Arthur will spend 2/3 of his income on beer and 1/3 of his income on ice cream.

Difficulty: 3
Correct Answer: c

31. Andrew's utility function is $U(x_1, x_2) = 4x^2_1 + x_2$. Andrew's income is \$32, the price of good 1 is \$16 per unit, and the price of good 2 is \$1 per unit. What happens if Andrew's income increases to \$80 and prices do not change? (Hint: Does he have convex preferences?)
a. He will consume 48 more units of good 2 and the same number of units of good 1 as before.
b. He will increase his consumption of both goods.
c. He will reduce his consumption of good 2.
d. He will consume the same number of units of good 2 and 3 more units of good 1 as before.
e. None of the above.

Difficulty: 2
Correct Answer: a

32. Lorenzo lives on x and y alone. His utility function is $U(x, y) = \min\{3x + 4y, 7y\}$. The prices of both goods are positive. He will
a. never buy more x than y.
b. buy equal amounts of the two goods.
c. always buy more y than x.
d. always buy more x than y.
e. More than one of the above is true.

Difficulty: 2
Correct Answer: a

33. Mort's utility function is $U(x_1, x_2) = x_1x_2$. His income is \$100. The price of good 2 is \$10. Good 1 is priced as follows. The first 6 units cost \$10 per unit and any additional units cost \$5 per unit. What consumption bundle does Mort choose?
a. (5, 5)
b. (7, 3.5)
c. (9, 3)
d. (6, 4)
e. None of the above.

Difficulty: 1
Correct Answer: d

34. Clara's utility function is $U(x, y) = (x + 2)(y + 1)$. If her marginal rate of substitution is -4 and she is consuming 14 units of good x, how many units of good y must she be consuming?
a. 30
b. 68
c. 18
d. 63
e. 9

Difficulty: 1
Correct Answer: d

35. Clara's utility function is $U(x, Y) = (x + 2)(Y + 1)$. If her marginal rate of substitution is -3 and she is consuming 12 units of good x, how many units of good Y must she be consuming?
a. 15
b. 46
c. 24
d. 41
e. 7

Difficulty: 2
Correct Answer: d

36. Elmer's utility function is $U(x, y) = \min\{x, y^2\}$. If the price of x is \$25 and the price of y is \$15 and if Elmer chooses to consume 7 units of y, what must his income be?
a. \$2,660
b. \$280
c. \$1,430
d. \$1,330
e. There is not enough information to determine his income.

Difficulty: 2
Correct Answer: a

37. Elmer's utility function is $U(x, y) = \min\{x, y^2\}$. If the price of x is \$10 and the price of y is \$15 and if Elmer chooses to consume 4 units of y, what must his income be?
a. \$220
b. \$100
c. \$320
d. \$440
e. There is not enough information to determine his income.

Difficulty: 3
Correct Answer: c

38. Justin consumes goods x and y and has a utility function $U(x, y) = x^2 + y$. The price per unit of x is p_x and the price per unit of y is p_y. He has enough money so that he can afford at least 1 unit of either good. When he chooses his best affordable bundle,
    a. his budget line must be tangent to the indifference curve passing through this bundle.
    b. he must consume only x.
    c. he must consume only y if p^2_x/p_y exceeds his income.
    d. he must consume some of each good if $p_x = p_y$.
    e. he must consume some of each good if $p_y = p_x/2$.

Difficulty:
Correct Answer: a

39. Charlie has a utility function $U(x_A, x_B) = x_A x_B$, the price of apples is \$1, and the price of bananas is \$2. If Charlie's income were \$120, how many units of bananas would he consume if he chose the bundle that maximized his utility subject to his budget constraint?
    a. 30
    b. 15
    c. 60
    d. 6
    e. 90

Difficulty:
Correct Answer: b

40. Charlie has a utility function $U(x_A, x_B) = x_A x_B$, the price of apples is \$1, and the price of bananas is \$2. If Charlie's income were \$200, how many units of bananas would he consume if he chose the bundle that maximized his utility subject to his budget constraint?
    a. 25
    b. 50
    c. 10
    d. 100
    e. 150

Difficulty:
Correct Answer: e

41. Charlie's utility function is $U(x_A, x_B) = x_A x_B$. If Charlie's income is \$40, the price of apples is \$4, and the price of bananas is \$2, how many apples are there in the best bundle that Charlie can afford?
    a. 10
    b. 12
    c. 8
    d. 9
    e. 5

Difficulty:
Correct Answer: e

42. Charlie's utility function is $U(x_A, x_B) = x_A x_B$. If Charlie's income is \$40, the price of apples is \$4, and the price of bananas is \$2, how many apples are there in the best bundle that Charlie can afford?
    a. 10
    b. 8
    c. 12
    d. 9
    e. 5

Difficulty:
Correct Answer: b

43. Ambrose's utility function is $U(x_1, x_2) = 4x_1^{1/2} + x_2$. If the price of nuts (good 1) is \$1, the price of berries (good 2) is \$6, and his income is \$264, how many units of *nuts* will Ambrose choose?
    a. 20
    b. 144
    c. 288
    d. 147
    e. 72

Difficulty:
Correct Answer: a

44. Ambrose's utility function is $U(x_1, x_2) = 4x_1^{1/2} + x_2$. If the price of nuts (good 1) is \$1, the price of berries (good 2) is \$5, and his income is \$145, how many units of *nuts* will Ambrose choose?
    a. 100
    b. 200
    c. 9
    d. 103
    e. 50

Difficulty: 2
Correct Answer: d

45. Our old friend, Edmund Stench, of Chapter 2 loves punk rock video tapes. He has no income and therefore has to accept garbage in his backyard in return for money. Each video tape cost \$2 and each sack of garbage that he accepts brings him \$1. His utility function is given by $U(c, g) = \min\{2c, 20 - g\}$, where c is the number of video tapes and g is the number of sacks of garbage that he gets per month. Each month he will choose to accept
    a. 20 sacks of garbage.
    b. no garbage.
    c. 5 sacks of garbage.
    d. 10 sacks of garbage.
    e. 15 sacks of garbage.

Difficulty: 3
Correct Answer: d

46. Joseph's utility function is given by $U_J = x_A + 2x_B$, where x_A denotes his consumption of apples and x_B his consumption of bananas. Clara's utility function is given by $U_C = 3x_A + 2x_B$. Joseph and Clara shop at the same grocery store.
    a. When we observe that Joseph leaves the store with some bananas, then we can deduce that Clara also buys some bananas.
    b. There exist prices of apples and bananas such that both consumers buy strictly positive amounts of both goods.
    c. When we observe that Joseph leaves the store with some apples and some bananas, then we can deduce that Clara also buys some apples and some bananas.
    d. When we observe that Joseph leaves the store with some apples, then we can deduce that Clara also buys some apples.
    e. Apples and bananas are perfect complements for Joseph.

Difficulty:
Correct Answer: b

47. If a consumer maximizes her preferences subject to her budget by choosing a consumption bundle where the ratio of her marginal utilities of shelter and food, MU_S/MU_F, is greater than the ratio of the prices of shelter and food, p_S/p_F, then she must
    a. be consuming food but no shelter.
    b. be consuming shelter but no food.
    c. be consuming both food and shelter.
    d. not be spending all of her income.
    e. believe that shelter is a "bad."

PROBLEMS

Difficulty: 2

1. Max has the utility function $U(x, y) = x(y + 1)$. The price of x is \$2 and the price of y is \$1. Income is \$10. How much x does Max demand? How much y? If his income doubles and prices stay unchanged, will Max's demand for both goods double?

Answer: To set his MRS equal to the price ratio, Max sets $(y + 1)/x = 2$. His budget constraint is $2x + y = 10$. Solve these two equations to find that $x = 11/4$ and $y = 9/2$. If his income doubles and prices stay unchanged, his demand for both goods does not double. A quick way to see this is to note that if quantities of both goods doubled, the MRS would not stay the same and hence would not equal the price ratio, which has stayed constant.

Difficulty: 3

2. Casper consumes cocoa and cheese. Cocoa is sold in an unusual way. There is only one supplier, and the more cocoa you buy from him, the higher the price you have to pay per unit. In fact y units of cocoa will cost Casper y^2 dollars. Cheese is sold in the usual way at a price of 2 dollars per unit. Casper's income is 20 dollars and his utility function is $U(x, y) = x + 2y$, where x is his consumption of cheese and y is his consumption of cocoa.
    a. Sketch Casper's budget set and shade it in.
    b. Sketch some of his indifference curves and label the point that he chooses.
    c. Calculate the amount of cheese and the amount of cocoa that Casper demands at these prices and this income.

Answer: This problem is different from those in the text and is designed to see whether the student can use the tools presented there in a creative way.
    a. The budget set is a convex set.
    b. The solution is a point of tangency.
    c. Casper demands 2 units of cocoa and 16 units of cheese.

Difficulty: 1

3. Is the following statement true or false? Briefly explain your answer. "A utility maximizer will always choose a bundle at which his indifference curve is tangent to his budget line."

Answer: False. At a ~~corner solution~~ the indifference curve need not be tangent to the budget line.

Difficulty: 2

4. Max has a utility function $U(x, y) = 2xy + 1$. The prices of x and y are both \$1 and Max has an income of \$20.
    a. How much of each good will he demand?
    b. A tax is placed on x so that x now costs Max \$2 while his income and the price of y stay the same. How much of good x does he now demand?
    c. Would Max be as well off as he was before the tax if when the tax was imposed, his income rose by an amount equal to \$1 times the answer to part (b)?

Answer:
    a. $10x$ and $10y$.
    b. $5x$.
    c. No.

Difficulty: 2

5. Harold consumes chardonnay and quiche. His utility function is $U(c, q) = \min\{c, q^2\}$. Draw a diagram showing three or four of Harold's indifference curves. If the price of chardonnay is \$10 and the price of quiche is \$3 and if Harold is consuming 4 units of quiche, how many units of chardonnay is he consuming?

Answer: The diagram has fixed-coefficients indifference curves, but their corners line up along the locus $c = q^2$ rather than along a straight line. Therefore he is consuming 16 units of chardonnay.

Difficulty: 2

6. Les has the utility function $U(x, y) = (x + 1)(y + 4)$. The price of y is \$1. Les spends all of his income to buy 6 units of y and no x. What must the price of x be? Explain your answer and draw a diagram to illustrate it.

Answer: The price of x must be at least \$10. His marginal rate of substitution at the bundle (6, 0) is 10. If the price of x is \$10 or greater, he will choose that corner.

CHAPTER 6 Demand

TRUE-FALSE

Difficulty: 1
Correct Answer: True

1. If preferences are quasilinear, then for very high incomes the income offer curve is a straight line parallel to one of the axes.

Difficulty: 1
Correct Answer: False

2. In economic theory, the demand for a good must depend only on income and its own price and not on the prices of other goods.

Difficulty: 1
Correct Answer: True

3. If two goods are substitutes, then an increase in the price of one of them will increase the demand for the other.

Difficulty: 2
Correct Answer: True

4. If consumers spend all of their income, it is impossible for all goods to be inferior goods.

Difficulty: 1
Correct Answer: False

5. An Engel curve is a demand curve with the vertical and horizontal axes reversed.

Difficulty: 2
Correct Answer: False

6. If the demand curve is a downward-sloping straight line, then the price elasticity of demand is constant all along the demand curve.

Difficulty: 2
Correct Answer: True

7. If the price elasticity of demand for a good is -1, then doubling the price of that good will leave total expenditures on that good unchanged.

Difficulty: 2
Correct Answer: False

8. If preferences are homothetic, then the slope of the Engel curve for any good will decrease as income increases.

Difficulty: 1
Correct Answer: True

9. A good is a luxury good if the income elasticity of demand for it is greater than 1.

Difficulty: 2
Correct Answer: True

10. Prudence was maximizing her utility subject to her budget constraint. Then prices changed. After the price change she was better off. Therefore the new bundle costs more at the old prices than the old bundle did.

Difficulty: 1
Correct Answer: False

11. If income is doubled and all prices are doubled, then the demand for luxury goods will more than double.

Difficulty: 1
Correct Answer: True

12. If preferences are homothetic and all prices double while income remains constant, then demand for all goods is halved.

Difficulty: 1
Correct Answer: False

13. An inferior good is less durable than a normal good.

Difficulty: 2
Correct Answer: True

14. It is impossible for a person to have a demand curve that slopes upward at all prices.

Difficulty: 2
Correct Answer: False

15. Donald's utility function is $U(x, y) = x + y^{1/2}$. Currently he is buying some of both goods. If his income rises and prices don't change, he will buy more of both goods.

Difficulty: 2
Correct Answer: True

16. Angela's utility function is $x + y^{1/2}$. It is possible that if her income is very high, an increase in income will not make her spend more on y.

Difficulty: 2
Correct Answer: False

17. When other variables are held fixed, the demand for a Giffen good rises when income increases.

Difficulty: 1
Correct Answer: False

18. A rational consumer spends her entire income. If her income doubles and prices do not change, then she will necessarily choose to consume twice as much of every good as she did before.

Difficulty: 2
Correct Answer: False

19. A consumer has a utility function given by $U = \min\{x_1, 2x_2\}$. If good 2 has a price of zero, the consumer will always prefer more of good 2 to less.

Difficulty: 2
Correct Answer: False

20. A consumer has the utility function $U(x, y) = \min\{x, 2y\}$. If the price of good x is zero and the price of good y is p, then the consumer's demand function for good y is $m/2p$.

Difficulty:
Correct Answer: False

21. Fred has a Cobb-Douglas utility function with exponents that sum to 1. Sally consumes the same two goods, but the two goods are perfect substitutes for her. Despite these differences, Fred and Sally have the same price offer curves.

Difficulty:
Correct Answer: False

22. Darlene's utility function is $U(x, y, z) = x^3y^7z$. If her income doubles and prices remain unchanged, her demand for good y will more than double.

Difficulty:
Correct Answer: False

23. Darlene's utility function is $U(x, y, z) = x^4y^8z$. If her income doubles and prices remain unchanged, her demand for good y will more than double.

Difficulty:
Correct Answer: False

24. Quasilinear preferences are homothetic when the optimal amount of one of the goods is not affordable.

MULTIPLE CHOICE

Difficulty: 3
Correct Answer: a

1. Daisy received a tape recorder as a birthday gift and is not able to return it. Her utility function is $U(x, y, z) = x + z^{1/2} f(y)$, where z is the number of tapes she buys, y is the number of tape recorders she has, and x is the amount of money she has left to spend. $f(y) = 0$ if $y < 1$ and $f(y) = 24$ if y is 1 or greater. The price of tapes is \$4 and she can easily afford to buy dozens of tapes. How many tapes will she buy?
   a. 9
   b. 11
   c. 7
   d. 13
   e. We need to know the price of tape recorders to solve this problem.

Difficulty: 3
Correct Answer: c

2. Daisy received a tape recorder as a birthday gift and is not able to return it. Her utility function is $U(x, y, z) = x + z^{1/2} f(y)$, where z is the number of tapes she buys, y is the number of tape recorders she has, and x is the amount of money she has left to spend. $f(y) = 0$ if $y < 1$ and $f(y) = 8$ if y is 1 or greater. The price of tapes is \$1 and she can easily afford to buy dozens of tapes. How many tapes will she buy?
   a. 18
   b. 14
   c. 16
   d. 20
   e. We need to know the price of tape recorders to solve this problem.

Difficulty: 2
Correct Answer: b

3. Mickey is considering buying a tape recorder. His utility function is $U(x, y, z) = x + f(y)z^{.5}$, where x is the amount of money he spends on other goods, y is the number of tape recorders he buys, and z is the number of tapes he buys. Let $f(y) = 0$ if $y < 1$ and $f(y) = 8$ if y is greater than or equal to 1. The price of tape recorders is \$20, the price of tapes is \$1, and Mickey can easily afford to buy a tape recorder and several tapes. Will he buy a tape recorder?

a. He should buy a tape recorder at these prices, but if tapes were any more expensive, it would not pay to buy one.
b. He should not buy a tape recorder.
c. He is indifferent to buying a tape recorder or not.
d. Even if the price of tapes doubled, he should still buy a tape recorder.
e. There is not enough information here for us to be able to tell.

Difficulty: 1
Correct Answer: d

4. Walt consumes strawberries and cream but only in the fixed ratio of three boxes of strawberries to two cartons of cream. At any other ratio, the excess goods are totally useless to him. The cost of a box of strawberries is \$10 and the cost of a carton of cream is \$10. Walt's income is \$200.
   a. Walt demands 10 cartons of cream.
   b. Walt demands 10 boxes of strawberries.
   c. Walt considers strawberries and cartons of cream to be perfect substitutes.
   d. Walt demands 12 boxes of strawberries.
   e. None of the above.

Difficulty: 3
Correct Answer: d

5. Mike consumes two commodities, x and y, and his utility function is $\min\{x + 2y, y + 2x\}$. He chooses to buy 8 units of good x and 16 units of good y. The price of good y is \$.50. What is his income?
   a. \$32
   b. \$40
   c. \$24
   d. \$16
   e. Mike's income cannot be found unless the price of x is given too.

Difficulty: 2
Correct Answer: d

6. Georgina consumes only grapefruits and pineapples. Her utility function is $U(x, y) = x^2y^8$, where x is the number of grapefruits consumed and y is the number of pineapples consumed. Georgina's income is \$105, and the prices of grapefruits and pineapples are \$1 and \$3, respectively. How many grapefruits will she consume?
   a. 10.5
   b. 7
   c. 63
   d. 21
   e. None of the above.

Difficulty: 2
Correct Answer: b

7. Natalie consumes only apples and tomatoes. Her utility function is $U(x, y) = x^2y^8$, where x is the number of apples consumed and y is the number of tomatoes consumed. Natalie's income is \$320, and the prices of apples and tomatoes are \$4 and \$3, respectively. How many apples will she consume?
   a. 21.33
   b. 16
   c. 8
   d. 48
   e. None of the above.

Difficulty: 2
Correct Answer: b

8. For $m > p_2$, the demand functions for goods 1 and 2 are given by the equations, $x_1 = m/p_2 - 1$ and $x_2 = p_1/p_2$, where m is income and p_1 and p_2 are prices. Let the horizontal axis represent the quantity of good 1. Let $p_1 = 1$ and $p_2 = 2$. Then for $m > 2$, the income offer curve is
   a. a vertical line.
   b. a horizontal line.
   c. a straight line with slope 2.
   d. a straight line with a slope of 1/2.
   e. None of the above.

Difficulty: 1
Correct Answer: e

9. Harry has \$10 to spend on cans of Coke and Pepsi, which he regards as perfect substitutes, one for one. Pepsi costs \$.50 a can and Coke costs \$.60 a can. Harry has 20 coupons, each of which can be used to buy 1 can of Coke for \$.40. Which of the following bundles will Harry buy?
   a. 20 cans of Pepsi and no Coke
   b. 16 2/3 cans of Coke and no Pepsi
   c. 10 cans of Coke and 8 cans of Pepsi
   d. 10 cans of Coke and 12 cans of Pepsi
   e. None of the above.

Difficulty: 2
Correct Answer: d

10. Madonna buys only two goods. Her utility function is Cobb-Douglas. Her demand functions have which of the following properties?
    a. Her demand for one of the two goods does not depend on income.
    b. Her demand for neither good depends on income.
    c. Her demand for each of the goods depends on income and on the prices of both goods.
    d. Her demand for each of the two goods depends only on her income and on the price of that good itself.
    e. One of the goods is an inferior good and the other is a normal good.

Difficulty: 1
Correct Answer: d

11. Seppo consumes brandy and saunas. Neither is an inferior good. Seppo has a total of \$30 a day and 6 hours a day to spend on brandy and saunas. Each brandy costs \$2 and takes half an hour to consume. Each sauna costs \$1 and takes 1 hour to consume. (It is, unfortunately, impossible to consume a brandy in the sauna.) Seppo suddenly inherits a lot of money and now has \$50 a day to spend on brandy and saunas. Since Seppo is a rational consumer, he will
    a. increase brandy consumption only.
    b. increase sauna consumption only.
    c. increase consumption of both.
    d. consume the same amounts of both goods as before.
    e. We can't tell since we are told nothing about his indifference curves.

Difficulty: 1
Correct Answer: e

12. Where x is the quantity of good X demanded, the inverse demand function for X
    a. expresses $1/x$ as a function of prices and income.
    b. expresses the demand for x as a function of $1/p_x$ and income, where p_x is the price of x.
    c. expresses the demand for x as a function of $1/p_x$ and $1/m$, where m is income.
    d. specifies $1/x$ as a function of $1/p_x$ and $1/m$, where m is income.
    e. None of the above.

Difficulty: 2
Correct Answer: d

13. If there are two goods and if income doubles and the price of good 1 doubles while the price of good 2 stays constant, a consumer's demand for good
    a. 1 will increase only if it is a Giffen good for her.
    b. 2 will decrease only if it is a Giffen good for her.
    c. 2 will increase only if it is an inferior good for her.
    d. 2 will decrease only if it is an inferior good for her.
    e. None of the above.

Difficulty: 2
Correct Answer: c

14. Clarissa's utility function is $U(r, z) = z + 160r - r^2$, where r is the number of rose plants she has in her garden and z is the number of zinnias. She has 250 square feet to allocate to roses and zinnias. Roses each take up 4 square feet and zinnias each take up 1 square foot. She gets the plants for free from a generous friend. If she acquires another 100 square feet of land for her garden and her utility function remains unchanged, she will plant
    a. 100 more zinnias and no more roses.
    b. 25 more roses and no more zinnias.
    c. max(1, min(99, *zdem* + 100)) more zinnias and some more roses.
    d. 20 more roses and 20 more zinnias.
    e. None of the above.

Difficulty: 2
Correct Answer: d

15. Clarissa's utility function is $U(r, z) = z + 120r - r^2$, where r is the number of rose plants she has in her garden and z is the number of zinnias. She has 250 square feet to allocate to roses and zinnias. Roses each take up 4 square feet and zinnias each take up 1 square foot. She gets the plants for free from a generous friend. If she acquires another 100 square feet of land for her garden and her utility function remains unchanged, she will plant
    a. 99 more zinnias and some more roses.
    b. 20 more roses and 20 more zinnias.
    c. 25 more roses and no more zinnias.
    d. 100 more zinnias and no more roses.
    e. None of the above.

Difficulty: 2
Correct Answer: d

16. Regardless of his income and regardless of prices, Smedley always spends 25% of his income on housing, 10% on clothing, 30% on food, 15% on transportation, and 20% on recreation. This behavior is consistent with which of the following?
    a. All goods are perfect substitutes.
    b. Smedley's demands for commodities do not change when their prices change.
    c. Smedley consumes all goods in fixed proportions.
    d. Smedley has a Cobb-Douglas utility function.
    e. More than one of the above.

Difficulty: 2
Correct Answer: a

17. Ms. Laura Mussel's preferences between golf and tennis are represented by $U(g, t) = gt$, where g is the number of rounds of golf and t is the number of tennis matches she plays per week. She has \$24 per week to spend on these sports. A round of golf and a tennis match each cost \$4. She used to maximize her utility subject to this budget. She decided to limit the time she spends on these sports to 16 hours a week. A round of golf takes 4 hours. A tennis match takes 2 hours. As a result of this additional constraint on her choice,
    a. she plays 1 less round of golf and 1 more tennis match each week.
    b. she plays more golf and less tennis, but can't say how much.
    c. her choices and her utility are unchanged.
    d. she plays 2 less rounds of golf and 3 more rounds of tennis per week.
    e. There is too little information to tell about her choices.

Difficulty: 1
Correct Answer: a

18. Mary has homothetic preferences. When her income was \$1,000, she bought 40 books and 60 newspapers. When her income increased to \$1,500 and prices did not change, she bought
   a. 60 books and 90 newspapers.
   b. 80 books and 120 newspapers.
   c. 60 books and 60 newspapers.
   d. 40 books and 120 newspapers.
   e. There is not enough information for us to determine what she would buy.

Difficulty: 2
Correct Answer: c

19. Katie Kwasi's utility function is $U(x_1, x_2) = 2(\ln x_1) + x_2$. Given her current income and the current relative prices, she consumes 10 units of x_1 and 15 units of x_2. If her income doubles, while prices stay constant, how many units of x_1 will she consume after the change in income?
   a. 20
   b. 18
   c. 10
   d. 5
   e. There is not enough information to determine how many.

Difficulty: 2
Correct Answer: a

20. Katie Kwasi's utility function is $U(x_1, x_2) = 5(\ln x_1) + x_2$. Given her current income and the current relative prices, she consumes 10 units of x_1 and 15 units of x_2. If her income doubles, while prices stay constant, how many units of x_1 will she consume after the change in income?
   a. 10
   b. 15
   c. 5
   d. 20
   e. There is not enough information to determine how many.

Difficulty: 2
Correct Answer: e

21. Will Feckless unexpectedly inherits \$10,000 from a rich uncle. He is observed to consume fewer hamburgers than he used to.
   a. Hamburgers are a Giffen good for Will.
   b. Hamburgers are a normal good for Will.
   c. Will's Engel curve for hamburgers is vertical.
   d. Will's Engel curve for hamburgers is horizontal.
   e. Will's preferences are not homothetic.

Difficulty: 3
Correct Answer: b

22. Fred consumes pork chops and lamb chops and nothing else. When the price of pork chops rises with no change in his income or in the price of lamb chops, Fred buys fewer lamb chops and fewer pork chops.
   a. Pork chops are a normal good for Fred.
   b. Lamb chops are a normal good for Fred.
   c. Pork chops are an inferior good for Fred.
   d. Lamb chops are an inferior good for Fred.
   e. Fred prefers pork chops to lamb chops.

Difficulty:
Correct Answer: c

23. Cecil consumes x_1 and x_2 in fixed proportions. He consumes A units of good 1 with B units of good 2. To solve for his demand functions for goods 1 and 2,
   a. set $MU_1/MU_2 = p_1/p_2$ and solve for x_1.
   b. solve the following two equations in two unknowns: $Ax_1 = Bx_2$ and $p_1x_1 + p_2x_2 = m$.
   c. solve the following two equations in two unknowns: $Bx_1 = Ax_2$ and $p_1x_1 + p_2x_2 = m$.
   d. you only need to use the equation given by his budget line.
   e. use the fact that he spends all of his income on good 1 so long as it is the cheaper good.

Difficulty:
Correct Answer: b

24. Wilma Q. has a utility function $U(x_1, x_2) = x^2{}_1 + 1.5x_1x_2 + 30x_2$. The prices are $p_1 = \$1$ and $p_2 = \$1$. For incomes between \$20 and \$60, the Engel curve for good 2 is
   a. upward sloping.
   b. downward sloping.
   c. vertical.
   d. upward sloping for incomes between \$20 and \$40 and downward sloping between \$40 and \$60.
   e. downward sloping for incomes between \$20 and \$40 and upward sloping between \$40 and \$60.

Difficulty: 2
Correct Answer: c

25. Which of the following utility functions represent preferences of a consumer who does *not* have homothetic preferences?
   a. $U(x, y) = xy$.
   b. $U(x, y) = x + 2y$.
   c. $U(x, y) = x + y^{.5}$.
   d. $U(x, y) = \min\{x, y\}$.
   e. More than one of the above.

Difficulty: 2
Correct Answer: a

26. Robert's utility function is $U(x, y) = \min\{4x, 2x + y\}$. The price of x is \$3 and the price of y is \$1. Robert's income offer curve is
   a. a ray from the origin with a slope of 2.
   b. a line parallel to the x axis.
   c. a line parallel to the y axis.
   d. the same as his Engel curve for x.
   e. none of the above.

Difficulty: 2
Correct Answer: b

27. Alfredo lives on apples and bananas only. His utility function is $U(a, b) = \min\{a + b, 2b\}$. He maximizes his utility subject to his budget constraint and consumes the bundle $(a, b) = (4, 4)$.
   a. $p_a > p_b$.
   b. p_a is less than or equal to p_b.
   c. $p_a = p_b$.
   d. $p_a = 2p_b$.
   e. None of the above.

Difficulty: 2
Correct Answer: e

28. Miss Muffet insists on consuming 2 units of whey per 1 unit of curds. If the price of curds is \$5 and the price of whey is \$3, then if Miss Muffet's income is m, her demand for curds will be
   a. $m/5$.
   b. $3m/5$.
   c. $5c + 3w = m$.
   d. $5m$.
   e. $m/11$.

Difficulty: 2
Correct Answer: e

29. Miss Muffet insists on consuming 2 units of whey per 1 unit of curds. If the price of curds is \$5 and the price of whey is \$6, then if Miss Muffet's income is m, her demand for curds will be
   a. $5c + 6w = m$.
   b. $6m/5$.
   c. $5m$.
   d. $m/5$.
   e. $m/17$.

Difficulty:
Correct Answer: a

30. If Charlie's utility function were $X^4{}_A X_B$ and if apples cost 30 cents each and bananas cost 10 cents each, Charlie's budget line would be tangent to one of his indifference curves whenever
   a. $4X_B = 3X_A$.
   b. $X_B = X_A$.
   c. $X_A = 4X_B$.
   d. $X_B = 4X_A$.
   e. $30X_A + 10X_B = M$.

Difficulty:
Correct Answer: a

31. If Charlie's utility function were $X^6{}_A X_B$ and if apples cost 40 cents each and bananas cost 10 cents each, Charlie's budget line would be tangent to one of his indifference curves whenever
   a. $6X_B = 4X_A$.
   b. $X_A = 6X_B$.
   c. $X_B = X_A$.
   d. $X_B = 6X_A$.
   e. $40X_A + 10X_B = M$.

Difficulty:
Correct Answer: d

32. If Charlie's utility function is $X^4{}_A X_B$, the price of apples is p_A, the price of bananas is p_B, and his income is m, then Charlie's demand for apples will be
   a. $m/(2p_A)$.
   b. $0.25\, p_A m$.
   c. $m/(p_A + p_B)$.
   d. $0.80m/p_A$.
   e. $1.25p_B m/p_A$.

Difficulty:
Correct Answer: a

33. If Charlie's utility function is $X^5{}_A X_B$, the price of apples is p_A, the price of bananas is p_B, and his income is m, then Charlie's demand for apples will be
   a. $0.83m/p_A$.
   b. $m/(2p_A)$.
   c. $m/(p_A + p_B)$.
   d. $0./20p_A m$.
   e. $1.20p_B m/p_A$.

Difficulty:
Correct Answer: d

34. Ambrose's brother Patrick has a utility function $U(x_1, x_2) = 16x^{1/2}{}_1 + x_2$. His income is \$82, the price of good 1 (nuts) is \$2, and the price of good 2 (berries) is \$1. How many units of *nuts* will Patrick demand?
   a. 26
   b. 12
   c. 14
   d. 16
   e. 30

Difficulty:
Correct Answer: a

35. Ambrose's brother Sebastian has a utility function $U(x_1, x_2) = 60x^{1/2}{}_1 + x_2$. His income is \$165, the price of good 1 (nuts) is \$6, and the price of good 2 (berries) is \$1. How many units of *nuts* will Sebastian demand?

a. 25
b. 23
c. 35
d. 21
e. 48

Difficulty:
Correct Answer: a

36. Ambrose's brother Bartholomew has a utility function $U(x_1, x_2) = 40x_1^{1/2} + x_2$, where x_1 is his consumption of nuts and x_2 is his consumption of berries. His income is \$115, the price of nuts is \$5, and the price of berries is \$1. How many units of *berries* will Bartholomew demand?
    a. 35
    b. 16
    c. 70
    d. 22
    e. There is not enough information to determine the answer.

Difficulty:
Correct Answer: a

37. Ambrose's brother Sebastian has a utility function $U(x_1, x_2) = 28x_1^{1/2} + x_2$, where x_1 is his consumption of nuts and x_2 is his consumption of berries. His income is \$128, the price of nuts is \$2, and the price of berries is \$1. How many units of *berries* will Sebastian demand?
    a. 30
    b. 60
    c. 55
    d. 49
    e. There is not enough information to determine the answer.

Difficulty:
Correct Answer: e

38. Miss Muffet insists on consuming 2 units of whey per 1 unit of curds. If the price of curds is \$3 and the price of whey is \$3, then if Miss Muffett's income is m, her demand for curds will be
    a. $m/3$.
    b. $3m/3$.
    c. $3C + 3W = m$.
    d. $3m$.
    e. $m/9$.

Difficulty:
Correct Answer: e

39. Miss Muffet insists on consuming 2 units of whey per 1 unit of curds. If the price of curds is \$3 and the price of whey is \$3, then if Miss Muffett's income is m, her demand for curds will be
    a. $3C + 3W = m$.
    b. $m/3$.
    c. $3m$.
    d. $3m/3$.
    e. $m/9$.

Difficulty:
Correct Answer: b

40. Casper's utility function is $3x + y$, where x is his consumption of cocoa and y is his consumption of cheese. If the total cost of x units of cocoa is x^2, the price of cheese is \$10, and Casper's income is \$260, how many units of cocoa will he consume?
    a. 12
    b. 15
    c. 29
    d. 14
    e. 30

Difficulty:
Correct Answer: c

41. Casper's utility function is $3x + y$, where x is his consumption of cocoa and y is his consumption of cheese. If the total cost of x units of cocoa is x^2, the price of cheese is \$8, and Casper's income is \$174, how many units of cocoa will he consume?
    a. 9
    b. 11
    c. 12
    d. 23
    e. 24

Difficulty: 2
Correct Answer: d

42. Let w be the number of whips and j the number of leather jackets. If Kinko's utility function is $U(x, y) = \min\{7w, 4w + 12j\}$, then if the price of whips is \$20 and the price of leather jackets is \$40, Kinko will demand
    a. 6 times as many whips as leather jackets.
    b. 5 times as many leather jackets as whips.
    c. 3 times as many whips as leather jackets.
    d. 4 times as many whips as leather jackets.
    e. only leather jackets.

Difficulty: 2
Correct Answer: a

43. Let w be the number of whips and j the number of leather jackets. If Kinko's utility function is $U(x, y) = \min\{7w, 4w + 12j\}$, then if the price of whips is \$20 and the price of leather jackets is \$40, Kinko will demand
    a. 4 times as many whips as leather jackets.
    b. 6 times as many whips as leather jackets.
    c. 3 times as many whips as leather jackets.
    d. 5 times as many leather jackets as whips.
    e. only leather jackets.

Difficulty: 3
Correct Answer: d

44. Between 1990 and 2000, a particular consumer's income increased by 25%, while the price of X and of "all other goods" both increased by 10%. It was observed that the consumer's consumption of X and of all other goods both increased by 15%.
   a. The consumer did not regard X and "all other goods" as perfect complements.
   b. The consumer's preferences cannot be represented by a Cobb-Douglas utility function.
   c. The consumer's preferences can be represented by a Cobb-Douglas utility function.
   d. The consumer's preferences cannot be represented by a quasilinear utility function.
   e. More than one of the above options is true.

Difficulty: 2
Correct Answer: a

45. John Parker Nosey works for the Internal Revenue Service. He is in charge of auditing income of self-employed people. In any year, people divide their total income between consumption and saving. John cannot determine people's consumptions, but he is able to determine how much people have saved over the course of a year. From years of experience, he has learned that people act as if they are maximizing a utility function of the form $U(c, s) = 10{,}000\ln(c) + s$, where c is the number of dollars worth of consumption in a year and s is the number of dollars saved.
   a. If someone saves at least \$1,000, then that person's income is at least \$11,000.
   b. If someone saves nothing, then that person must earn less than \$1,000.
   c. If someone saves exactly \$1,000, then that person's income must be greater than \$1,000 and less than \$10,000.
   d. If someone saves exactly \$10,000, then that person must earn exactly \$21,000.
   e. If someone saves more than \$1,000, then that person's income must be more than \$20,000.

Difficulty:
Correct Answer: e

46. Carlos consumes only two goods, apples and bananas. His utility function is $U(a, b) = \min\{a, b\}$. Before trade, his initial endowment is w_a apples and w_b bananas. After he trades to his optimal consumption point at these prices, the relative prices change. Carlos is allowed to make further trades if he wishes.
   a. Carlos will definitely be better off after the price change.
   b. Carlos will be better off if the price of the good he was selling goes up and worse off if the price of the good he was selling goes down.
   c. Unless the price of both goods goes down, we cannot tell if Carlos is better off or worse off.
   d. Carlos will be better off if the price of the good he was selling goes down and worse off if the price of the good he was selling goes up.
   e. Carlos's utility will not be affected by the change.

Difficulty:
Correct Answer: a

47. Carlos consumes only two goods, apples and bananas. His utility function is $U(a, b) = a^3b^2$. Before he trades, his initial endowment is w_a apples and w_b bananas. After he trades to his optimal consumption point at these prices, the relative prices change. Carlos is allowed to make further trades if he wishes.
   a. Carlos will definitely be better off after the price change.
   b. Carlos will be better off if the price of the good he was selling goes up and worse off if the price of the good he was selling goes down.
   c. Unless the prices of both goods goes down, we cannot tell if Carlos is better off or worse off.
   d. Carlos will be better off if the price of the good he was selling goes down and worse off if the price of the good he was selling goes up.
   e. Carlos's utility will not be affected by the change.

PROBLEMS

Difficulty: 3

1. Is the following statement true or false? "If consumers spend their entire incomes, it is impossible for the income elasticity of demand for every good to be bigger than 1." Write a brief but convincing explanation of your answer.

Answer: True. If income elasticities of demand for all goods exceed 1, then a 1% increase in income would result in a more than 1% increase in expenditures for every good. Therefore total expenditures would rise by more than 1%. But this is impossible if the entire budget is spent both before and after the income increase.

Difficulty: 3

2. Wanda Lott's utility function is $U(x, y) = \max\{2x, y\}$. Draw some of Wanda's indifference curves. If the price of x is 1, the price of y is p, and her income is m, how much of y does Wanda demand?

Answer: Wanda's indifference curves are rectangles that are twice as high as they are wide. If $p >$ \$.50, Wanda demands no y. If $p < \$.50$, Wanda demands m/p units of y. If $p = \$.50$, Wanda is indifferent between her two best options which are buying m units of x and no y or buying $2m$ units of y and no x.

Difficulty: 3

3. Martha has the utility function $U = \min\{4x, 2y\}$. Write down her demand function for x as a function of the variables m, p_x, and p_y, where m is income, p_x is the price of x, and p_y is the price of y.

Answer: $x = m/(p_x + 2p_y)$.

Difficulty: 1

4. Briefly explain in a sentence or two how you could tell
   a. whether a good is a normal good or an inferior good.
   b. whether a good is a luxury or a necessity.
   c. whether two goods are complements or substitutes.

Answer:
   a. If prices are left constant and income rises, demand for a normal good will rise and demand for an inferior good will fall.
   b. If income rises, expenditure on it will rise more or less than proportionately depending on whether the good is a luxury or necessity respectively.
   c. Two goods are complements or substitutes depending on whether a rise in the price of one of them increases or decreases demand for the other.

Difficulty: 1

5. Define each of the following:
   a. Inverse demand function
   b. Engel curve

Answer:
   a. The inverse demand function expresses for any quantity the price at which that quantity can be sold. It is simply the inverse function corresponding to the demand function.
   b. An Engel curve is the graph of the function that expresses quantity demanded as a function of income.

Difficulty: 3

6. Ray Starr has the utility function $U(x, y) = y/(100 - x)$.
   a. Does Ray prefer more to less of both goods?
   b. Draw a diagram showing Ray's indifference curves corresponding to the utility levels $U = 1/2$, $U = 1$, and $U = 2$.
   c. How can you describe the set of indifference curves for Ray?
   d. If the price of x is \$1 and the price of y is \$1, find Ray's demand for x as a function of his income and draw a diagram showing his Engel curve for x.

Answer:
   a. Yes.
   b. These curves are straight lines with the equations $x/2 + y = 50$, $x + y = 100$, $2x + y = 200$.
   c. The indifference curve through any bundle is the straight line passing through that point and through the point (100, 0). The set of all indifference curves is the star shaped set of rays passing through the point (100, 0) (to be more precise, the part of that set that is in the nonnegative quadrant).
   d. If Ray's income is less than 100, he buys y and no x. If his income is more than 100, he buys x and no y.

Difficulty: 2

7. With some services, e.g., checking accounts, phone service, or pay TV, a consumer is offered a choice of two or more payment plans. One can either pay a high entry fee and get a low price per unit of service or pay a low entry fee and a high price per unit of service. Suppose you have an income of \$100. There are two plans. Plan A has an entry fee of \$20 with a price of \$2 per unit. Plan B has an entry fee of \$40 with a price of \$1 per unit for using the service. Let x be expenditure on other goods and y be consumption of the service.
   a. Write down the budget equation that you would have after you paid the entry fee for each of the two plans.
   b. If your utility function is xy, how much y would you choose in each case?
   c. Which plan would you prefer? Explain.

Answer:
   a. $x + 2y = 80$, $x + y = 60$.
   b. 20, 30.
   c. Plan B. The utility of the bundle chosen with Plan A is 20(40) = 800 and the utility from the Plan B bundle is 30(30) = 900.

Difficulty: 2

8. Marie's utility function is $U(x, y) = \min\{3x + 2y, 2x + 5y\}$, where x is the number of units of sugar she consumes and y is the number of units of spice she consumes. She is currently consuming 12 units of sugar and 40 units of spice and she is spending all of her income.
   a. Draw a graph showing her indifference curve through this point.
   b. The price of spice is \$1. In order for this to be her consumption bundle, what must the price of sugar be and what must her income be?

Answer:
   a. Her indifference curve is a broken line consisting of the outer envelope of the two lines $3x + 2y = 116$

and $2x + 5y = 116$. The point (12, 40) is on the line $3x + 2y = 116$.

b. The price of sugar must be \$1.50 and her income must be \$58.

Difficulty:

9. Murphy's utility function is $U(x, y) = \min\{4x + y, 2x + 2y, x + 4y\}$. Murphy is consuming 12 units of x and 6 units of y.
   a. Draw the indifference curve through this point. At what points does this indifference curve have kinks?
   b. The price of good x is \$1. What is the highest possible price for y? What is the lowest possible price for y?

Answer:

a. The indifference curve is a broken line extending from (36, 0) to (12, 6) to (6, 12) to (0, 36).

b. The price of y must be between \$1 and \$4.

CHAPTER 7 Revealed Preference

TRUE-FALSE

Difficulty: 2
Correct Answer: True

1. The strong axiom of revealed preference requires that if a consumer chooses *x* when he can afford *y* and chooses *y* when he can afford *z*, then he will not choose *z* when he can afford *x*.

Difficulty: 1
Correct Answer: True

2. Rudolf Rational obeys the weak axiom of revealed preferences. His preferences don't change over time. One year he could afford bundle *x* but bought bundle *y*. If another year he buys bundle *x*, then he can't afford bundle *y*.

Difficulty: 2
Correct Answer: True

3. If a consumer maximizes a utility function subject to a budget constraint and has strictly convex preferences, then his behavior will necessarily satisfy the weak axiom of revealed preference and the strong axiom of revealed preference.

Difficulty: 1
Correct Answer: True

4. The Laspeyres index of prices in period 2 relative to period 1 tells us the ratio of the cost of buying the period 1 bundle at period 2 prices to the cost of buying the period 1 bundle at period 1 prices.

Difficulty: 1
Correct Answer: False

5. The Laspeyres price index differs from the Paasche price index because the Laspeyres index holds prices constant and varies quantities while the Paasche price index holds quantities constant and varies prices.

Difficulty: 2
Correct Answer: False

6. Patience was maximizing her utility subject to her budget constraint. Prices changed and Patience was less well off than before. Therefore, at the old prices her new bundle must cost less than her old bundle.

Difficulty: 1
Correct Answer: False

7. It follows from the weak axiom of revealed preference that if a consumer chooses *x* when he could afford *y* and chooses *y* when he could afford *x*, then his income must have changed between the two observations.

Difficulty: 2
Correct Answer: False

8. The strong axiom of revealed preference says that if a consumer bought *x* when he could have afforded *y* and bought *y* when he could have afforded *z*, then he will buy *x* whenever he can afford *z*.

Difficulty: 1
Correct Answer: False

9. An increase in the price of an inferior good makes the people who consume that good better off.

Difficulty: 2
Correct Answer: True

10. Prudence was maximizing her utility subject to her budget constraint. Then prices changed. After the change, she is better off. Therefore the new bundle costs more at the old prices than the old bundle did.

Difficulty: 1
Correct Answer: False

11. The Laspeyres price index differs from the Paasche price index because the Paasche index holds prices constant and varies quantities, while the Laspeyres index holds quantities constant and varies prices.

Difficulty: 2
Correct Answer: True

12. It is possible for a consumer to satisfy the weak axiom of revealed preference but violate the strong axiom of revealed preference.

Difficulty:
Correct Answer: True

13. For a consumer who has an allowance to spend and no endowment of goods, a decrease in the price of an inferior good consumed makes him better off.

Difficulty: 2
Correct Answer: True

14. There are two goods, bananas and potatoes. The price of bananas increases and the price of potatoes decreases. If after the price change a consumer (whose preferences satisfy WARP) can still exactly afford her old consumption bundle, then she will consume at least as many potatoes as before, even if potatoes are a Giffen good.

MULTIPLE CHOICE

Difficulty: 1
Correct Answer: e

1. Let A stand for the bundle (7, 9), B stand for the bundle (10, 5), and C stand for the bundle (6, 6). When prices are (2, 4), Betty chooses C. When prices are (12, 3) she chooses A.
   a. A is directly revealed preferred to B.
   b. A is indirectly revealed preferred to B.
   c. C is directly revealed preferred to A.
   d. B is directly revealed preferred to A.
   e. None of the above.

Difficulty: 2
Correct Answer: b

2. Remember that the Laspeyres price index uses the old quantities for the weights. In 1991, good x cost \$5 and good y cost \$1. The current price of good x is \$7 and the current price of good y is \$6. In 1991 the consumption bundle was $(x, y) = (2, 4)$. The current consumption bundle is $(x, y) = (5, 3)$. The Laspeyres index of current prices relative to 1991 prices is closest to which of the following numbers?
   a. 3.79
   b. 2.71
   c. 0.26
   d. 1.89
   e. 1.26

Difficulty: 2
Correct Answer: a

3. Remember that the Laspeyres price index uses the old quantities for the weights. In 1991, good x cost \$2 and good y cost \$1. The current price of good x is \$6 and the current price of good y is \$2. In 1971 the consumption bundle was $(x, y) = (3, 6)$. The current consumption bundle is $(x, y) = (6, 4)$. The Laspeyres index of current prices relative to 1991 prices is closest to which of the following numbers?
   a. 2.50
   b. 3.67
   c. 2.75
   d. 0.27
   e. 1.27

Difficulty: 2
Correct Answer: b

4. Twenty years ago, Dmitri consumed bread which cost him 10 kopeks a loaf and potatoes which cost him 20 kopeks a sack. With his income of 330 kopeks, he bought 9 loaves of bread and 12 sacks of potatoes. Today he has an income of 452 kopeks. Bread now costs him 22 kopeks a loaf and potatoes cost him 17 kopeks a sack. Assuming his preferences haven't changed (and the sizes of loaves and sacks haven't changed), when was he better off?
   a. He was better off 20 years ago.
   b. He is better off today.
   c. He was equally well off in the two periods.
   d. From the information given here, we are unable to tell.
   e. None of the above.

Difficulty: 2
Correct Answer: b

5. Twenty years ago, Dmitri consumed bread which cost him 10 kopeks a loaf and potatoes which cost him 18 kopeks a sack. With his income of 230 kopeks, he bought 5 loaves of bread and 10 sacks of potatoes. Today he has an income of 400 kopeks. Bread now costs him 20 kopeks a loaf and potatoes cost him 25 kopeks a sack. Assuming his preferences haven't changed (and the sizes of loaves and sacks haven't changed), when was he better off?
   a. He was equally well off in the two periods.
   b. He is better off today.
   c. He was better off 20 years ago.
   d. From the information given here, we are unable to tell.
   e. None of the above.

Difficulty: 1
Correct Answer: a

6. At prices ($4, $12), Harry chooses the bundle (9, 4). At the prices ($8, $4), Harry chooses the bundle (2, 9). Is this behavior consistent with the weak axiom of revealed preference?
   a. Yes.
   b. No.
   c. It depends on his income.
   d. We would have to observe a third choice to be able to say.
   e. None of the above.

Difficulty: 2
Correct Answer: a

7.When prices are ($6, $3), Holly chooses the bundle (9, 18), and when prices are ($1, $2), she chooses the bundle (8, 14).
   a. The bundle (9, 18) is revealed preferred to the bundle (8, 14) and she does not violate WARP.
   b. She violates SARP but not WARP.
   c. The bundle (8, 14) is revealed preferred to the bundle (9, 18) and she does not violate WARP.
   d. She violates WARP.
   e. None of the above.

Difficulty: 2
Correct Answer: c

8. When prices are ($4, $2), Tomoko chooses the bundle (9, 18), and when prices are ($1, $2), she chooses the bundle (8, 14).
   a. The bundle (8, 14) is revealed preferred to the bundle (9, 18) and she does not violate WARP.
   b. She violates SARP but not WARP.
   c. The bundle (9, 18) is revealed preferred to the bundle (8, 14) and she does not violate WARP.
   d. She violates WARP.
   e. None of the above.

Difficulty: 2
Correct Answer: a

9. Maria consumes strawberries which cost her 10 pesos a box and bananas which cost her 9 pesos a bunch. With her income of 192 pesos she buys 12 boxes of strawberries and 8 bananas. Daphne, with an income of 170 shillings, consumes strawberries at a cost of 6 shillings each and bananas at a cost of 12 shillings each. Assuming their preferences are identical,
   a. Maria would prefer Daphne's consumption bundle to her own.
   b. Daphne would prefer Maria's consumption bundle to her own.
   c. they would both be indifferent between their own bundles and the other's.
   d. each prefers her own bundle to the other's.
   e. we can't make any of the above statements without more information.

Difficulty: 2
Correct Answer: b

10. In 1991, good x cost $5 and good y cost $1. They now cost $9 and $5 respectively. In 1991 the consumption bundle of x and y was 4 x's and 5 y's. It is now 9 x's and 7 y's. Calculate the Laspeyres index of current prices relative to 1991 prices rounded to one decimal place. (Remember the Laspeyres index uses the old quantities for weights.)
    a. 0.5
    b. 2.4
    c. 2.5
    d. 2.2
    e. None of the above.

Difficulty: 2
Correct Answer: b

11. Carlos has at one time or another lived in Argentina, Bolivia, and Colombia. He buys only two goods, x and y. In Argentina the prices were ($9, $3) and he consumed the bundle (6, 7). In Bolivia he consumed (9, 2). In Colombia he consumed the bundle (6, 5) at the prices ($3, $3).
    a. The Argentine bundle is directly revealed preferred to the Bolivian bundle.
    b. The Argentine bundle is indirectly revealed preferred to the Bolivian bundle.
    c. The Colombian bundle is directly revealed preferred to the Argentine bundle.
    d. The Bolivian bundle is indirectly revealed preferred to the Argentine bundle.
    e. None of the above.

Difficulty: 2
Correct Answer: a

12. Prudence is careful to plan ahead. She is going to Paris next year to study. To protect herself from exchange rate fluctuations, she bought a futures contract for the number of francs she plans to spend next year, given current prices. When she arrives in Paris, she can cash in her contract for this many francs no matter what the exchange rate is. If the value of the franc relative to the dollar should happen to fall before she gets to Paris, she
    a. will be at least as well off and probably better off than if the exchange rate hadn't changed.
    b. will be worse off than if the exchange rate hadn't changed.
    c. will be exactly as well off as if the exchange rate hadn't changed.
    d. might be better off or she might be worse off, depending on whether she plans to spend more or less than she does at home.

Difficulty: 2
Correct Answer: b

13. Jose consumes rare books which cost him 8 pesos each and pieces of antique furniture which cost him 10 pesos each. He spends his entire income to buy 9 rare books and 11 pieces of antique furniture. Nigel has the same preferences as Jose, but faces different prices and has a different income. Nigel has an income of 162 pounds. He buys rare books at a cost of 4 pounds each and pieces of antique furniture at a cost of 11 pounds each.
   a. Nigel would prefer Jose's bundle to his own.
   b. Jose would prefer Nigel's bundle to his own.
   c. Neither would prefer the other's bundle to his own.
   d. Each prefers the other's bundle to his own.
   e. We can't tell whether either would prefer the other's bundle without knowing what quantities Nigel consumes.

Difficulty: 2
Correct Answer: d

14. Twenty years ago, Amanda consumed cans of motor oil which cost her 6 pesos each and gallons of gasoline which cost her 14 pesos each. With her income of 112 pesos, she bought 7 cans of motor oil and 5 gallons of gasoline. Today she has an income of 230 pesos. Cans of motor oil now cost 10 pesos each and gallons of gasoline now cost 32 pesos each. Assuming her preferences haven't changed, she
   a. is definitely better off than she was 20 years ago.
   b. was definitely better off 20 years ago than she is now.
   c. is just as well off as she was 20 years ago.
   d. may be either better or worse off now than 20 years ago. There is not enough information to determine which is the case.
   e. is behaving irrationally.

Difficulty: 1
Correct Answer: b

15. When prices are ($2, $4), Ms. Consumer chooses the bundle (7, 9), and when prices are ($15, $3), she chooses the bundle (10, 3). Is her behavior consistent with the weak axiom of revealed preference?
   a. Yes.
   b. No.
   c. We would have to observe a third choice to be able to say.
   d. We can't tell because we are not told her income in the two cases.
   e. None of the above.

Difficulty: 2
Correct Answer: b

16. Stan Ford currently spends $100 a week on entertainment. A rich uncle offers him a choice between a $50 a week allowance and the opportunity to buy all of his entertainment at half price. Stan has no kinks in his difference curves. Stan would
   a. prefer the $50 allowance.
   b. prefer the half-price subsidy.
   c. be indifferent between the allowance and the subsidy.
   d. prefer the subsidy if entertainment is a normal good and be indifferent otherwise.
   e. prefer the allowance if entertainment is an inferior good and prefer the subsidy otherwise.

Difficulty: 2
Correct Answer: a

17. When prices are ($2, $10), Emil chooses the bundle (1, 6), and when prices are ($12, $4), he chooses the bundle (7, 2).
   a. Emil violates WARP.
   b. Emil has kinked indifference curves.
   c. The bundle (1, 6) is revealed preferred to (7, 2), but (7, 2) is not revealed preferred to (1, 6).
   d. The bundle (7, 2) is revealed preferred to (1, 6), but (1, 6) is not revealed preferred to (7, 2).
   e. None of the above.

Difficulty: 2
Correct Answer: b

18. Desmond has lived in Australia, Belgium, and Canada. His tastes never changed but his income and prices did. In Australia his commodity bundle was $(x_1, x_2) = (7, 8)$, in Belgium it was (9, 4), and in Canada it was (7, 5). Prices in Canada were $(p_1, p_2) = (3, 3)$, and prices in Australia were $(p_1, p_2) = (3, 3)$, and prices in Australia were $(p_{1,} p_2) = (16, 4)$.
   a. Desmond's consumption in Australia is directly revealed preferred to his consumption in Belgium.
   b. His consumption in Australia is indirectly revealed preferred to his consumption in Belgium.
   c. His consumption in Australia is indirectly but not directly revealed preferred to his consumption in Canada.
   d. We can't tell if he was better off in Belgium or in Australia.
   e. None of the above.

Difficulty: 1
Correct Answer: d

19. If all prices increase by 20%,
   a. the Paasche price index increases by more than 20% and the Laspeyres price index increases by less than 20%.

b. the Laspeyres price index increases by more than 20% and the Paasche price index increases by less than 20%.
c. both the Paasche price index and the Laspeyres price index increase by more than 20%.
d. both the Paasche price index and the Laspeyres price index increase by exactly 20%.
e. both the Paasche price index and the Laspeyres price index increase by less than 20%.

Difficulty: 3
Correct Answer: c

20. A student spends all of her income on pizza and books. When pizzas cost $3 each and books cost $10 each, she consumed 30 pizzas and 3 books per month. The price of pizzas fell to $2.90 each while the price of books rose to $11 each. The price change
a. made her worse off.
b. left her exactly as well off as before.
c. left her at least as well off as before and possibly helped her.
d. might have helped her, might have harmed her. We can't tell which unless we observe what she consumed after the price change.
e. had the same effect as a $3 increase in her income.

Difficulty: 1
Correct Answer: c

21. A consumer's behavior was observed in three situations with different prices and incomes. In situation 1, she chose a bundle that cost $1,600. In situation 2, she chose a bundle that cost $2,500. In situation 3, she chose a bundle that cost $3,100. The bundle purchased in situation 2 would cost $1,200 at situation 1 prices. The bundle purchased in situation 3 cost $2,000 at situation 2 prices. This consumer's behavior is known to satisfy the strong axiom of revealed preference. Therefore, the bundle purchased in situation
a. 1 must cost less than $3,100 at situation 3 prices.
b. 3 must cost at least $3,100 at situation 1 prices.
c. 1 can not cost less than $3,100 at situation 3 prices.
d. 2 must cost at least $3,100 at situation 1 prices.
e. None of the above.

Difficulty: 2
Correct Answer: b

22. Recall that the Laspeyres price index (P.I.) uses the old bundle as weights and the Paasche price index uses the new bundle as weights. If the prices of all goods double and your income triples,
a. your income increase has exceeded the increase in the Laspeyres P.I. but may not have exceeded the increase in the Paasche P.I.
b. your income increase has exceeded the increase in the Laspeyres P.I. and has also exceeded the increase in the Paasche P.I.
c. your income increase has exceeded the increase in the Paasche P.I. but may not have exceeded the increase in the Laspeyres P.I.
d. you would need to know the old and new consumption bundles to compare your income change with the change in price indexes.
e. None of the above.

Difficulty: 1
Correct Answer: c

23. If the government gave you a subsidy of $100 per month that you had to spend on housing and if you could spend the remainder of your income in any way you wished, the effect of the subsidy would differ from the effect of a $100 per month unrestricted increase in your income only if
a. housing were an inferior good for you.
b. housing were a normal good for you.
c. you would spend less than $100 per month on housing when you received the unrestricted $100 monthly increase in your income.
d. you would spend more than $100 per month on housing when you received the unrestricted $100 monthly increase in your income.
e. your preferences were homothetic.

Difficulty: 3
Correct Answer: a

24. When the prices were ($5, $1), Vanessa chose the bundle $(x, y) = (6, 3)$. Now at the new prices, (p_x, p_y), she chooses the bundle $(x, y) = (5, 7)$. For Vanessa's behavior to be consistent with the weak axiom of revealed preference, it must be that
a. $4p_y < p_x$.
b. $p_x < 4p_y$.
c. $5p_y < p_x$.
d. $p_y = 5p_x$.
e. None of the above.

Difficulty: 3
Correct Answer: c

25. When the prices were ($4, $1), Maria chose the bundle $(x, y) = (8, 6)$. Now at the new prices, (p_x, p_y), she chooses the bundle $(x, y) = (7, 9)$. For Maria's behavior to be consistent with the weak axiom of revealed preference, it must be that
a. $p_y = 4p_x$.
b. $4p_y < p_x$.
c. $3p_y < p_x$.
d. $p_x < 3p_y$.
e. None of the above.

Difficulty: 3
Correct Answer: a

26. At prices ($p1$, $p2$) = (\$4, \$1), George buys the bundle (x_1, x_2) = (10, 20). At prices (p'_1, p'_2) = (\$1, \$4), he buys the bundle (x'_1, x'_2) = (4, 14). At prices (p''_1, p''_2), he buys the bundle (x''_1, x''_2) = (20, 10). If his preferences satisfy the strong axiom of revealed preferences, then it must be that
   a. $10p''_1 < 10p''_2$.
   b. $10p''_1 < 8p_2$.
   c. $8p_1 > 8p_2$.
   d. $p''_1 = p''_2$.
   e. None of the above.

Difficulty: 3
Correct Answer: b

27. At prices (p_1, p_2) = (\$4, \$2), Ivan buys the bundle (x_1, x_2) = (8, 20). At prices (p'_1, p'_2) = (\$2, \$4), he buys the bundle (x'_1, x'_2) = (10, 13). At prices (p''_1, p''_2), he buys the bundle (x''_1, x''_2) = (14, 11). If his preferences satisfy the strong axiom of revealed preferences, then it must be that
   a. $8p_1 > 2p_2$.
   b. $6p''_1 < 9p''_2$.
   c. $6p''_1 < 8p_2$.
   d. $p''_1 = p''_2$.
   e. None of the above.

Difficulty: 3
Correct Answer: b

28. Tonal is a traveling substitute orchestra conductor. Each year, he starts in Ann Arbor, moves to Brownsville, then to Carson City, and so on until he reaches Zilvania, Ohio, after which he returns to Ann Arbor. He gets a salary according to the following simple rule. In Brownsville he is paid what his Ann Arbor consumption bundle would cost in Brownsville. In Carson City he is paid what his Brownsville bundle would cost in Carson City, and so on. After 26 two-week stints, he returns to Ann Arbor, where he is paid the cost in Ann Arbor of his Zilvania bundle. At each stop, he spends his entire salary on apples (A) and paperback books (B), so as to maximize the utility $U = AB$. Over the course of the year, his utility will
   a. be constant at every stop.
   b. increase at every stop where relative prices are different from the previous stop.
   c. decrease at every stop where relative prices are different from the previous stop.
   d. increase or decrease depending on whether the Paasche price index goes down or up between stops.
   e. increase or decrease depending on whether the Laspeyres price index goes down or up between stops.

Difficulty: 3
Correct Answer: b

29. If Goldie chooses the bundle (6, 6) when prices are (\$6, \$2) and the bundle (10, 0) when prices are (\$2, \$5),
   a. the bundle (6, 6) is revealed preferred to (10, 0) but there is no evidence that she violates WARP.
   b. neither bundle is revealed preferred to the other.
   c. Goldie violates WARP.
   d. the bundle (10, 0) is revealed preferred to (6, 6) and she violates WARP.
   e. the bundle (10, 0) is revealed preferred to (6, 6) and there is no evidence that she violates WARP.

Difficulty: 3
Correct Answer: b

30. If Goldie chooses the bundle (6, 6) when prices are (\$6, \$2) and the bundle (10, 0) when prices are (\$5, \$5), $Aif(P2 > 4)$]
   a. the bundle (6, 6) is revealed preferred to (10, 0) but there is no evidence that she violates WARP.
   b. neither bundle is revealed preferred to the other.
   c. the bundle (10, 0) is revealed preferred to (6, 6) and she violates WARP.
   d. Goldie violates WARP.
   e. the bundle (10, 0) is revealed preferred to (6, 6) and there is no evidence that she violates WARP.

Difficulty: 2
Correct Answer: c

31. Pierre's friend Henri lives in a town where he has to pay 3 francs per glass of wine and 5 francs per loaf of bread. Henri consumes 5 glasses of wine and 4 loaves of bread per day. Bob has an income of \$15 per day and pays \$.50 per loaf of bread and \$2 per glass of wine. If Bob has the same tastes as Henri and if the only thing that either of them cares about is consumption of bread and wine,
   a. Bob and Henri are equally well off.
   b. Henri is better off than Bob.
   c. Bob is better off than Henri.
   d. both of them violate the weak axiom of revealed preferences.
   e. we do not have enough information to be able to determine whether one is better off than the other.

Difficulty: 2
Correct Answer: e

32. Pierre's friend Henri lives in a town where he has to pay 3 francs per glass of wine and 6 francs per loaf of bread. Henri consumes 9 glasses of wine and 4 loaves of bread per day. Bob has an income of \$15 per day and pays \$.50 per loaf of bread and \$2 per glass of wine. If Bob has the same tastes as Henri and if the

only thing that either of them cares about is consumption of bread and wine,

a. Henri is better off than Bob.
b. Bob and Henri are equally well off.
c. both of them violate the weak axiom of revealed preferences.
d. Bob is better off than Henri.
e. we do not have enough information to be able to determine whether one is better off than the other.

Difficulty: 2
Correct Answer: a

33. Consider the case of Ronald. Let the prices and consumptions in the base year be as in situation D, where $p_1 = 3$, $p_2 = 1$, $x_1 = 5$, and $x_2 = 15$. If in the current year, the price of good 1 is \$1 and the price of good 2 is \$2, and Ronald's current consumptions of good 1 and good 2 are 25 and 25 respectively, what is the Laspeyres price index of current prices relative to base year prices? (Pick the most nearly correct answer.)
a. 1.17
b. 2.50
c. 0.75
d. 0.50
e. 1.75

Difficulty: 2
Correct Answer: b

34. Consider the case of Ronald. Let the prices and consumptions in the base year be as in situation D, where $p_1 = 3$, $p_2 = 1$, $x_1 = 5$, and $x_2 = 15$. If in the current year, the price of good 1 is \$1 and the price of good 2 is \$4, and Ronald's current consumptions of good 1 and good 2 are 25 and 5 respectively, what is the Laspeyres price index of current prices relative to base year prices? (Pick the most nearly correct answer.)
a. 1.50
b. 2.17
c. 1.25
d. 1
e. 3.25

Difficulty: 2
Correct Answer: a

35. On the planet Homogenia, every consumer who has ever lived consumes only two goods, x and y, and has the utility function $U(x, y) = xy$. The currency in Homogenia is the fragel. In this country in 1900, the price of good 1 was 1 fragel and the price of good 2 was 2 fragels. Per capita income was 96 fragels. In 2000, the price of good 1 was 4 fragels and the price of good 2 was 5 fragels. The Laspeyres price index for the price level in 2000 relative to the price level in 1900 is
a. 3.25.
b. 4.50.
c. 3.
d. 5.25.
e. It is not possible to determine the Laspeyres price index from this information.

Difficulty: 2
Correct Answer: c

36. On the planet Homogenia, every consumer who has ever lived consumes only two goods, x and y, and has the utility function $U(x, y) = xy$. The currency in Homogenia is the fragel. In this country in 1900, the price of good 1 was 1 fragel and the price of good 2 was 2 fragels. Per capita income was 72 fragels. In 2000, the price of good 1 was 5 fragels and the price of good 2 was 2 fragels. The Laspeyres price index for the price level in 2000 relative to the price level in 1900 is
a. 3.50.
b. 2.33.
c. 3.
d. 5.50.
e. It is not possible to determine the Laspeyres price index from this information.

Difficulty: 2
Correct Answer: a

37. On the planet Hyperion, every consumer who has ever lived has a utility function $U(x, y) = \min\{x, 2y\}$. The currency of Hyperion is the doggerel. In 1850 the price of x was 1 doggerel per unit and the price of y was 2 doggerels per unit. In 2000 the price of x was 11 doggerels per unit and the price of y was 4 doggerels per unit. The Paasche price index of prices in 2000 relative to prices in 1850 is
a. 6.50.
b. 5.
c. 2.75.
d. 3.75.
e. It is not possible to determine the Paasche price index without further information.

Difficulty: 2
Correct Answer: d

38. On the planet Hyperion, every consumer who has ever lived has a utility function $U(x, y) = \min\{x, 2y\}$. The currency of Hyperion is the doggerel. In 1850 the price of x was 1 doggerel per unit and the price of y was 2 doggerels per unit. In 2000 the price of x was 8 doggerels per unit and the price of y was 4 doggerels per unit. The Paasche price index of prices in 2000 relative to prices in 1850 is
a. 4.
b. 3.
c. 2.
d. 5.
e. It is not possible to determine the Paasche price index without further information.

Difficulty:
Correct Answer: d

39. Howard Send is deciding whether to keep his car when he moves to New York City. To operate his car for a year, he would have to pay a flat fee of $6,000 for auto insurance and parking, plus $.20 for every mile that he drives for gasoline and repairs. Alternatively, he could give his car to his brother-in-law in Buffalo (the market value of the car is negligible) and take taxicabs in New York, which cost $1 a mile. Howard knows that if he took the car to New York he would drive 6,500 miles per year. If he places no value, positive or negative, on his brother-in-law's getting the car and if he is indifferent between riding a cab and driving, he should
    a. keep his car if he wouldn't want to travel as much as 6,500 miles by cab.
    b. give his car away if he wouldn't travel more than 6,000 miles by cab but keep it if he would travel more than 6,000 miles by cab.
    c. keep his car if he would travel more than 6,000 but less than 6,500 miles by cab.
    d. give his car away.
    e. There is not enough information given here to allow one to give him reasonable advice about what to do.

Difficulty:
Correct Answer: a

40. Franco and Gianni have the same tastes and consume only two goods, wine and pizza. Franco lives in Milano and spends 100,000 lire per week. It costs him 5,000 lire for a bottle of wine and 5,000 lire for a pizza. Gianni lives in Napoli. It costs him 4,000 lire for a bottle of wine and 6,000 lire for a pizza. At those prices, he chooses to buy 10 bottles of wine and 6 pizzas per week.
    a. Franco is better off with his own budget than he would be with Gianni's.
    b. Gianni is better off with his own budget than he would be with Franco's.
    c. Franco and Gianni violate WARP.
    d. Franco and Gianni are equally well off.
    e. There is not enough information to determine whether either would prefer the other's bundle.

Difficulty:
Correct Answer: c

41. Hillary has an initial endowment of $500 and is interested in two things: how many visits she can make to the doctor and how much money will be left over to spend on other things. When a trip to the doctor costs $50, Hillary sees the doctor 7 times. After health care reform, a visit to the doctor will cost $10 but her taxes will rise by $360.
    a. Hillary will be made better off by health care reform.
    b. Hillary will be made worse off by health care reform.
    c. We cannot tell how health care reform will affect Hillary.
    d. Hillary violates the Weak Axiom of Revealed Preference.
    e. Hillary violates the Strong Axiom of Revealed Preference.

Difficulty:
Correct Answer: c

42. Hillary has an initial endowment of $500 and is interested in two things: how many visits she can make to the doctor and how much money will be left over to spend on other things. When a trip to the doctor costs $60, Hillary sees the doctor 3 times. After health care reform, a visit to the doctor will cost $10 but her taxes will rise by $170.
    a. Hillary will be made better off by health care reform.
    b. Hillary violates the Weak Axiom of Revealed Preference.
    c. We cannot tell how health care reform will affect Hillary.
    d. Hillary will be made worse off by health care reform.
    e. Hillary violates the Strong Axiom of Revealed Preference.

PROBLEMS

Difficulty:

1. Hillary has an initial endowment of $500 and is interested in two things: how many visits she can make to the doctor and how much money will be left over to spend on other things. When a trip to the doctor costs $40, Hillary sees the doctor 4 times. After health care reform, a visit to the doctor will cost $10 but her taxes will rise by $160.
    a. Explain what conditions are necessary for Hillary to be made better off by health care reform.
    b. Is it possible to tell whether Hillary has been made better off with the given information?
    c. Explain what conditions are necessary for Hillary to be made worse off by health care reform.
    d. Is it possible to tell whether Hillary has been made worse off with the given information?

Answer:
    a. Hillary must be able to afford a bundle she prefers to the one she is currently consuming after health care reform.

b. Yes. If her current consumption bundle is contained within the interior of her new budget set, she will be able to afford a better bundle.
c. If Hillary's current consumption bundle and all other bundles she considers equally good have been excluded from the new budget set, she has been made worse off.
d. No. Not knowing Hillary's indifference curves, it is impossible to tell whether she has been made worse off or better off when her original bundle falls outside her new budget set.

Difficulty:

2. Hillary has an initial endowment of $500 and is interested in two things: how many visits she can make to the doctor and how much money will be left over to spend on other things. When a trip to the doctor costs $60, Hillary sees the doctor 2 times. After health care reform, a visit to the doctor will cost $10 but her taxes will rise by $100.

a. Explain what conditions are necessary for Hillary to be made better off by health care reform.
b. Is it possible to tell whether Hillary has been made better off with the given information?
c. Explain what conditions are necessary for Hillary to be made worse off by health care reform.
d. Is it possible to tell whether Hillary has been made worse off with the given information?

Answer:

a. Hillary must be able to afford a bundle she prefers to the one she is currently consuming after health care reform.
b. Yes. If her current consumption bundle is contained within the interior of her new budget set, she will be able to afford a better bundle.
c. If Hillary's current consumption bundle and all other bundles she considers equally good have been excluded from the new budget set, she has been made worse off.
d. No. Not knowing Hillary's indifference curves, it is impossible to tell whether she has been made worse off or better off when her original bundle falls outside her new budget set.

CHAPTER 8 Slutsky Equation

TRUE-FALSE

Difficulty: 1
Correct Answer: True

1. A Giffen good must be an inferior good.

Difficulty: 1
Correct Answer: False

2. If a good is an inferior good, then an increase in its price will increase the demand for it.

Difficulty: 1
Correct Answer: False

3. The compensated demand function refers to the demand function of someone who is adequately paid for what he or she sells.

Difficulty: 2
Correct Answer: False

4. The Slutsky substitution effect measures the movement between two points on the same indifference curve.

Difficulty: 2
Correct Answer: False

5. In the case of homothetic preferences, the entire change in demand from a price change is due to the substitution effect.

Difficulty: 1
Correct Answer: True

6. If two goods x and y are perfect complements, then if the price of x falls, the entire change in the demand for x is due to the income effect.

Difficulty: 1
Correct Answer: True

7. If the Engel curve slopes up, then the demand curve slopes down.

Difficulty: 1
Correct Answer: False

8. A rational consumer prefers more of good x to less. If the price of good x rises and the prices of all other goods remain constant, then the consumer must necessarily demand less of x.

Difficulty: 1
Correct Answer: False

9. When the price of a good rises and income remains constant, there is a substitution effect on demand but there cannot be an income effect.

Difficulty: 2
Correct Answer: True

10. Ivan spends his entire income on two goods. One of them is a Giffen good. If the price of the Giffen good rises, demand for the other good must fall.

Difficulty: 1
Correct Answer: False

11. An increase in the price of a Giffen good makes the people who consume that good better off.

Difficulty: 2
Correct Answer: True

12. Jessica's preferences for peanut butter and jelly are represented by the utility function $U(p, j) = \min\{2p, 5j\}$. If prices and income change, but her old consumption bundle lies somewhere on her new budget line, she will not change her consumption.

Difficulty: 2
Correct Answer: False

13. Jimmy's utility function is $U(a, b) = ab$, where a is his consumption of apples and b is his consumption of bananas. If prices and income change in such a way that Jimmy's old consumption lies on his new budget line, then Jimmy will not change his consumption bundle.

Difficulty:
Correct Answer: True

14. Suppose a consumer has strictly convex preferences and her Engel curve for a good is a vertical line for some range of income. In that same income range, her demand curve for the good slopes down.

Difficulty: 2
Correct Answer: True

15. John purchases two goods, x and y. Good x is an inferior good for some range of income. There must be another range of income for which good x is a normal good.

Difficulty: 2
Correct Answer: True

16. A consumer has the utility function $U(x, y) = x + 2y^{1/2}$. The price of good x is 2 and the price of good y is 1. The consumer's income is 20. If the price of good y rises to 2, then entire change in demand for y is due to the substitution effect.

Difficulty:
Correct Answer: True

17. The Hicks version of the substitution effect of a price change measures the change in a consumer's demand if the consumer's income were changed just enough so the consumer would remain on the same indifference curve as before the price change.

MULTIPLE CHOICE

Difficulty: 3
Correct Answer: b

1. Cindy consumes goods x and y. Her demand for x is given by $x(p_x, m) = 0.05m - 5.15p_x$. Now her income is \$419, the price of x is \$3, and the price of y is \$1. If the price of x rises to \$4 and if we denote the income effect on her demand for x by DI and the substitution effect on her demand for x by DS, then
   a. $DI = -0.28$ and $DS = -0.52$.
   b. $DI = -0.28$ and $DS = -4.88$.
   c. $DI = -0.52$ and $DS = -0.52$.
   d. $DI = 0$ and $DS = -2.00$.
   e. None of the above.

Difficulty: 3
Correct Answer: d

2. Cindy consumes goods x and y. Her demand for x is given by $x(p_x, m) = 0.04m - 4.24p_x$. Now her income is \$322, the price of x is \$2, and the price of y is \$1. If the price of x rises to \$3 and if we denote the income effect on her demand for x by DI and the substitution effect on her demand for x by DS, then
   a. $DI = 0$ and $DS = -2.00$.
   b. $DI = -0.18$ and $DS = -0.52$.
   c. $DI = -0.52$ and $DS = -0.52$.
   d. $DI = -0.18$ and $DS = -4.06$.
   e. None of the above.

Difficulty: 1
Correct Answer: c

3. Walt considers x and y to be perfect substitutes. They originally cost \$10 and \$9 respectively. His income is \$720. One day the price of x drops to \$8.
   a. The income effect increases the quantity of y by 90.
   b. The substitution effect increases the quantity of y by 80.
   c. The substitution effect increases the quantity of x by 90.
   d. The income effect increases the quantity of x by 80.
   e. None of the above.

Difficulty: 2
Correct Answer: a

4. Ernest's income elasticity of demand for natural gas is .4. His price elasticity of demand for natural gas is $-.3$, and he spends 10% of his income on natural gas. What is his substitution price elasticity?
   a. $-.26$
   b. $-.34$
   c. .20
   d. $-.12$
   e. None of the above.

Difficulty: 2
Correct Answer: a

5. Suppose that bananas are a normal good and Woody is currently consuming 100 bananas at a price of 10 cents each.
   a. His Slutsky compensated demand curve going through this point is steeper than his ordinary demand curve.
   b. His ordinary demand curve going through this point is steeper than his Slutsky compensated demand curve.
   c. His ordinary demand curve is steeper to the left and his Slutsky compensated demand curve is steeper to the right of this point.
   d. Whether his ordinary demand curve or his Slutsky compensated demand curve is steeper depends on whether his price elasticity is greater than 1.
   e. None of the above.

Difficulty: 2
Correct Answer: c

6. The following can be said about the income and substitution effects of a price increase on the demand for a good whose price rose:

a. The former is always positive and the latter is always negative.
b. Both can be either positive or negative.
c. While the latter is always negative, the former can be either positive or negative.
d. While the former is always negative, the latter can be either positive or negative.
e. The former can at times be negative, but it will never overwhelm the latter.

Difficulty: 3
Correct Answer: a

7. In 2000, Bruce spent his income on two goods, x and y. Between 2000 and 2001, the price of good x rose by 8% and the price of good y rose by 8%. In 2001, Bruce bought the same amount of x as he bought in 2000, but he bought more of good y than he had bought in 2000.
   a. y is a normal good.
   b. y is an inferior good.
   c. x is an inferior good.
   d. Nothing can be said about inferiority or superiority, since we don't know what happened to income.
   e. Bruce is acting irrationally, since the relative prices of x and y did not change.

Difficulty: 1
Correct Answer: e

8. When the price of x rises, Marvin responds by changing his demand for x. The substitution effect is the part of this change that represents his change in demand
   a. holding the prices of substitutes constant.
   b. if he is allowed to substitute as much x for y as he wishes.
   c. if his money income is held constant when the price of x changes.
   d. if the prices of all other goods are held constant.
   e. None of the above.

Difficulty: 1
Correct Answer: b

9. Polly consumes crackers and fruit. The price of fruit rose and the price of crackers stayed constant. The income effect on Polly's demand is
   a. zero because Polly's income didn't change.
   b. the change in Polly's demand if her income is decreased by the change in the price of fruit times her old consumption of fruit.
   c. the change in Polly's demand if her income is decreased by the total amount she used to spend on fruit.
   d. the change in Polly's demand if her income is increased by the amount she used to spend on fruit.
   e. the change in Polly's demand if her income is increased by the change in the price of fruit times the amount she used to buy.

Difficulty: 2
Correct Answer: a

10. Waldo consumes only apples and bananas and bananas are an inferior good for him. The price of apples increases, but there is an increase in his income that keeps him on the same indifference curve as before. (Waldo has convex preferences, and he prefers more to less of either good.)
   a. After the change, Waldo will buy more bananas and fewer apples.
   b. After the change, Waldo will buy fewer bananas and more apples.
   c. After the change, Waldo will buy more of both goods.
   d. After the change, Waldo will buy fewer of both goods.
   e. We would need to know his utility function to determine whether any of the above statements are true.

Difficulty: 2
Correct Answer: b

11. Charlie consumes apples and bananas. His utility function is $U(X_A, X_B) = x_A x^2{}_B$. The price of apples is \$1 the price of bananas is \$2, and his income is \$30 per week. If the price of bananas falls to \$1
   a. Charlie demands fewer apples and more bananas.
   b. the substitution effect of the fall in banana prices reduces his apple consumption, but the income effect increases his apple consumption by the same amount.
   c. the substitution effect of the fall in the price of bananas reduces his banana consumption but the income effect increases his banana consumption by enough so that his banana consumption rises.
   d. the income used to calculate the substitution effect is higher than his original income, since the change made Charlie better off.
   e. More than one of the above is true.

Difficulty: 2
Correct Answer: b

12. Rob consumes two goods, x and y. He has an allowance of \$50 per week and is not endowed with either of the goods. If the price of good x increases and his substitution and income effects change demand in opposite directions,
   a. good x must be a Giffen good.
   b. good x must be an inferior good.
   c. WARP is violated.
   d. good x must be a normal good.
   e. There is not enough information to judge whether good x is a normal or inferior good.

Difficulty: 1
Correct Answer: d

13. Ben consumes two goods and his utility function is $U(x_1, x_2) = x^2{}_1x^4{}_2$. The price of good 2 does not change and his income does not change, but the price of good 1 decreases.
    a. The income effect is zero, since his income remained constant.
    b. The substitution effect on the demand for good 2 is zero, since the price of good 2 did not change.
    c. The substitution effect reduces the demand for good 2, and since the income effect is zero, the demand for good 2 falls.
    d. The substitution effect of the price change reduces the demand for good 2 and increases the demand for good 1.
    e. More than one of the above statements is true.

Difficulty: 1
Correct Answer: a

14. Herbie consumes two goods and his utility function is $U(x_1, x_2) = x^3{}_1x^4{}_2$. The price of good 2 does not change and his income does not change, but the price of good 1 decreases.
    a. The substitution effect of the price change reduces the demand for good 2 and increases the demand for good 1.
    b. The substitution effect reduces the demand for good 2, and since the income effect is zero, the demand for good 2 falls.
    c. The substitution effect on the demand for good 2 is zero, since the price of good 2 did not change.
    d. The income effect is zero, since his income remained constant.
    e. More than one of the above statements is true.

Difficulty:
Correct Answer: a

15. Charlie's utility function is $x_A x_B$. The price of apples used to be \$1 per unit and the price of bananas was \$2 per unit. His income was \$40 per day. If the price of apples increased to \$2.25 and the price of bananas fell to \$1.25, then in order to be able to just afford his old bundle, Charlie would have to have a daily income of
    a. \$57.50.
    b. \$116.
    c. \$28.75.
    d. \$86.25.
    e. \$230.

Difficulty:
Correct Answer: b

16. Charlie's utility function is $x_A x_B$. The price of apples used to be \$1 per unit and the price of bananas was \$2 per unit. His income was \$40 per day. If the price of apples increased to \$1.50 and the price of bananas fell to \$1.75, then in order to be able to just afford his old bundle, Charlie would have to have a daily income of
    a. \$23.75.
    b. \$47.50.
    c. \$96.
    d. \$71.25.
    e. \$190.

Difficulty:
Correct Answer: c

17. Charlie's utility function is $x_A x_B$. The price of apples used to be \$1, the price of bananas used to be \$2, and his income used to be \$40. If the price of apples increased to \$6 and the price of bananas stayed constant, the substitution effect on Charlie's apple consumption would reduce his consumption by
    a. 16.67 apples.
    b. 5 apples.
    c. 8.33 apples.
    d. 13.33 apples.
    e. None of the above.

Difficulty:
Correct Answer: c

18. Charlie's utility function is $x_A x_B$. The price of apples used to be \$1, the price of bananas used to be \$2, and his income used to be \$40. If the price of apples increased to \$5 and the price of bananas stayed constant, the substitution effect on Charlie's apple consumption would reduce his consumption by
    a. 4 apples.
    b. 13 apples.
    c. 8 apples.
    d. 16 apples.
    e. None of the above.

Difficulty: 2
Correct Answer: c

19. Neville from your workbook has a friend named Peregrine. Peregrine has the same demand function for claret as Neville, namely $q = .02m - 2p$, where m is income and p is price. Peregrine's income is \$6,500 and he initially had to pay a price of \$50 per bottle of claret. The price of claret rose to \$60. The substitution effect of the price change
    a. reduced his demand by 20.
    b. increased his demand by 20.
    c. reduced his demand by 14.
    d. reduced his demand by 26.
    e. reduced his demand by 24.

Difficulty: 2
Correct Answer: a

20. Neville from your workbook has a friend named Cedric. Cedric has the same demand function for claret as Neville, namely $q = .02m - 2p$, where m is income and p is price. Cedric's income is \$6,000 and he initially had to pay a price of \$40 per bottle of claret. The price of claret rose to \$60. The substitution effect of the price change
   a. reduced his demand by 24.
   b. reduced his demand by 40.
   c. reduced his demand by 56.
   d. increased his demand by 40.
   e. reduced his demand by 34.

Difficulty: 1
Correct Answer: c

21. Goods 1 and 2 are perfect complements and a consumer always consumes them in the ratio of 2 units of good 2 to 1 unit of good 1. If a consumer has an income of \$300 and if the price of good 2 changes from \$5 to \$6, while the price of good 1 stays at \$1, then the income effect of the price change
   a. is 6 times as strong as the substitution effect.
   b. does not change the demand for good 1.
   c. accounts for the entire change in demand.
   d. is exactly twice as strong as the substitution effect.
   e. is 5 times as strong as the substitution effect.

Difficulty: 1
Correct Answer: d

22. Goods 1 and 2 are perfect complements and a consumer always consumes them in the ratio of 2 units of good 2 to 1 unit of good 1. If a consumer has an income of \$120 and if the price of good 2 changes from \$3 to \$4, while the price of good 1 stays at \$1, then the income effect of the price change
   a. is 4 times as strong as the substitution effect.
   b. does not change the demand for good 1.
   c. is exactly twice as strong as the substitution effect.
   d. accounts for the entire change in demand.
   e. is 3 times as strong as the substitution effect.

Difficulty:
Correct Answer: a

23. Suppose that Agatha has \$465 to spend on tickets for her trip. She intends to spend the entire amount \$465 on tickets and prefers traveling first class to traveling second class. She needs to travel a total of 1,500 miles. Suppose that the price of first-class tickets is \$.40 per mile and the price of second-class tickets is \$.10 per mile. How many miles will she travel by second class?
   a. 450
   b. 600
   c. 225
   d. 550
   e. 150

Difficulty:
Correct Answer: d

24. Suppose that Agatha has \$825 to spend on tickets for her trip. She intends to spend the entire amount \$825 on tickets and prefers traveling first class to traveling second class. She needs to travel a total of 1,500 miles. Suppose that the price of first-class tickets is \$.60 per mile and the price of second-class tickets is \$.30 per mile. How many miles will she travel by second class?
   a. 125
   b. 400
   c. 350
   d. 250
   e. 83.33

Difficulty: 2
Correct Answer: c

25. Maude thinks delphiniums and hollyhocks are perfect substitutes, one for one. If delphiniums currently cost \$5 per unit and hollyhocks cost \$6 per unit and if the price of delphiniums rises to \$8 per unit,
   a. the income effect of the change in demand for delphiniums will be bigger than the substitution effect.
   b. there will be no change in the demand for hollyhocks.
   c. the entire change in demand for delphiniums will be due to the substitution effect.
   d. 1/3 of the change will be due to the income effect.
   e. 2/3 of the change will be due to the income effect.

Difficulty: 2
Correct Answer: d

26. Maude thinks delphiniums and hollyhocks are perfect substitutes, one for one. If delphiniums currently cost \$2 per unit and hollyhocks cost \$3 per unit and if the price of delphiniums rises to \$7 per unit,
   a. there will be no change in the demand for hollyhocks.
   b. the income effect of the change in demand for delphiniums will be bigger than the substitution effect.
   c. 1/5 of the change will be due to the income effect.
   d. the entire change in demand for delphiniums will be due to the substitution effect.
   e. 4/5 of the change will be due to the income effect.

Difficulty:
Correct Answer: a

27. Carlos consumes only two goods, apples and bananas. His utility function is given by $U(x, y) = a^3b^2$. He is endowed with w_a apples and w_b bananas. Unaware that prices are about to change, Carlos buys the quantities

of apples and bananas that maximize his utility subject to his budget constraint. After he has made his purchases but before he has eaten them, the relative prices change. Carlos is then free to make further trades at the new relative prices if he wishes.

a. Carlos will definitely be better off after the price change.
b. Carlos will definitely be worse off after the price change.
c. Carlos will be better off after the price change if the price of the good for which he is a net seller rises relative to the price of the other good.
d. Carlos will be better off after the price change if the price of the good for which he is a net buyer rises relative to the price of the other good.
e. Carlos's utility will not be affected by the price change.

Difficulty:
Correct Answer: e

28. Carlos consumes only two goods, apples and bananas. His utility function is given by $U(x, y) = \min\{x, 2y\}$. He is endowed with w_a apples and w_b bananas. Unaware that prices are about to change, Carlos buys the quantities of apples and bananas that maximize his utility subject to his budget constraint. After he has made his purchases but before he has eaten them, the relative prices change. Carlos is then free to make further trades at the new relative prices if he wishes.

a. Carlos will definitely be better off after the price change.
b. Carlos will definitely be worse off after the price change.
c. Carlos will be better off after the price change if the price of the good for which he is a net seller rises relative to the price of the other good.
d. Carlos will be better off after the price change if the price of the good for which he is a net buyer rises relative to the price of the other good.
e. Carlos's utility will not be affected by the price change.

Difficulty:
Correct Answer: b

29. Gladys loves music and spends her money only on tapes and compact discs. She is always willing to trade 2 tapes for 1 compact discs. Originally, music stores sold compact disc for \$9 each and tapes for \$5 each. Then the price of compact discs fell to \$8 each. The change in her consumption of compact discs that resulted was

a. entirely due to the substitution effect.
b. entirely due to the income effect.
c. partly due to the income effect and partly due to the substitution effect.
d. due to the income effect for low incomes and the substitution effect for high incomes.
e. There was no change in her demand for compact discs.

ESSAY

Difficulty: 2

1. A taxpayer says, "Sure I pay a lot of income tax, but I don't mind because I get back just as much money as I pay in." Assuming that his facts are correct, explain why the taxpayer's reasoning is faulty. Use a diagram to show that an income tax can make a person worse off even if he is rebated an amount of money equal to what he paid in.

Answer: Since an income tax lowers the price of leisure relative to all other goods, a taxpayer will consume too much leisure, leaving him worse off even after a full tax rebate.

Difficulty: 3

2. Use a diagram to prove that in case there are two goods, the substitution effect of an increase in the price of good x reduces the demand for good x.

Answer: A good way to proceed is to suppose that the price of x increases and the substitution effect increases demand for x. Draw the pivoted budget and notice that the new bundle would have to be a bundle that was previously rejected in favor of the old bundle. Since the pivoted budget still allows the old purchase, the weak axiom of revealed preference would be violated.

Difficulty: 2

3. Draw two different diagrams, one illustrating the Slutsky version of income and substitution effects and the other illustrating the Hicks version of income and substitution effects. How do these two notions differ?

Answer: The diagrams can be found in the text. The Slutsky version of the substitution effect has income adjusted so the consumer is just able to afford the old bundle at the new prices. The Hicks version has the consumer's income adjusted so he is exactly as well off as he was at the old prices.

Difficulty: 1

4. What conditions ensure that the quantity of a good demanded increases as its price falls? Explain your answer, using diagrams.

Answer*:* The standard Slutsky analysis is called for here. See the text.

Difficulty: 2

5. Suggest at least one reason why it might be worth the trouble it takes to learn how to decompose the effects of a price change into an income effect and a substitution effect.

Answer: The substitution effect of a price increase must decrease demand for that good. We know that if demand for the good increases as income increases, then the income effect works in the same direction as the substitution effect. Therefore the decomposition into income and substitution effects allows one to prove that the demand curve slopes down whenever the Engel curve slopes up. A second reason is that someone who has already purchased his planned consumption bundle faces only a substitution effect and not an income effect when prices change, since in this case his budget line just pivots around the current consumption.

CHAPTER 9 Buying and Selling

TRUE-FALSE

Difficulty: 2
Correct Answer: True

1. If a rational utility maximizer is a net demander of a good and if an increase in its price causes him to buy more of it, then it must be an inferior good.

Difficulty: 2
Correct Answer: False

2. If a person is a net supplier of a normal good and its price increases while all other prices stay the same, then his demand for the good must decrease.

Difficulty: 1
Correct Answer: True

3. If a consumer is a buyer of some goods and a seller of others, then a change in prices will generate an extra income effect in the Slutsky equation due to the revaluation of the consumer's endowment.

Difficulty: 1
Correct Answer: True

4. If a consumer is initially endowed with a positive amount of two goods and sells some of one to get more of the other and if she has no other sources of income, then her budget line will pass through her endowment point.

Difficulty: 2
Correct Answer: False

5. If a utility maximizer is a net seller of something and the price of that good rises while other prices stay constant, her situation might improve so much that she becomes a net buyer.

Difficulty: 2
Correct Answer: True

6. If a person is a net seller of some good and the price of that good decreases, she might possibly become a net buyer.

Difficulty: 2
Correct Answer: False

7. Wilhelm consumes only apples and bananas. His endowment is 5 units of apples and 10 units of bananas. Both goods are normal goods for Wilhelm. At current prices, Wilhelm is a net seller of apples. If the price of apples rises and the price of bananas stays the same, his demand for apples must decrease.

Difficulty: 2
Correct Answer: False

8. Bill receives half of his income in wages and half of his income in dividends. Bill would be indifferent between a 50% increase in his wage rate and a 50% increase in his dividend income.

Difficulty: 1
Correct Answer: False

9. If all goods, including leisure, are normal goods, then an increase in the wage rate will necessarily make people want to work more hours.

Difficulty: 2
Correct Answer: True

10. If someone has a Cobb-Douglas utility function and no income from any source other than labor earnings, then an increase in wages will not change the amount that person chooses to work.

Difficulty: 1
Correct Answer: True

11. If leisure is a normal good, then an increase in nonlabor income will reduce labor supply.

Difficulty: 1
Correct Answer: False

12. A person's full income is the amount of income that he or she would have if there were no taxes.

Difficulty: 2
Correct Answer: False

13. If a person has no nonlabor income, a decrease in wages causes the budget line between leisure and other goods to shift downward in a parallel fashion.

Difficulty: 1
Correct Answer: True

14. If leisure is an inferior good, then an increase in the wage rate will make a person work more.

Difficulty: 1
Correct Answer: False

15. Jack has a backward-bending labor supply curve. At wages of \$5 an hour he chooses to work 50 hours a week. His boss wants him to work more hours per week and offers him \$5 an hour for the first 50 hours per week and \$7 an hour for every hour beyond 50 hours per week. Because of his backward − bending supply curve, Jack might actually choose to work fewer hours.

Difficulty: 1
Correct Answer: True

16. Les is allowed to work only 8 hours a day at his main job, although he would like to work more hours. He takes a second job. He can work as many hours as he wishes at the second job, but at a lower wage. If leisure is a normal good, then an increase in the wage rate for his first job will reduce the number of hours he chooses to work at his second job.

Difficulty: 2
Correct Answer: False

17. Suppose a consumer is initially endowed with a positive amount of two goods, sells some of one to get more of the other, and has no other sources of income. If the price of one good falls, his new budget line is everywhere above his old budget line.

MULTIPLE CHOICE

Difficulty: 1
Correct Answer: c

1. Marsha Mellow is very flexible. She consumes x and y. She says, "Give me x or give me y, I don't care. I can't tell the difference between them." She is currently endowed with 14 units of x and 3 units of y. The price of x is 3 times the price of y. Marsha can trade x and y at the going prices but has no other source of income. How many units of y will Marsha consume?
   a. 48
   b. 17
   c. 45
   d. 3
   e. 23

Difficulty: 1
Correct Answer: d

2. Marsha Mellow is very flexible. She consumes x and y. She says, "Give me x or give me y, I don't care. I can't tell the difference between them." She is currently endowed with 8 units of x and 17 units of y. The price of x is 3 times the price of y. Marsha can trade x and y at the going prices but has no other source of income. How many units of y will Marsha consume?
   a. 17
   b. 44
   c. 25
   d. 41
   e. 21

Difficulty: 3
Correct Answer: c

3. Yoram insists on consuming 4 times as much of y as he consumes of x (so he always has $y = 4x$). He will consume these goods in no other ratio. The price of x is 3 times the price of y. Yoram has an endowment of 20 x's and 45 y's which he can trade at the going prices. He has no other source of income. What is Yoram's gross demand for x?
   a. 105
   b. 65
   c. 15
   d. 12
   e. We can't determine the answer without knowing the price of x.

Difficulty: 3
Correct Answer: c

4. Nick insists on consuming 3 times as much of y as he consumes of x (so he always has $y = 3x$). He will consume these goods in no other ratio. The price of x is 2 times the price of y. Nick has an endowment of 20 x's and 75 y's which he can trade at the going prices. He has no other source of income. What is Nick's gross demand for x?
   a. 21
   b. 115
   c. 23
   d. 95
   e. We can't determine the answer without knowing the price of x.

Difficulty: 1
Correct Answer: c

5. Diana consumes commodities x and y and her utility function is $U(x, y) = xy^2$. Good x costs \$2 per unit and good y costs \$1 per unit. If she is endowed with 3 units

of x and 6 units of y, how many units of good y will she consume?

a. 11
b. 3
c. 8
d. 14
e. None of the above.

Difficulty: 1
Correct Answer: b

6. Holly consumes commodities x and y and her utility function is $U(x, y) = xy^5$. Good x costs \$2 per unit and good y costs \$1 per unit. If she is endowed with 7 units of x and 4 units of y, how many units of good y will she consume?

a. 7
b. 15
c. 19
d. 18
e. None of the above.

Difficulty: 2
Correct Answer: a

7. Donald consumes goods x and y. His utility function is $U(x, y) = xy^3$. He is endowed with 43 units of x and 7 units of y. The price of x is \$1 and the price of y is \$3. Find his net demand for x.

a. -27
b. 18
c. -30
d. -20
e. 59

Difficulty: 2
Correct Answer: b

8. Donald consumes goods x and y. His utility function is $U(x, y) = xy^3$. He is endowed with 10 units of x and 15 units of y. The price of x is \$1 and the price of y is \$2. Find his net demand for x.

a. 15
b. 0
c. 12
d. -3
e. 20

Difficulty: 1
Correct Answer: d

9. Jackie's net demands for x and y are $(6, -6)$ and her gross demands are $(15, 15)$. What is her initial endowment of x?

a. 16
b. 13
c. 5
d. 9
e. None of the above.

Difficulty: 2
Correct Answer: c

10. Holly consumes x and y. The price of x is 4 and the price of y is 4. Holly's only source of income is her endowment of 6 units of x and 6 units of y which she can buy or sell at the going prices. She plans to consume 7 units of x and 5 units of y. If the prices change to \$7 for x and \$7 for y,

a. she is better off.
b. she is worse off.
c. she is neither better off nor worse off.
d. she is better off if she has nonconvex preferences.
e. We can't tell whether she is better off or worse off unless we know her utility function.

Difficulty: 2
Correct Answer: c

11. Fanny consumes x and y. The price of x is \$9 and the price of y is \$9. Fanny's only source of income is her endowment of 12 units of x and 12 units of y which she can buy or sell at the going prices. She plans to consume 13 units of x and 11 units of y. If the prices change to \$12 for x and \$12 for y,

a. she is better off.
b. she is worse off.
c. she is neither better off nor worse off.
d. she is better off if she has nonconvex preferences.
e. We can't tell whether she is better off or worse off unless we know her utility function.

Difficulty: 1
Correct Answer: d

12. Milton consumes two commodities in a perfect market system. The price of x is \$5 and the price of y is \$1. His utility function is $U(x, y) = xy$. He is endowed with 40 units of good x and no y. Find his consumption of good y.

a. 110
b. 105
c. 50
d. 100
e. None of the above.

Difficulty: 1
Correct Answer: c

13. Milton consumes two commodities in a perfect market system. The price of x is \$4 and the price of y is \$1. His utility function is $U(x, y) = xy$. He is endowed with 76 units of good x and no y. Find his consumption of good y.

a. 76
b. 157
c. 152
d. 162
e. None of the above.

Difficulty: 2
Correct Answer: a

14. Russ Tickman is a dairy farmer. He consumes milk and other goods. His utility function is given by $U(x, y) = y(x + 1)$, where x is his milk consumption and y is his consumption of other goods. His initial endowment is 19 units of milk per day and no units of other goods. If the price of milk is \$2 and the price of other goods is \$1, how much milk does he consume?
    a. 9 gallons
    b. 38 gallons
    c. 20 gallons
    d. 14 gallons
    e. 12 gallons

Difficulty: 2
Correct Answer: a

15. Jack earns 5 dollars per hour. He has 100 hours per week which he can use for either labor or leisure. The government institutes a plan in which each worker receives a \$100 grant from the government but has to pay 50% of his or her labor income in taxes. If Jack's utility function is $U(c, r) = cr$, where c is dollars worth of consumption of goods and r is hours of leisure per week, how many hours per week will Jack choose to work?
    a. 30
    b. 40
    c. 26
    d. 20
    e. None of the above.

Difficulty: 1
Correct Answer: e

16. Aristotle earns 5 dollars per hour. He has 110 hours per week available for either labor or leisure. In the old days he paid no taxes and received nothing from the government. Now he gets a \$200 payment per week from the government but he must pay half of his labor income in taxes. (His before-tax wages are the same as they were before, and he has no other source of income than wages and payments from the government.) He notices that with the government payment and his taxes, he can exactly afford the combination of leisure and consumption goods that he used to choose. How many hours per week did he work in the old days?
    a. 100
    b. 20
    c. 45
    d. 60
    e. None of the above.

Difficulty: 2
Correct Answer: c

17. Rhoda takes a job with a construction company. She earns \$5 an hour for the first 40 hours of each week and then gets "double-time" for overtime. That is, she is paid \$10 an hour for every hour beyond 40 hours a week that she works. Rhoda has 70 hours a week available to divide between construction work and leisure. She has no other source of income, and her utility function is $U = cr$, where c is her income to spend on goods and r is the number of hours of leisure that she has per week. She is allowed to work as many hours as she wants to. How many hours will she work?
    a. 50
    b. 30
    c. 45
    d. 35
    e. None of the above.

Difficulty: 2
Correct Answer: c

18. Wendy and Mac work in fast-food restaurants. Wendy is paid \$4 an hour for the first 40 hours a week that she works and \$6 an hour for every hour beyond 40 hours per week. Mac gets \$5 an hour no matter how many hours he works. Each has 110 hours per week to allocate between work and leisure. Each has a utility function $U = cr$, where c is expenditure per week on consumption and r is hours of leisure per week. Each can choose the number of hours to work. If Wendy works W hours and Mac works M hours, then
    a. $W = 1.5M$.
    b. $W < M$.
    c. $W - M = 6.66$.
    d. $W - M = 10$.
    e. None of the above.

Difficulty: 3
Correct Answer: b

19. Heather and Myrtle have the same tastes. Heather is paid \$10 an hour and chooses to work 9 hours a day. Myrtle is paid \$9 an hour for the first 8 hours she works and \$18 an hour for any time she works beyond 8 hours a day.
    a. Since she has the same tastes as Heather and can earn the same income by working 9 hours a day, she chooses to work 9 hours a day.
    b. Unless her indifference curve is kinked, Heather would be better off facing the same pay schedule as Myrtle.
    c. Myrtle would prefer Heather's pay schedule to her own.
    d. Myrtle will work less than 9 hours a day.
    e. None of the above.

Difficulty: 1
Correct Answer: c

20. Mike Teevee likes to watch television and to eat candy. In fact his utility function is $U(x, y) = x^2y$, where x is the number of hours he spends watching television and y is the number of dollars per week he spends on candy. Mike's mother doesn't like him to watch so much television. She limits his television watching to 36 hours a week and in addition she pays him $1 an hour for every hour that he reduces his television watching below 36 hours a week. If this is Mike's only source of income to buy candy, how many hours of television does he watch per week?
    a. 36
    b. 12
    c. 24
    d. 18
    e. 16

Difficulty: 2
Correct Answer: b

21. Georgina earns 6 dollars an hour. She has no nonlabor income. She has 100 hours a week available for either labor or leisure. Her utility function is $U(c, r) = cr^3$, where c is dollars worth of goods and r is hours of leisure. How many hours per week will she work?
    a. 23
    b. 25
    c. 28
    d. 50
    e. None of the above.

Difficulty: 2
Correct Answer: d

22. Irene earns 8 dollars an hour. She has no nonlabor income. She has 30 hours a week available for either labor or leisure. Her utility function is $U(c, r) = cr^2$, where c is dollars worth of goods and r is hours of leisure. How many hours per week will she work?
    a. 8
    b. 13
    c. 15
    d. 10
    e. None of the above.

Difficulty: 2
Correct Answer: a

23. Will is paid $10 an hour for the first 40 hours per week that he works. He can also work as many hours overtime as he wishes to. He is paid $15 an hour for every hour that he works beyond 40 hours a week. Leisure is a normal good for Will and he is currently working some overtime. If his hourly wage for the first 40 hours per week that he works rises to $12 and his wages for overtime remain at $15 per hour, he will choose to work
    a. fewer hours per week.
    b. more hours per week.
    c. the same number of hours per week.
    d. more hours per week if and only if his income exceeds his labor income.
    e. more hours per day if and only if he works less than 20 hours overtime per week.

Difficulty: 2
Correct Answer: d

24. Henri is paid $9 an hour for the first 40 hours per week that he works. He can also work as many hours overtime as he wishes to. He is paid $15 an hour for every hour that he works beyond 40 hours a week. Leisure is a normal good for Henri and he is currently working some overtime. If his hourly wage for the first 40 hours per week that he works rises to $11 and his wages for overtime remain at $15 per hour, he will choose to work
    a. more hours per week.
    b. more hours per week if and only if his income exceeds his labor income.
    c. the same number of hours per week.
    d. fewer hours per week.
    e. more hours per day if and only if he works less than 20 hours overtime per week.

Difficulty: 3
Correct Answer: b

25. There are no taxes on the first $500 that Debra earns per week, but on income above $500 per week, she must pay a 60% tax. Debra's job pays $10 per hour. Her utility function is $U(c, r) = rc^2$, where r is hours of leisure and c is dollars worth of consumption. She has 100 hours to divide between work and leisure. How many hours per week will she choose to work?
    a. 66.66
    b. 50
    c. 40
    d. 33.33
    e. 20

Difficulty: 2
Correct Answer: c

26. Susan's utility function is $U(x, y) = (x + y)R^2$, where x and y are the quantities of goods X and Y that she consumes and R is the number of hours of leisure that she has per day. Good X costs 4 dollars per unit and good Y costs 2 dollars per unit. Her wage rate is 8 dollars per hour and she has 15 hours per day to allocate between labor and leisure. She will
    a. consume equal amounts of goods X and Y.

b. consume 10 units of good X.
c. consume 20 units of good Y.
d. work 10 hours a day.
e. consume twice as much of good X as of good Y.

Difficulty:
Correct Answer: c

27. George Goodhands is a life insurance agent. He can work 40 hours a week for a large national insurance company and receive a fixed salary of S dollars per week, or he can work independently, for as many or as few hours per week as he likes and earn w dollars per hour. (He cannot take both jobs.) Which of the following responses to an increase in the salary paid by the insurance company would be *inconsistent* with the weak axiom of revealed preference?
a. Leaving independent work for the 40 hour salaried job
b. Doing exactly what he was doing before
c. More than one of these options would be inconsistent
d. Continuing to work independently but working more hours
e. None of the above.

Difficulty: 3
Correct Answer: e

28. Gladys Goodhands is an insurance agent. She must choose one and only one of two possible alternative jobs. She can either work for a large national insurance company for which she must work exactly 40 hours a week and will receive a salary of S dollars per week, or she can work as an independent insurance agent, in which case she can work exactly as many hours per week as she wishes and will earn w dollars for every hour that she works. Gladys satisfies the weak axiom of revealed preference and she cares only about how much money she makes and about how much leisure time she has.
a. If $S/40 > w$, she will prefer to work for the large national insurance company.
b. If $S/40 < w$ and she decides to work independently, then it must be that she chooses to work more than 40 hours a week.
c. If $S/40 < w$ and she decides to work independently, then it must be that she chooses to work less than 40 hours a week.
d. If $S/40 = w$, she will be indifferent between working for the large insurance company and working independently.
e. None of the above.

Difficulty: 2
Correct Answer: a

29. Albert consumes only tangerines and bananas. His only source of income is an initial endowment of 30 units of tangerines and 10 units of bananas. Albert insists on consuming tangerines and bananas in fixed proportions, 1 unit of tangerines per 1 unit of bananas. He initially faces a price of \$10 per unit for each fruit. The price of tangerines rose to \$30 per unit while the price of bananas stayed unchanged. After the price change, he would
a. increase his consumption of tangerines by exactly 5 units.
b. decrease his consumption or tangerines by at least 5 units.
c. increase his consumption of tangerines by exactly 15 units.
d. decrease his consumption of tangerines by exactly 7 units.
e. decrease his consumption of bananas by at least 1 unit.

Difficulty: 2
Correct Answer: a

30. Quincy consumes only uglifruits and bananas. His only source of income is an initial endowment of 30 units of uglifruits and 10 units of bananas. Quincy insists on consuming uglifruits and bananas in fixed proportions, 1 unit of uglifruits per 1 unit of bananas. He initially faces a price of \$20 per unit for each fruit. The price of uglifruits rose to \$40 per unit while the price of bananas stayed unchanged. After the price change, he would
a. increase his consumption of uglifruits by exactly 3.33 units.
b. decrease his consumption or uglifruits by at least 3.33 units.
c. decrease his consumption of uglifruits by exactly 5.33 units.
d. increase his consumption of uglifruits by exactly 13.33 units.
e. decrease his consumption of bananas by at least 1 unit.

Difficulty: 1
Correct Answer: b

31. Yolanda receives a lump sum child support payment of \$150 per week. She has 80 hours a week to divide between labor and leisure. She earns \$5 an hour. The first \$150 per week of her labor income is untaxed, but all labor income that she earns above \$150 is taxed at the rate 30%. If we graph her budget line with leisure on the horizontal axis and consumption on the vertical axis, her budget line has

a. a kink in it at the point where she takes 60 units of leisure.
b. a kink in it where her income is \$300 and her leisure is 50 units.
c. a slope of -3.50 everywhere.
d. no kinks in the part that corresponds to positive labor supply.
e. a piece that is a horizontal straight line.

Difficulty: 1
Correct Answer: b

32. Tomoko receives a lump sum child support payment of \$200 per week. She has 80 hours a week to divide between labor and leisure. She earns \$5 an hour. The first \$100 per week of her labor income is untaxed, but all labor income that she earns above \$100 is taxed at the rate 50%. If we graph her budget line with leisure on the horizontal axis and consumption on the vertical axis, her budget line has
a. no kinks in the part that corresponds to positive labor supply.
b. a kink in it where her income is \$300 and her leisure is 60 units.
c. a kink in it at the point where she takes 70 units of leisure.
d. a slope of -2.50 everywhere.
e. a piece that is a horizontal straight line.

Difficulty: 1
Correct Answer: d

33. If Abishag owns 16 quinces and 15 kumquats and if the price of kumquats is 4 times the price of quinces, how many kumquats can she afford if she buys as many kumquats as she can?
a. 38
b. 31
c. 15
d. 19
e. 16

Difficulty:
Correct Answer: d

34. If Abishag owns 18 quinces and 5 kumquats and if the price of kumquats is 6 times the price of quinces, how many kumquats can she afford if she buys as many kumquats as she can?
a. 5
b. 23
c. 16
d. 8
e. 5

Difficulty: 2
Correct Answer: a

35. Mario consumes eggplants and tomatoes in the ratio of 1 bushel of eggplants per 1 bushel of tomatoes. His garden yields 30 bushels of eggplants and 10 bushels of tomatoes. He initially faced prices of \$25 per bushel for each vegetable, but the price of eggplants rose to \$100 per bushel, while the price of tomatoes stayed unchanged. After the price change, he would
a. increase his eggplant consumption by 6 bushels.
b. decrease his eggplant consumption by at least 6 bushels.
c. increase his consumption of eggplants by 8 bushels.
d. decrease his consumption of eggplants by 8 bushels.
e. decrease his tomato consumption by at least 1 bushel.

Difficulty: 2
Correct Answer: d

36. Mario consumes eggplants and tomatoes in the ratio of 1 bushel of eggplants per 1 bushel of tomatoes. His garden yields 30 bushels of eggplants and 10 bushels of tomatoes. He initially faced prices of \$10 per bushel for each vegetable, but the price of eggplants rose to \$30 per bushel, while the price of tomatoes stayed unchanged. After the price change, he would
a. decrease his consumption of eggplants by 7 bushels.
b. increase his consumption of eggplants by 7 bushels.
c. decrease his eggplant consumption by at least 5 bushels.
d. increase his eggplant consumption by 5 bushels.
e. decrease his tomato consumption by at least 1 bushel.

Difficulty: 2
Correct Answer: b

37. Dr. Johnson receives a lump sum payment of \$150 per week. Suppose that the first \$150 per week of labor income is untaxed but all labor income above \$150 is taxed at a rate of 10%.
a. Dr. Johnson's budget line has a kink in it at the point where he takes 60 units of leisure.
b. Dr. Johnson's budget line has a kink where his income is \$300 and his leisure is 50 units.
c. Dr. Johnson's budget line has slope -4.50 everywhere.
d. Dr. Johnson's budget line has no kinks in the part of it that corresponds to a positive labor supply.
e. Dr. Johnson's budget line has a piece that is a horizontal straight line.

Difficulty: 2
Correct Answer: d

38. Dr. Johnson receives a lump sum payment of \$100 per week. Suppose that the first \$100 per week of labor income is untaxed but all labor income above \$100 is taxed at a rate of 40%.
    a. Dr. Johnson's budget line has a kink in it at the point where he takes 70 units of leisure.
    b. Dr. Johnson's budget line has no kinks in the part of it that corresponds to a positive labor supply.
    c. Dr. Johnson's budget line has slope -3 everywhere.
    d. Dr. Johnson's budget line has a kink where his income is \$200 and his leisure is 60 units.
    e. Dr. Johnson's budget line has a piece that is a horizontal straight line.

Difficulty: 1
Correct Answer: e

39. Dudley has a utility function $U(C, R) = C - (12 - R)^2$, where R is leisure and C is consumption per day. He has 16 hours per day to divide between work and leisure. If Dudley has a nonlabor income of \$20 per day and is paid a wage of \$0 per hour, how many hours of leisure will he choose per day?
    a. 9
    b. 10
    c. 11
    d. 13
    e. 12

Difficulty: 1
Correct Answer: e

40. Dudley has a utility function $U(C, R) = C - (12 - R)^2$, where R is leisure and C is consumption per day. He has 16 hours per day to divide between work and leisure. If Dudley has a nonlabor income of \$35 per day and is paid a wage of \$6 per hour, how many hours of leisure will he choose per day?
    a. 10
    b. 8
    c. 7
    d. 6
    e. 9

Difficulty: 1
Correct Answer: b

41. Mr. Cog has 18 hours per day to divide between labor and leisure. His utility function is $U(C, R) = CR$, where C is dollars per year spent on consumption and R is hours of leisure. If he has 19 dollars of nonlabor income per day and gets a wage rate of 15 dollars per hour when he works, his budget equation, expressing combinations of consumption and leisure that he can afford to have, can be written as
    a. $15R + C = 19$.
    b. $15R + C = 289$.
    c. $R + C/15 = 379$.
    d. $C = 289 + 15R$.
    e. $C = 346 + 15R$.

Difficulty: 1
Correct Answer: d

42. Mr. Cog has 18 hours per day to divide between labor and leisure. His utility function is $U(C, R) = CR$, where C is dollars per year spent on consumption and R is hours of leisure. If he has 5 dollars of nonlabor income per day and gets a wage rate of 11 dollars per hour when he works, his budget equation, expressing combinations of consumption and leisure that he can afford to have, can be written as
    a. $C = 203 + 11R$.
    b. $R + C/11 = 269$.
    c. $11R + C = 5$.
    d. $11R + C = 203$.
    e. $C = 218 + 11R$.

Difficulty:
Correct Answer: d

43. Mr. Cog has 18 hours per day to divide between labor and leisure. His utility function is $U(C, R) = CR$, where C is dollars per year spent on consumption and R is hours of leisure. If he has a nonlabor income of 40 dollars per day and a wage rate of 8 dollars per hour, he will choose a combination of labor and leisure that allows him to spend
    a. 184 dollars per day on consumption.
    b. 82 dollars per day on consumption.
    c. 112 dollars per day on consumption.
    d. 92 dollars per day on consumption.
    e. 138 dollars per day on consumption.

Difficulty:
Correct Answer: a

44. Mr. Cog has 18 hours per day to divide between labor and leisure. His utility function is $U(C, R) = CR$, where C is dollars per year spent on consumption and R is hours of leisure. If he has a nonlabor income of 32 dollars per day and a wage rate of 13 dollars per hour, he will choose a combination of labor and leisure that allows him to spend
    a. 133 dollars per day on consumption.
    b. 149 dollars per day on consumption.
    c. 266 dollars per day on consumption.
    d. 123 dollars per day on consumption.
    e. 199.50 dollars per day on consumption.

Difficulty: 3
Correct Answer: e

45. Ollie South has an endowment of 10 guns and 10 pounds of butter. He can buy or sell butter at $1 a pound. But the world market for guns is more complicated: he can buy guns for $5 each, but he can sell guns for only $2. If we graph his budget line with guns on the horizontal axis and butter on the vertical axis, then Ollie's budget line is a straight line
    a. joining (12, 0) and (0, 30).
    b. joining (14, 0) and (0, 14).
    c. with slope $-2/5$ through the point (10, 10).
    d. with slope $-5/2$ going through the point (10, 10).
    e. None of the above.

Difficulty:
Correct Answer: a

46. Charlie consumes apples and bananas; his utility function is $U(a, b) = ab$. Charlie's fruit farm yielded 5 apples and 10 bananas. In addition, Charlie has $10 that he was given by a secret admirer. Charlie can buy or sell apples at $2 each and he can buy or sell bananas at $1 each. Charlie will consume
    a. more apples and more bananas than he grows.
    b. more apples and fewer bananas than he grows.
    c. fewer apples and more bananas than he grows.
    d. fewer apples and more bananas than he grows.
    e. exactly as many apples as he grows and more bananas than he grows.

Difficulty:
Correct Answer: a

47. A farmer gets 20 eggs and 10 tomatoes every week from her chickens and her tomato plants. She has no other source of income. She has convex, downward-sloping indifference curves. The current market prices are $2 per egg and $3 per tomato. At these prices she chooses the same bundle that she is endowed with (20 eggs and 10 tomatoes).
    a. If relative prices change in any way whatsoever, she will certainly be no worse off and may be better off than she was before the price change.
    b. An increase in the price of eggs (with the price of tomatoes remaining constant) will decrease her utility.
    c. An increase in the price of tomatoes (with the price of eggs remaining constant) will make her worse off.
    d. If both prices rise, she will be worse off, but if only one price rises, she might be made better off or worse off, depending on her tastes.
    e. Since she earns her income from tomatoes and eggs only, she treats eggs and tomatoes as perfect substitutes.

PROBLEMS

Difficulty: 3

1. Mr. and Mrs. Brauer owned their own home. There was a real estate boom in their town and the price of houses doubled. Their income and other prices stayed constant. The Brauers complained that "we are being driven from our home; we can't afford to live here any more."
    a. Draw a diagram that illustrates what happened to the Brauers' budget constraint.
    b. Could they have been made worse off by the change? Could they have been made better off? Explain why.

Answer:
    a. A good diagram would show their budget line between housing and other goods pivoting around their current consumption.
    b. They can't be made worse off because they can still afford their old consumption bundle. They might be made better off because they might choose to consume less housing and more other goods.

Difficulty: 1

2. Harvey's net demands for goods 1 and 2 are $(2, -3)$ and his endowment is (6, 5).
    a. What are his gross demands?
    b. Draw a diagram illustrating his budget line, his endowment, and his consumption. (Put good 1 on the horizontal axis.)
    c. Draw a dotted line to show what his budget line would be if the price of good 1 doubled and the price of good 2 stayed the same.

Answer: (a) Harvey's gross demands are (8, 2). (b) and (c) The graph is pretty straightforward. Check the text for similar graphs.

Difficulty: 2

3. Is it ever possible that if someone is a net seller of a good, and the price of the good he sells falls, the consumer could wind up better off than he was before by switching from being a seller to being a buyer? Draw a graph to justify your answer.

Answer: Yes, it is possible. For example, one can draw a budget line and an indifference curve for a person who is a net seller of the good on the horizontal axis. The price decrease pivots the budget line around his initial endowment which is located below and to the right of his consumption. Draw the pivoted line so that it crosses the indifference curve. The consumer can now benefit by becoming a net buyer of the good on the horizontal axis.

Difficulty: 1

4. Is it ever possible that an increase in the price of a good for which a person is a net seller can make him worse off? Use a diagram to illustrate your answer.

Answer: No, it is not. If one is a net seller of a good and its price rises, one can still afford the old consumption bundle and hence can't be made worse off.

Difficulty: 1

5. Peter has an endowment of 3 units of good x and 5 units of good y. He can buy and sell x at a price of $100 and y at a price of $200. He receives an income of $700 as alimony from a former spouse.
   a. Draw Peter's budget line for x and y. Show his initial endowment of x and y on your diagram.
   b. Calculate the amount of x that he could afford if he bought only x and the amount of y he could afford if he bought only y.
   c. Write an equation for Peter's budget.

Answer:
   b. He could afford 20 units of x and no y or 10 units of y and no x.
   c. His budget is $100x + 200y = 2{,}000$.

Difficulty: 2

6. Dudley's utility function for goods and leisure is $U(G, L) = G - (20 - L)(20 - L)$, where G is consumption of goods and L is the number of hours of leisure per day. Goods cost $1 per unit.
   a. If Dudley had an income from nonlabor sources of $25 per day and could work as much as he chose to but would get zero wages, how much would he work?
   b. Sketch Dudley's indifference curves on a graph with leisure on the horizontal axis and income on the vertical axis. If Dudley's nonlabor income were $25 a day and he could work as much as he wished for $10 an hour, how many hours a day would he choose to work?

Answer:
   a. 4 hours a day.
   b. 9 hours a day.

Difficulty: 2

7. Marilyn is a journalist. She is considering two possible jobs. One job is as an editor for a magazine. The other job is writing freelance articles and selling them to whoever will buy them. If she works for the magazine, she must spend 10 hours a day at work and commuting. She will be paid $130 a day net of commuting costs and taxes if she takes this job. If she writes freelance articles, she can work at home and as many hours a day as she pleases. She estimates that she would earn $10 an hour after taxes if she does this. Her utility function is $U = (R^3)C$, where R is the number of hours a day she spends not working or commuting and C is her earnings.
   a. If Marilyn chooses to freelance, how many hours will she work?
   b. Calculate her utility in each job and identify which job she will choose.

Answer:
   a. 6 hours.
   b. If she freelances, $U = 349{,}920$. If she works for the magazine $U = 356{,}720$. She should choose the magazine.

Difficulty: 1

8. Ernie's wage rate is $10 an hour. He has no earnings other than his labor income. His utility function is $U(C, L) = CR^2$, where C is the amount of money he spends on consumption, and R is the number of hours a day he spends *not* working.
   a. Write an equation that describes Ernie's budget constraint.
   b. How many hours does Ernie choose to work per day?
   c. How much money does he spend on consumption per day?

Answer:
   a. $C + 10R = 240$.
   b. 8.
   c. 80.

Difficulty: 3

9. May's utility function is $U = C + 14D^{1/2} - .5(H + J)^2$, where C is dollars spent on goods other than housecleaning, D is the number of hours per day that somebody spends cleaning her house, H is the number of hours per day May spends cleaning her house, and J is the number of hours per day May spends working at her job. All May's income comes from her job. She can work as many hours a day as she wishes at a wage of $7 an hour.
   a. If she cannot hire anyone to do her housecleaning, how many hours will she spend on the job and how many hours will she spend housecleaning?
   b. If she can hire a housecleaner at $5 an hour, how many hours will she work on her job, how many hours of housecleaning will she hire, and how many hours will she clean house?

Answer:
   a. 6 hours and 1 hour.
   b. 7 hours, 49/25 hours, and 0 hours.

Difficulty: 2

10. Leo thinks leisure and consuming goods are perfect complements. Goods cost $1 per unit. Leo wants to consume 5 units of goods per hour of leisure. Leo can work as much as he wants to at the wage rate of $15 an hour. He has no other source of income.
    a. How many hours a day will Leo choose to spend at leisure?
    b. Draw a diagram showing Leo's budget and his choice of goods and leisure.
    c. Will Leo work more or less if his wage rate increases?

Answer:
   a. 18 hours a day.
   b. Less.

Difficulty: 2

11. Lucetta changes light bulbs. She is paid $10 an hour. She can work as many hours as she wishes. Lucetta works only 6 hours a day. But she says she loves her job and is happier working at this job than she would be if she made the same income without working at all. Though this may sound strange, Lucetta is perfectly rational. Draw a graph showing leisure on the horizontal axis and income on the vertical axis. Draw a budget line and some indifference curves for Lucetta that are consistent with Lucetta's words and actions. Explain in words what happens.

Answer: Work for Lucetta is desirable on average but undesirable at the margin when she is working 6 hours a day. The diagram will work if you draw a U-shaped indifference curve tangent to her budget line at 6 hours. Make sure that this indifference curve intersects the horizontal line through her consumption choice somewhere to the right of her choice but to the left of where she doesn't work at all.

CHAPTER 10 Intertemporal Choice

TRUE-FALSE

Difficulty: 2
Correct Answer: True

1. An increase in the interest rate cannot make a lender who satisfies WARP become a borrower.

Difficulty: 1
Correct Answer: True

2. If the real interest rate is positive, then a unit of future consumption can be had for the sacrifice of less than 1 unit of current consumption.

Difficulty: 1
Correct Answer: False

3. The real interest rate is the interest rate that one receives net of brokerage costs or fees imposed by financial intermediaries.

Difficulty: 1
Correct Answer: True

4. An increase in the interest rate will necessarily result in a decrease in the present value of a given stream of positive incomes.

Difficulty: 1
Correct Answer: True

5. In a graph that has current consumption on the horizontal axis and future consumption on the vertical axis, the horizontal intercept of the budget line is the present value of all one's income in the two periods.

Difficulty: 1
Correct Answer: True

6. If a consumer can borrow and lend at the same interest rate, then he can exactly afford a consumption plan if the present value of his consumption equals the present value of his income.

Difficulty: 1
Correct Answer: False

7. It would be a mistake to choose the investment that maximizes the present value of your income stream unless you planned to spend your entire wealth in the current time period.

Difficulty:
Correct Answer: False

8. If the interest rate at which you can borrow is higher than the interest rate at which you can lend, your budget for current and future consumption is a convex set.

Difficulty: 2
Correct Answer: False

9. If apples today are perfect substitutes for bananas today, then apples today must also be perfect substitutes for bananas tomorrow.

Difficulty: 2
Correct Answer: True

10. Isaiah is a net borrower when the interest rate is 5% and a net saver when the interest rate is 25%. An increase in the interest rate from 5 to 25% may make Isaiah worse off.

Difficulty: 2
Correct Answer: False

11. If the interest rate is less than the inflation rate, a rational person will never save money.

Difficulty:
Correct Answer: False

12. An increase in the interest rate can make a utility-maximizing lender become a borrower.

Difficulty: 1
Correct Answer: False

13. The intertemporal budget constraint for a consumer can be expressed by setting the present value of her lifetime consumption equal to the future value of her endowment.

Difficulty: 1
Correct Answer: False

14. The nominal interest rate is 5% and the inflation rate is 6%. A rational consumer will not choose to save.

Difficulty: 1
Correct Answer: False

15. If the inflation rate doubles and the nominal interest rate remains constant, the real interest rate must be halved.

Difficulty: 1
Correct Answer: False

16. If the nominal interest rate is 3% and if prices fall by 2% per year, then the real rate of interest is approximately 5%.

Difficulty: 1
Correct Answer: False

17. If the nominal interest rate is 5% and if prices fall by 3% per year, then the real rate of interest is approximately 8%.

Difficulty: 1
Correct Answer: False

18. A utility-maximizing consumer would not choose the investment that maximizes the present value of her income stream unless she planned to spend her entire wealth in the first period.

Difficulty: 2
Correct Answer: True

19. Susan is a net borrower when the interest rate is 10% and a net saver when the interest rate is 20%. A decrease in the interest rate from 20% to 10% may make Susan worse off.

Difficulty: 1
Correct Answer: False

20. A newspaper article claims that more students are choosing 1-year M.B.A. programs instead of 2-year programs because the 2-year programs no longer guarantee a well-paid job. If the length of your M.B.A. program doesn't matter to employers, and you take a job right after completing your M.B.A., the present value of your lifetime earnings is the same whether you take a 1-year or 2-year program.

Difficulty: 2
Correct Answer: True

21. If the interest rate is 5% and will be 5% forever, the present value of an income stream consisting of $10 a year paid to you on February 11 of every year, starting right now, is $210.

MULTIPLE CHOICE

Difficulty: 3
Correct Answer: b

1. If current and future consumption are both normal goods, an increase in the interest rate will necessarily
   a. cause savers to save more.
   b. cause borrowers to borrow less.
   c. reduce everyone's current consumption.
   d. make everyone worse off.
   e. None of the above.

Difficulty: 2
Correct Answer: a

2. Harvey Habit has a utility function $U(c_1, c_2) = \min\{c_1, c_2\}$, where c_1 and c_2 are his consumption in periods 1 and 2 respectively. Harvey earns $189 in period 1 and he will earn $63 in period 2. Harvey can borrow or lend at an interest rate of 10%. There is no inflation.
   a. Harvey will save $60.
   b. Harvey will borrow $60.
   c. Harvey will neither borrow nor lend.
   d. Harvey will save $124.
   e. None of the above.

Difficulty: 2
Correct Answer: d

3. Harvey Habit has a utility function $U(c_1, c_2) = \min\{c_1, c_2\}$, where c_1 and c_2 are his consumption in periods 1 and 2 respectively. Harvey earns $147 in period 1 and he will earn $63 in period 2. Harvey can borrow or lend at an interest rate of 10%. There is no inflation.
   a. Harvey will save $102.
   b. Harvey will borrow $40.
   c. Harvey will neither borrow nor lend.
   d. Harvey will save $40.
   e. None of the above.

Difficulty: 3
Correct Answer: d

4. Mr. O. B. Kandle will live for only two periods. In the first period he will earn $100,000. In the second period he will retire and live on his savings. Mr. Kandle has a Cobb-Douglas utility function $U(c_1, c_2) = c_1^2 c_2$, where c_1 is his period 1 consumption and c_2 is his period 2 consumption. The real interest rate is r.
   a. If the interest rate rises, Mr. Kandle will save more.
   b. If the interest rises, Mr. Kandle will save less.
   c. He will consume the same amount in each period.
   d. A change in the interest rate won't affect his saving.
   e. None of the above.

Difficulty: 2
Correct Answer: b

5. Suppose that a person can borrow and lend at an interest rate of 10%. But there is a 5% rate of inflation and the person has to pay an income tax of 30% on all interest income. If the person borrows money, he can deduct interest as an expense. Where current consumption is on the horizontal axis and future consumption is on the vertical axis, the budget line will
   a. have a kink at the point of no saving or lending.
   b. be a straight line with a slope of about −1.02.
   c. be a straight line with a slope of about −1.05.
   d. be a straight line with a slope of about −1.35.
   e. None of the above.

Difficulty: 3
Correct Answer: b

6. For every two boxes of strawberries that she consumes, Millicent insists on having one pitcher of cream. She does not, however, insist on consuming the same amount every week. Her utility functions is $U = \min\{s_1, 2c_1\}\min\{s_2, 2c_2\}$, where s_1 and s_2 are the number of boxes of strawberries she consumes this week and next week and c_1 and c_2 are the number of pitchers of cream she consumes this week and next. Strawberries cost \$2 a box and cream costs \$1 a pitcher. She has a present value of \$100 to spend on these goods in the next two weeks. The weekly interest rate is 1%. How many boxes of strawberries will she consume this week?
   a. 10
   b. 20
   c. 22
   d. 14.1
   e. 6.06

Difficulty: 2
Correct Answer: a

7. Roger's utility function is $U = \min\{a_1, a_2\}\min\{b_1, b_2\}$, where a_1 and a_2 are the number of piano lessons he consumes this year and next and b_1 and b_2 are the number of ice skating lessons he consumes this year and next. The price of piano lessons is \$10 each and the price of ice skating lessons is \$4 each. The prices won't change, but the interest rate is 7%. If Roger consumes 20 piano lessons this year, how many ice-skating lessons will he consume next year?
   a. 50
   b. 20
   c. 40
   d. 30
   e. There is not enough information to be able to tell.

Difficulty: 2
Correct Answer: b

8. If a consumer views a unit of consumption in period 1 as a perfect substitute (one for one) for a unit of consumption in period 2 and if the real interest rate is positive, the consumer will
   a. consume only in period 1.
   b. consume only in period 2.
   c. consume equal amounts in each period.
   d. consume more in period 1 than in period 2 if income elasticity exceeds 1, otherwise consume more in period 2 than in period 1.
   e. equalize expenditures but not consumption in the two periods.

Difficulty: 2
Correct Answer: a

9. If the price level increases by 80% in one year, then for the real rate of interest to be 10%, the nominal rate of interest would have to be
   a. 98%.
   b. 70%.
   c. 18%.
   d. 88%.
   e. 72%.

Difficulty: 2
Correct Answer: a

10. Kenny Kink's utility function is $u(c_1, c_2) = \min\{c_1, c_2\}$, where c_1 is his consumption in period 1 and c_2 is his consumption in period 2. He earns \$200 in period 1 and \$220 in period 2. Kenny can borrow and lend at an interest rate of 10%, and there is no inflation. The number of dollars that Kenny spends on consumption in the first period must be
    a. more than 200 but less than 220.
    b. exactly 200.
    c. more than 220.
    d. exactly 180.
    e. more than 180 but less than 200.

Difficulty: 2
Correct Answer: d

11. The nominal interest rate is 5% and the inflation rate is 6%. A rational consumer
    a. will not save since the real interest rate is negative.
    b. will save less than 1% of her income.
    c. will save the same amount regardless of the inflation rate; only the nominal interest rate matters.
    d. might save despite the negative real interest rate.
    e. will necessarily save less if the inflation rate rises and the nominal interest rate does not change.

Difficulty: 1
Correct Answer: a

12. If the real rate of interest is 8% and the nominal rate of interest is 28%, then the rate of inflation must be about
    a. 36%.
    b. 24.26%.
    c. 3.50%.
    d. 18.52%.
    e. 23%.

Difficulty: 1
Correct Answer: b

13. If the real rate of interest is 12% and the nominal rate of interest is 31%, then the rate of inflation must be about
    a. 27.26%.
    b. 43%.
    c. 2.58%.
    d. 16.96%.
    e. 22%.

Difficulty: 3
Correct Answer: a

14. In an isolated mountain village, the only crop is corn. Villagers plan for two time periods. In the first time period each villager will harvest 100 bushels. In the second time period, no corn will be harvested. There is no trade with the rest of the world and no stocks of corn remain from before the first period. Corn can be stored from one time period to the next, but rats eat 25% of what is stored. The villagers all have Cobb-Douglas utility functions $U(C_1, C_2) = C_1C_2$ and can allocate their own corn between consumption and storage as they wish. If the introduction of cats to the village reduces the rats' predations to 10% of what is stored,
    a. consumption in the first time period will not change.
    b. villagers will consume 5% more corn in each time period.
    c. consumption in the first time period will increase but by less than 5%.
    d. consumption in the second time period will not change.
    e. consumption in the first time period will decrease.

Difficulty: 2
Correct Answer: b

15. Minnie has an income of $300 in period 1 and will have an income of $625 in period 2. Her utility function is $U(c_1, c_2) = c^{0.80}{}_1c^{0.20}{}_2$, where c_1 is her consumption in period 1 and c_2 is her consumption in period 2. The interest rate is 0.25. If she unexpectedly won a lottery which pays its prize in period 2 so that her income in period 2 would be $1,250 and her income in period 1 would remain $300, then her consumption in period 1 would
    a. double.
    b. increase by $400.
    c. increase by $150.
    d. stay constant.
    e. increase by $120.

Difficulty: 2
Correct Answer: c

16. Mandy has an income of $800 in period 1 and will have an income of $500 in period 2. Her utility function is $U(c_1, c_2) = c^{0.80}{}_1c^{0.20}{}_2$, where c_1 is her consumption in period 1 and c_2 is her consumption in period 2. The interest rate is .25. If she unexpectedly won a lottery which pays its prize in period 2 so that her income in period 2 would be $1,000 and her income in period 1 would remain $800, then her consumption in period 1 would
    a. stay constant.
    b. double.
    c. increase by $320.
    d. increase by $400.
    e. increase by $320.

Difficulty: 2
Correct Answer: e

17. Holly's utility function is $U(c_1, c_2) = c^{1/2}{}_1 + 0.87c^{1/2}{}_2$, where c_1 is her consumption in period 1 and c_2 is her consumption in period 2. In period 2, her income is twice as large as her income in period 1. At what interest rate will she choose to consume the same amount in period 2 as in period 1? (Choose the closest answer.)
    a. 0.30
    b. 0.08
    c. 0.23
    d. 0
    e. 0.15

Difficulty: 2
Correct Answer: e

18. Vanessa's utility function is $U(c_1, c_2) = c^{1/2}{}_1 + 0.83c^{1/2}_2$, where c_1 is her consumption in period 1 and c_2 is her consumption in period 2. In period 2, her income is 4 times as large as her income in period 1. At what interest rate will she choose to consume the same amount in period 2 as in period 1? (Choose the closest answer.)
    a. 0.10
    b. 0
    c. 0.30
    d. 0.80
    e. 0.20

Difficulty: 2
Correct Answer: b

19. Will Wisp will live for exactly two periods. His utility function is $U(c_1, c_2) = c_1c_2$, where c_1 is consumption in period 1 and c_2 is consumption in period 2. He will have no income in period 2. His income in period 1 is $80,000. If the interest rate rises from 10 to 12%:
    a. his savings will increase by 2% and his consumption in period 2 will increase.
    b. his savings will not change but his consumption in period 2 will increase by $800.
    c. his consumption in both periods will increase.
    d. his consumption in both periods will decrease.
    e. his consumption in period 1 will decrease by 12% and his consumption in period 2 will increase.

Difficulty: 2
Correct Answer: d

20. Will Wisp will live for exactly two periods. His utility function is $U(c_1, c_2) = c_1c_2$, where c_1 is consumption in period 1 and c_2 is consumption in period 2. He will have no income in period 2. His income in period 1 is $40,000. If the interest rate rises from 10 to 14%:
    a. his savings will increase by 4% and his consumption in period 2 will increase.
    b. his consumption in both periods will increase.
    c. his consumption in both periods will decrease.
    d. his savings will not change but his consumption in period 2 will increase by $800.
    e. his consumption in period 1 will decrease by 14% and his consumption in period 2 will increase.

Difficulty:
Correct Answer: b

21. Peregrine consumes ($700, $880) and earns ($600, $990). If the interest rate is 0.10, the present value of his endowment is
    a. $1,590.
    b. $1,500.
    c. $1,580.
    d. $3,150.
    e. $3,750.

Difficulty:
Correct Answer: a

22. Peregrine consumes ($1,300, $1,320) and earns ($1,000, $1,680). If the interest rate is 0.20, the present value of his endowment is
    a. $2,400.
    b. $2,680.
    c. $2,620.
    d. $5,280.
    e. $6,280.

Difficulty:
Correct Answer: b

23. Molly has income $400 in period 1 and income $600 in period 2. Her utility function is $c^a{}_1c^{1-a}{}_2$, where $a = 0.40$ and the interest rate is 0.20. If her income in period 1 doubled and her income in period 2 stayed the same, her consumption in period 1 would
    a. double.
    b. increase by $160.
    c. increase by $80.
    d. stay constant.
    e. increase by $400.

Difficulty:
Correct Answer: a

24. Molly has income $200 in period 1 and income $920 in period 2. Her utility function is $c^a{}_1c^{1-a}{}_2$, where $a = 0.80$ and the interest rate is 0.15. If her income in period 1 doubled and her income in period 2 stayed the same, her consumption in period 1 would
    a. increase by $160.
    b. double.
    c. increase by $80
    d. stay constant.
    e. increase by $200.

Difficulty:
Correct Answer: b

25. Mr. O. B. Kandle has a utility function c_1c_2, where c_1 is his consumption in period 1 and c_2 is his consumption in period 2. He will have no income in period 2. If he had an income of $80,000 in period 1 and the interest rate increased from 10 to 19%,
    a. his savings would increase by 9% and his consumption in period 2 would also increase.
    b. his savings would not change but his consumption in period 2 would increase by $3,600.
    c. his consumption in both periods would increase.
    d. his consumption in both periods would decrease.
    e. his consumption in period 1 would decrease by 19% and his consumption in period 2 would also decrease.

Difficulty:
Correct Answer: a

26. Mr. O. B. Kandle has a utility function c_1c_2, where c_1 is his consumption in period 1 and c_2 is his consumption in period 2. He will have no income in period 2. If he had an income of $70,000 in period 1 and the interest rate increased from 10 to 17%,
    a. his savings would not change but his consumption in period 2 would increase by $2,450.
    b. his consumption in both periods would decrease.
    c. his consumption in both periods would increase.

d. his savings would increase by 7% and his consumption in period 2 would also increase.
e. his consumption in period 1 would decrease by 17% and his consumption in period 2 would also decrease.

Difficulty:
Correct Answer: e

27. Harvey Habit has a utility function $U(c_1, c_2) = \min\{c_1, c_2\}$. If he had an income of \$880 in period 1 and \$1,320 in period 2 and if the interest rate were 0.20, how much would Harvey choose to spend on bread in period 1?
a. \$1,620
b. \$360
c. \$540
d. \$2,160
e. \$1,080

Difficulty:
Correct Answer: e

28. Harvey Habit has a utility function $U(c_1, c_2) = \min\{c_1, c_2\}$. If he had an income of \$1,230 in period 1 and \$615 in period 2 and if the interest rate were 0.05, how much would Harvey choose to spend on bread in period 1?
a. \$1,860
b. \$465
c. \$1,395
d. \$310
e. \$930

Difficulty:
Correct Answer: a

29. In an isolated mountain village, the harvest this year is 3,000 bushels of grain and the harvest next year will be 1,100 bushels. The villagers all have utility functions $U(c_1, c_2) = c_1c_2$, where c_1 is consumption this year and c_2 is consumption next year. Rats eat 10% of any grain that is stored for a year. How much grain could the villagers consume next year if they consume 1,000 bushels of grain this year?
a. 2,900 bushels
b. 1,800 bushels
c. 4,100 bushels
d. 4,350 bushels
e. 1,200 bushels

Difficulty:
Correct Answer: c

30. In an isolated mountain village, the harvest this year is 6,000 bushels of grain and the harvest next year will be 900 bushels. The villagers all have utility functions $U(c_1, c_2) = c_1c_2$, where c_1 is consumption this year and c_2 is consumption next year. Rats eat 40% of any grain that is stored for a year. How much grain could the villagers consume next year if they consume 1,000 bushels of grain this year?
a. 5,850 bushels
b. 3,000 bushels
c. 3,900 bushels
d. 6,900 bushels
e. 1,000 bushels

Difficulty:
Correct Answer: c

31. Patience has a utility function $U(c_1, c_2) = c^{1/2}{}_1 + 0.83c^{1/2}{}_2$, where c_1 is her consumption in period 1 and c_2 is her consumption in period 2. Her income in period 1 is twice as large as her income in period 2. At what interest rate will she choose to consume the same amount in period 1 as in period 2?
a. 0.40
b. 0.10
c. 0.20
d. 0
e. 0.30

Difficulty:
Correct Answer: b

32. Patience has a utility function $U(c_1, c_2) = c^{1/2}{}_1 + 0.80c^{1/2}{}_2$, where c_1 is her consumption in period 1 and c_2 is her consumption in period 2. Her income in period 1 is twice as large as her income in period 2. At what interest rate will she choose to consume the same amount in period 1 as in period 2?
a. 0
b. 0.25
c. 0.13
d. 0.50
e. 0.38

Difficulty:
Correct Answer: c

33. Samantha Smoothie's utility function is $U(c_1, c_2) = c_1c_2$, where c_1 is her consumption in period 1 and c_2 is her consumption in period 2. She earns \$200 in period 1 and \$220 in period 2. Samantha can borrow and lend at an interest rate of 10% and there is no inflation. The number of dollars that Samantha spends in the second period must be
a. more than 200 but less than 220.
b. exactly 220.
c. more than 220.
d. exactly 200.
e. less than 200.

Difficulty:
Correct Answer: b

34. I am always indifferent between a unit of consumption today and tomorrow and the interest rate is 5%.
    a. My intertemporal indifference curve is horizontal.
    b. My intertemporal indifference curve is a straight line with slope −1.
    c. I will spend all of my current and future income on consumption today.
    d. I will spend 5% more on consumption today than on consumption tomorrow.
    e. I will spend 5% more on consumption tomorrow than on consumption today.

PROBLEMS

Difficulty: 2

1. Ophelia says, "If I could lend money at the rates I must pay to borrow, I would. And if I could borrow money at the rates I receive when I lend, I would again. But forsooth, although I spend, I neither borrow nor lend." Contrary to common belief, Ophelia is entirely rational. Draw a diagram to show how Ophelia's remarks can be consistent with rational behavior and smooth convex preferences if she pays a different interest rate when she borrows than she gets when she lends. Explain what happens in words.

Answer: Ophelia's budget between current and future consumption is kinked at the point where her consumption in each period equals her income. The highest indifference curve to touch her budget touches at the kink. The extensions of each of the lines that meet at the kink pass above this indifference curve for a distance. These lines are the lines she could move along if she could borrow at the lending rate and lend at the borrowing rate, respectively.

Difficulty: 3

2. Patience has the utility function $U(c_1, c_2) = c^{1/2}{}_1 + 2c^{1/2}{}_2$, where c_1 is her consumption in period 1 and c_1 is her consumption in period 2. She will earn 100 units of the consumption good in period 1 and 100 units of the consumption good in period 2. She can borrow or lend at an interest rate of 10%.
    a. Write an equation that describes Patience's budget.
    b. If Patience neither borrows nor lends, what will be her marginal rate of substitution between current and future consumption?
    c. If Patience does the optimal amount of borrowing or saving, what will be the ratio of her period 2 consumption to her period 1 consumption?

Answer:
   a. $c_1 + c_2/1.1 = 100 + 100/1.1$.
   b. 2.
   c. She will consume 4.84 times as much in period 2 as in period 1.

Difficulty: 2

3. Buzz is a chicken farmer. His earnings will be $100 this year and $100 next year. He can lend money at an interest rate of 20%. Because of a subsidized loan program for chicken farmers, he can borrow money at an interest rate of 10%. No matter what he borrows or lends, his earnings will still be $100 each year.
    a. If he is not allowed to either borrow or lend, draw a graph showing his budget between consumption this year and consumption next year. Put numerical labels on the vertical and horizontal intercepts of the budget set.
    b. Suppose that Buzz is allowed to borrow up to the present value of next year's earnings at 10% and is also allowed to make loans. Draw Buzz's budget constraint in this case.

Answer:
   a. His budget line is kinked at (100, 100). The vertical intercept is 220. The horizontal intercept is 100 + 100/1.1.
   b. His budget constraint is a straight line with slope −1.2 passing through the horizontal intercept of his previous budget line.

Difficulty: 2

4. Ymir Larson farms near Niffleheim, Minnesota. He works 80 hours a week. He can either grow rutabagas or raise pigs. Every hour that he spends growing rutabagas gives him $2 of income this year. Every hour that he spends raising pigs this year will add $4 to his income next year. In fact, next year's weekly income will be 100 + 4H dollars where H is the number of hours he spends raising pigs this year. Ymir's utility function is $U(c_1, c_2) = \min\{c_1, c_2\}$, where c_1 and c_2 are his consumption expenditures this year and next year. Ymir doesn't believe in banks and will neither lend money nor borrow money.
    a. Draw Ymir's budget line for current and future consumption, labeling key points on it.
    b. How many hours a week will he choose to spend raising pigs?
    c. How much money will he spend per week on consumption in each year?

Answer:
   a. His budget set is bounded by a line from (0, 420) to (160, 100) and a vertical line from (160, 100) to the horizontal axis.
   b. 10.
   c. 170.

Difficulty: 2

5. Luella has to pay an interest rate of 50% to borrow. She only gets an interest rate of 5% if she lends. She is currently endowed with $1,000 in period 1 and $1,050 in period 2. She considers two alternative investment projects. She can only choose one of them. For project A she would have to pay $500 in period 1 and would be paid back $630 in period 2. For project B, she would be paid $500 in period 1 and would have to pay back $525 in period 2.
   a. Diagram her budget set if she chooses project A. Also show her budget if she chooses project B.
   b. If she neither borrows nor lends, which project has the higher present value at the interest rate 50%? Which has the higher present value at an interest rate of 5%?
   c. Draw indifference curves such that she should choose A.
   d. With different preferences might she choose B?

Answer:
   b. B, A.
   d. Yes.

Difficulty: 2

6. In an isolated peasant village, the only crop is corn. Good harvests alternate with bad harvests. This year the harvest will be 1,000 bushels. Next year it will be 150 bushels. There is no trade with the outside world. Corn can be stored, but rats will eat 25% of what is stored in a year. The villagers have the Cobb-Douglas utility function $U(c_1, c_2) = c_1c_2$, where c_1 is consumption this year and c_2 is consumption next year.
   a. Draw a budget line for the village with this year's consumption on the horizontal axis and next year's consumption on the vertical axis. On your graph show the quantities at which the budget line intercepts the vertical and horizontal axes.
   b. How much will the villagers consume this year?
   c. How much will the rats eat?
   d. How much will the villagers consume next year?

Answer:
   b. 600 bushels.
   c. 100 bushels.
   d. 450 bushels.

CHAPTER 11 Asset Markets

TRUE-FALSE

Difficulty: 1
Correct Answer: False

1. If the interest rate is 10%, then an asset that returns $1 a year forever is worth $1/1.1.

Difficulty: 1
Correct Answer: False

2. The interest rate is 10% and there is no inflation. A bond is available that can be redeemed either after one year or after two years. If it is redeemed after one year, the investor gets $110. If it is redeemed after two years, the investor gets $117.70. The investor gets no other payments than what she receives when she redeems the bond. In equilibrium, investors will be willing to pay more than $100 for this bond.

Difficulty: 1
Correct Answer: False

3. The interest rate is 9% and there is no inflation. A bond is available that can be redeemed either after one year or after two years. If it is redeemed after one year, the investor gets $109. If it is redeemed after two years, the investor gets $115.54. The investor gets no other payments than what she receives when she redeems the bond. In equilibrium, investors will be willing to pay more than $100 for this bond.

Difficulty: 1
Correct Answer: False

4. In a perfect asset market, it is known with certainty that an asset will sell for $24 in one year. If the annual interest rate is 10%, then the asset will sell for $26.40 right now.

Difficulty: 1
Correct Answer: True

5. A consumer who can borrow and lend at the same interest rate should prefer an endowment with a higher present value to an endowment with a lower present value, no matter how he plans to allocate consumption over the course of his life.

Difficulty: 1
Correct Answer: True

6. If everybody has the same information, then a well-functioning market for assets would, in equilibrium, leave no opportunities for arbitrage.

Difficulty: 1
Correct Answer: False

7. Suppose that the cost of cutting down a tree is zero and the tree grows on land that is useless for anything else, that the interest rate is constant, and that the price of lumber does not change. The optimal time to cut the tree is when the difference between its growth rate and the interest rate is maximized.

Difficulty: 2
Correct Answer: True

8. According to the theory of asset markets, if the interest rate is constant, then the competitive market price of a bottle of wine will rise at a constant rate per year until it is consumed, even if the amount that wine drinkers are willing to pay for it does not rise at a constant rate.

MULTIPLE CHOICE

Difficulty: 2
Correct Answer: a

1. Vincent Smudge's paintings are unappreciated now. Nobody is willing to pay anything to have them on the walls. In 5 years Smudge's work will gain enduring popularity. People will suddenly be willing to pay

$1,000 a year to have an original Smudge on their walls and will continue to be willing to do so ever after. If investors realize that this is the case and if the interest rate is and always will be r, a painting by Smudge will currently be worth about

a. $\$(1{,}000/r)[1/(1 + r)^4]$.
b. $\$1{,}000/r - 5{,}000/r$.
c. $\$1{,}000(1 + r)^5$.
d. $\$1{,}000(1/r)^5$.
e. $\$200/r$.

Difficulty: 1
Correct Answer: c

2. If the interest rate is r and will remain r forever, then a bond that will pay 95 dollars a year forever, starting one year from now, is worth how much today?
   a. $95/(1 + r)$ dollars.
   b. $95(1 + r)$ dollars.
   c. $95/r$ dollars.
   d. $95/(1 + r + r^2 + \ldots + r^n + \ldots)$ dollars.
   e. None of the above.

Difficulty: 1
Correct Answer: d

3. If the interest rate is r and will remain r forever, then a bond that will pay 75 dollars a year forever, starting one year from now, is worth how much today?
   a. $75/(1 + r)$ dollars.
   b. $75(1 + r)$ dollars.
   c. $75/(1 + r + r^2 + \ldots + r^n + \ldots)$ dollars.
   d. $75/r$ dollars.
   e. None of the above.

Difficulty: 2
Correct Answer: b

4. If the nominal interest rate is 80% and the rate of inflation is 50%, then the exact real rate of interest is
   a. 10%.
   b. 20%.
   c. 30%.
   d. 40%.
   e. None of the above.

Difficulty: 1
Correct Answer: c

5. The interest rate is 10%. A certain piece of land can be used for a parking lot, in which case there are no construction costs and it will yield a net return of $5,000 per year forever starting one year from now. Or it can have a house built on it. Building a house would cost $50,000 now. If a house is built on the lot, it will yield a stream of net income equal to $12,000 per year starting one year from now. No other uses are contemplated. The theory of asset markets predicts that the lot will sell for
   a. $120,000 and a house will be built on it.
   b. $50,000 and it will be used as a parking lot.
   c. $70,000 and a house will be built on it.
   d. $13,200 and a house will be built on it.
   e. $80,000 and it will be used as a parking lot.

Difficulty: 1
Correct Answer: d

6. Today is January 1. The interest rate is 8% and investors are convinced that it will stay at 8% for the next 10 years. A corporate bond comes on the market that for the next 7 years will pay $160 on December 31 to whoever owns the bond on that date. On January 1, 7 years from today, the issuer of the bond will redeem the bond by buying it back from the bondholder for $2,000. What should this bond sell for?
   a. $3,120
   b. $2,160
   c. $1,600
   d. $2,000
   e. $2,780

Difficulty: 2
Correct Answer: a

7. The interest rate will be 10% for one more year, but a year from now, it will fall to 5% and stay at 5% forever. What is the market value of an investment that is sure to pay $220 a year forever, starting two years from today?
   a. $4,000
   b. $4,400
   c. $2,000
   d. $2,200
   e. $5,000

Difficulty: 2
Correct Answer: d

8. The interest rate will be 10% for one more year, but a year from now, it will fall to 5% and stay at 5% forever. What is the market value of an investment that is sure to pay $440 a year forever, starting two years from today?
   a. $4,000
   b. $8,800
   c. $4,400
   d. $8,000
   e. $9,000

Difficulty: 2
Correct Answer: b

9. A certain wine costs $3 a bottle to produce. It improves in taste if stored properly for a period of time. When it is newly bottled, people are willing to pay only $2 a bottle to drink it. But the amount that people are willing to pay to drink a bottle of this wine will rise by

$3 a year for the next 50 years. Storage costs, not including interest, are $.50 per year. If the interest rate is 5% and the wine is kept by rational investors, how old will it be when it is drunk and what will be its price at that time?

a. 50 years old and $152
b. 16 years old and $50
c. 50 years old and $153
d. 20 years old and $63
e. 4 years old and $14

Difficulty: 2
Correct Answer: b

10. The amount people are willing to pay to drink a bottle of a certain vintage of wine when it is t years old is $2 + 3$t$. It costs $.50 a bottle per year to store this wine. The interest rate is 5%. If the annual cost of storing the wine rises to $1, what will be the effect on the price of this wine when it is consumed and on the length of time for which it is stored before it is consumed?

a. Both will rise.
b. Both will fall.
c. The price will rise and the time for which it is stored will fall.
d. The price will not change but the time for which it is stored will fall.
e. The price will rise and the time for which it is stored will stay constant.

Difficulty: 2
Correct Answer: d

11. You buy a painting for $1,280. Its market value will rise by $80 per year for the next 30 years. It is worth $80 a year to you to have it hanging on the wall. The interest rate is 10%. In how many years will you sell it?

a. 30
b. Immediately
c. 8
d. 4
e. 5

Difficulty: 3
Correct Answer: d

12. Art Dreck's paintings are terribly unpopular now. In fact nobody would pay a dime to have one of his paintings on the wall now. But experts believe that 10 years from now, there will be a craze for Dreck paintings. The craze will last for 2 years and then nobody will ever want to see a Dreck again. During this 2-year period, people will be willing to pay $1,100 a year to have an original Dreck on the wall. The interest rate is r. If the experts' belief is widely held among investors, today's market value of Dreck should be about

a. $2{,}200/r$.
b. $2{,}200/(1 + r)$.
c. $1{,}100(1 + r)^{10} + 1{,}100(1 + r)^{11}$.
d. $1{,}100/(1 + r)^{10} + 1{,}100/(1 + r)^{11}$.
e. $1{,}100r + 1{,}100r^2$.

Difficulty: 2
Correct Answer: b

13. A large (subterranean) pool of oil lies in a remote region of Ohio. Oil companies have explored this region and know how much oil there is. They have purchased the rights to drill and extract oil when they wish to do so. Because of the extremely forbidding geography and the savagery of the natives, the companies have decided to postpone extraction until the price of oil is higher. The theory of intertemporal arbitrage predicts that

a. the companies are behaving irrationally.
b. the price of rights to this oil must rise at the interest rate.
c. the oil companies will not drill unless production costs fall.
d. the price of rights to this oil will stay constant until it pays to extract.
e. None of the above.

Difficulty: 1
Correct Answer: b

14. The interest rate is 10% and will remain so forever. You do not drink wine but are interested in buying some for investment purposes. Assume that there are no transactions costs or storage costs and that a certain bottle of wine will be worth $44 one year from now, $51 two years from now, and $55 three years from now. After that it turns to worthless vinegar. How much should you be willing to pay for a bottle? (Pick the closest answer.)

a. $40
b. $42.15
c. $47.15
d. $41.32
e. $49.30

Difficulty: 1
Correct Answer: d

15. The interest rate is 10% and will remain so forever. You do not drink wine but are interested in buying some for investment purposes. Assume that there are no transactions costs or storage costs and that a certain bottle of wine will be worth $55 one year from now, $58 two years from now, and $64 three years from now. After that it turns to worthless vinegar. How much should you be willing to pay for a bottle? (Pick the closest answer.)

a. $47.93
b. $53.12

c. $48.08
d. $50
e. $57.08

Difficulty: 2
Correct Answer: b

16. Suppose that a dispute in the Persian Gulf halts the sale of oil from the Persian Gulf for one year. At the same time an important new oil field is found in a place where nobody expected there to be oil. What does economic theory predict will be the effect on the future price of oil to be delivered two years from now?
   a. It will fall if the new pool is larger than the stock of oil in the Persian Gulf and rise otherwise.
   b. It will fall.
   c. It will rise unless the new pool can be brought into production before the Persian Gulf supply is resumed.
   d. It will rise.
   e. It will rise if the cost of extraction for the new oil is greater than the cost of extraction in the Gulf and fall otherwise.

Difficulty: 2
Correct Answer: c

17. Bank 1 offers a deal on deposits of $1,000 or more. You must leave your money in the bank for three years, but bank 1 will pay you 4% interest for the first year, 4% interest for the second year, and 7% interest for the third year. In response, bank 2 offers a deal that it claims is even better. It also requires you to deposit at least $1,000 and to leave it in the bank for three years, but it will pay 7% interest in the first year and then 4% in the second and third years. After three years, you can take your money out of either bank and do what you want with it. Both banks compound interest annually.
   a. Bank 2 offers a better deal than bank 1.
   b. Bank 1 offers a better deal than bank 2.
   c. The two offers are equally valuable.
   d. The offer of bank 2 becomes relatively more attractive as the size of your initial deposit is larger.
   e. None of the above.

Difficulty: 2
Correct Answer: d

18. Bank 1 offers a deal on deposits of $1,000 or more. You must leave your money in the bank for three years, but bank 1 will pay you 8% interest for the first year, 8% interest for the second year, and 7% interest for the third year. In response, bank 2 offers a deal that it claims is even better. It also requires you to deposit at least $1,000 and to leave it in the bank for three years, but it will pay 12% interest in the first year and then 8% in the second and third year. After three years, you can take your money out of either bank and do what you want with it. Both banks compound interest annually.
   a. The offer of bank 2 becomes relatively more attractive as the size of your initial deposit is larger.
   b. Bank 2 offers a better deal than bank 1.
   c. Bank 1 offers a better deal than bank 2.
   d. The two offers are equally valuable.
   e. None of the above.

Difficulty: 2
Correct Answer: e

19. If the rate of inflation is greater than the interest rate,
   a. you should consume all of your wealth in the first period.
   b. you are better off keeping your money in a mattress at home (assuming no risk of it being stolen) than at a bank.
   c. you will necessarily consume less this period than you would if the rate of inflation were less than the interest rate.
   d. you will necessarily consume more this period than you would if the rate of inflation were less than the interest rate.
   e. None of the above.

Difficulty: 2
Correct Answer: d

20. A zero coupon bond is a bond that pays no return until it comes due and then pays the holder of the bond its face value. Suppose that a $2,000 zero coupon bond will come due on January 1, 2020. If the interest rate is 5% and will remain 5% forever, what will this bond be worth on January 1, 2005?
   a. $2,000/0.05
   b. $\$2{,}000/0.05^{15}$
   c. $2,000 + 2,000/15
   d. $\$2{,}000/1.05^{15}$
   e. None of the above.

Difficulty: 2
Correct Answer: d

21. A zero coupon bond is a bond that pays no return until it comes due and then pays the holder of the bond its face value. Suppose that a $4,000 zero coupon bond will come due on January 1, 2020. If the interest rate is 5% and will remain 5% forever, what will this bond be worth on January 1, 2005?
   a. $4,000/0.05
   b. $\$4{,}000/0.05^{15}$
   c. $4,000 + 4,000/15
   d. $\$4{,}000/1.05^{15}$
   e. None of the above.

Difficulty: 1
Correct Answer: c

22. The sum of the terms of the infinite geometric series 1, 0.86, 0.86^2, 0.86^3, . . . , is closest to which of the following numbers?
    a. ∞
    b. 1.86
    c. 7.14
    d. 0.54
    e. 116.28

Difficulty: 1
Correct Answer: d

23. The sum of the terms of the infinite geometric series 1, 0.85, 0.85^2, 0.85^3, . . . , is closest to which of the following numbers?
    a. 0.54
    b. 1.85
    c. ∞
    d. 6.67
    e. 117.65

Difficulty: 2
Correct Answer: a

24. Ashley, from your workbook, has discovered another wine, wine *D*. Wine drinkers are willing to pay 40 dollars to drink it right now. The amount that wine drinkers are willing to pay will rise by 20 dollars each year that the wine ages. The interest rate is 10%. How much would Ashley be willing to pay for the wine if he buys it as an investment? (Pick the closest answer.)
    a. 93 dollars
    b. 40 dollars
    c. 200 dollars
    d. 440 dollars
    e. 71 dollars

Difficulty: 2
Correct Answer: a

25. Ashley, from your workbook, has discovered another wine, wine *D*. Wine drinkers are willing to pay 45 dollars to drink it right now. The amount that wine drinkers are willing to pay will rise by 15 dollars each year that the wine ages. The interest rate is 10%. How much would Ashley be willing to pay for the wine if he buys it as an investment? (Pick the closest answer.)
    a. 76 dollars
    b. 45 dollars
    c. 150 dollars
    d. 495 dollars
    e. 71 dollars

Difficulty: 2
Correct Answer: b

26. Shivers's annual fuel bill for home heating is 800 dollars per year. He considers three alternative plans for insulating his house. Plan *A* would reduce his annual fuel bill by 15%, plan *B* would reduce it by 20%, and plan *C* would eliminate his need for heating fuel altogether. The plan *A* insulation job would cost Shivers 800 dollars, plan *B* would cost him 1,100, dollars, and plan *C* would cost him 8,800 dollars. If the interest rate is 10% and his house and the insulation job last forever, which plan is the best for Shivers?
    a. Plan *A*.
    b. Plan *B*.
    c. Plan *C*.
    d. Plans *A* and *B* are equally good.
    e. He is best off using none of the plans.

Difficulty: 2
Correct Answer: d

27. Shiver's annual fuel bill for home heating is 900 dollars per year. He considers three alternative plans for insulating his house. Plan *A* would reduce his annual fuel bill by 15%, plan *B* would reduce it by 20%, and plan *C* would eliminate his need for heating fuel altogether. The plan *A* insulation job would cost Shivers 900 dollars, plan *B* would cost him 1,600 dollars, and plan *C* would cost him 9,900 dollars. If the interest rate is 10% and his house and the insulation job last forever, which plan is the best for Shivers?
    a. Plans *A* and *B* are equally good.
    b. Plan *B*.
    c. Plan *C*.
    d. Plan *A*.
    e. He is best off using none of the plans.

Difficulty: 2
Correct Answer: d

28. The price of an antique is expected to rise by 4% during the next year. The interest rate is 6%. You are thinking of buying an antique and selling it a year from now. You would be willing to pay a total of 400 dollars for the pleasure of owning the antique for a year. How much would you be willing to pay to buy this antique?
    a. 6,666.67 dollars
    b. 8,400 dollars
    c. 400 dollars
    d. 20,000 dollars
    e. 4,000 dollars

Difficulty: 2
Correct Answer: b

29. The price of an antique is expected to rise by 8% during the next year. The interest rate is 12%. You are thinking of buying an antique and selling it a year from now. You would be willing to pay a total of 800 dollars for the pleasure of owning the antique for a year. How much would you be willing to pay to buy this antique?
    a. 6,666.67 dollars
    b. 20,000 dollars
    c. 800 dollars
    d. 16,800 dollars
    e. 8,000 dollars

Difficulty: 2
Correct Answer: a

30. A bond has a face value of 7,000 dollars. It will pay 700 dollars in interest at the end of every year for the next 50 years. At the time of the last interest payment, 50 years from now, the company that issued the bond will redeem the bond at face value. That is, the company will buy back the bond from its owner at a price equal to the face value of the bond. If the interest rate is 10% and is expected to remain at 10%, how much would a rational investor pay for this bond right now?
    a. 7,000 dollars
    b. 42,000 dollars
    c. 35,000 dollars
    d. More than any of the above amounts
    e. Less than any of the above amounts

Difficulty: 2
Correct Answer: a

31. A bond has a face value of 5,000 dollars. It will pay 500 dollars in interest at the end of every year for the next 45 years. At the time of the last interest payment, 45 years from now, the company that issued the bond will redeem the bond at face value. That is, the company will buy back the bond from its owner at a price equal to the face value of the bond. If the interest rate is 10% and is expected to remain at 10%, how much would a rational investor pay for this bond right now?
    a. 5,000 dollars
    b. 27,500 dollars
    c. 22,500 dollars
    d. More than any of the above amounts
    e. Less than any of the above amounts

Difficulty:
Correct Answer: a

32. If the interest rate is 17%, and will remain 17% forever, how much would a rational investor be willing to pay for an asset that will pay him 7,020 dollars 1 year from now, 1,368 dollars 2 years from now, and nothing at any other time?
    a. 7,000 dollars
    b. 6,000 dollars
    c. 41,176.47 dollars
    d. 126,000 dollars
    e. 8,000 dollars

Difficulty:
Correct Answer: a

33. If the interest rate is 18%, and will remain 18% forever, how much would a rational investor be willing to pay for an asset that will pay him 9,440 dollars 1 year from now, 1,392 dollars 2 years from now, and nothing at any other time?
    a. 9,000 dollars
    b. 171,000 dollars
    c. 8,000 dollars
    d. 50,000 dollars
    e. 10,000 dollars

Difficulty:
Correct Answer: b

34. The interest rate is 10% and is expected to stay constant at that level forever. The present discounted value of $50,000 a year forever starting today is
    a. $500,000.
    b. $550,000.
    c. $ infinity.
    d. $1 million.
    e. $45,454.45.

PROBLEMS

Difficulty: 2

1. The interest rate is 10% and will remain 10% forever. Suppose that you do not drink wine but are interested in buying it for investment purposes. How much would you be willing to pay for each of the following?
    a. A bottle of wine that will be worth $22 a year from now and will then go bad and be worthless.
    b. A bottle of wine that will be worth $22 a year from now and will rise in value by $1 a year forever? Explain your answer.

Answer: (a) and (b) Both are worth $20. Each will be sold and drunk in 1 year. The increase in value of $1 per year on a $22 bottle of wine is not a high enough rate of return for anyone to want to hold it another year.

Difficulty: 3

2. A certain wine costs $3 a bottle to produce. The amount that people are willing to pay to drink it t years after it has been bottled is $2 + 3$t$. Storage costs, not including interest, are $.50 per year. If the interest rate is 5%, how much would a rational investor be willing to pay for it at the time it is bottled? Explain how you got your answer. Feel free to write formulas for present value calculations without working out the numerical answer if it involves long calculations. (Hint: How long would the wine be kept before it is drunk? At what price would it sell?)

Answer: The wine would be kept for 16 years and sold for $50. The present value of the wine is 50/(1.05)16. From this number, we have to subtract the present value of storage costs which is the present value of paying $.50 a year for 16 years. This is the cost of paying $.50 a year forever, starting now minus the cost of paying $.50 a year forever starting in 16 years or $.50(1/r)[1 − 1/(1 + r)16].

Difficulty: 2

3. Suppose that the cost of personal computers falls by 20% per year. To make this problem relatively easy, we will assume that their quality does not change and that computers never wear out. You plan to get one sometime. What is the rational way to decide when to buy one?

Answer: Figure out what it is worth to you to have the computer for one year. Notice that the cost to you of having it is approximately the difference between the price of a computer at the beginning of the year and the price at the end of the year. If the value to you is V and the current price is P, you buy if $V > 0.2P$. Otherwise you wait. Eventually, $0.2P$ will be smaller than V. Then you buy.

Difficulty: 2

4. According to a recent story in the *New York Times*, the South African gold strike has been costing South African mining companies about $7.5 million per day. Assuming that this number is the value of the gold that was not mined because of the strike, minus the labor costs (and other operating costs) that are saved by shutting down the mines, what is wrong with this calculation?

Answer: The gold that is not mined now will still be there and can be extracted later. The figure that was reached would be the cost if the gold that would have been mined had somehow been destroyed by the strike. The actual costs would be more closely measured by the interest cost of postponement of the net revenues from the gold mines until the strike is settled.

CHAPTER 12 Uncertainty

TRUE-FALSE

Difficulty: 1
Correct Answer: False

1. Of any two gambles, no matter what their expected returns, a risk averter will choose the one with the smaller variance.

Difficulty: 2
Correct Answer: True

2. An expected utility maximizer's preferences between two bundles contingent on event 1 happening must be independent of what he will get if event 2 happens.

Difficulty: 1
Correct Answer: True

3. If someone has strictly convex preferences between all contingent commodity bundles, then he or she must be risk averse.

Difficulty: 1
Correct Answer: True

4. Wilma is not risk averse. She is offered a chance to pay \$10 for a lottery ticket that will give her a prize of \$100 with probability .06, a prize of \$50 with probability .1, and no prize with probability .85. If she understands the odds and makes no mistakes in calculation, she will buy the lottery ticket.

Difficulty: 1
Correct Answer: False

5. If Paul is risk loving and his basketball team has a probability of .5 of winning, then Paul would rather bet \$10 on his team than \$100. (When Paul bets X, he wins X if his team wins and loses X if his team loses.)

Difficulty: 1
Correct Answer: False

6. If the price of insurance goes up, people will become less risk averse.

Difficulty: 2
Correct Answer: False

7. A consumer has a von Neumann-Morgenstern utility function of the form $U(c_A, c_B, p_A, p_B) = p_A v(c_A) + p_B v(c_B)$, where p_A and p_B are the probabilities of events A and B and where c_A and c_B are consumptions contingent on events A and B respectively. This consumer must be a risk lover if v is an increasing function.

MULTIPLE CHOICE

Difficulty: 2
Correct Answer: e

1. Prufrock is risk averse. He is offered a gamble in which with probability 1/4 he will lose \$1,000 and with probability 3/4, he will win \$500.
   a. Since he is risk averse, he will certainly not take the gamble.
   b. Since the expected value of the gamble is positive, he will certainly take the gamble.
   c. If Prufrock's initial wealth is greater than \$1,500, he will certainly take the gamble.
   d. If Prufrock's initial wealth is smaller than \$1,500, he will certainly not take the gamble.
   e. Not enough information is given to determine for sure whether he will take the gamble.

Difficulty: 3
Correct Answer: b

2. Timmy Qualm's uncle gave him a lottery ticket. With probability 1/2 the ticket will be worth \$100 and with probability 1/2 it will be worthless. Let x be Timmy's wealth if the lottery ticket is a winner, and y his wealth if it is a loser. Timmy's preferences over alternative contingent commodity bundles are represented by the utility function $U(x, y) = \min\{2x - y, 2y - x\}$. He has no risks other than the ticket.

a. Timmy would sell his lottery ticket for $25 but not for less.
b. Timmy hates risk so much that he'd be willing to throw away the lottery ticket rather than worry about whether he won.
c. Timmy satisfies the expected utility hypothesis.
d. Timmy is misnamed. He is a risk lover.
e. None of the above.

Difficulty: 2
Correct Answer: d

3. There are two events, 1 and 2. The probability of event 1 is p and the probability of event 2 is $1 - p$. Sally Kink is an expected utility maximizer with a utility function is $pu(c_1) + (1 - p)u(c_2)$, where for any number x, $u(x) = 2x$ if $x < 1{,}000$ and $u(x) = 1{,}000 + x$ if x is greater than or equal to 1,000.
   a. Sally is a risk lover.
   b. Sally will be a risk averter if she is poor but will be a risk lover if she is rich.
   c. Sally will be a risk lover if she is poor but a risk averter if she is rich.
   d. If there is no chance of her wealth exceeding $1,000, then she will take any bet that has positive expected net winnings.
   e. None of the above.

Difficulty: 2
Correct Answer: e

4. Socrates owns just one ship. The ship is worth $200 million dollars. If the ship sinks, Socrates loses $200 million. The probability that it will sink is .02. Socrates' total wealth including the value of the ship is $225 million. He is an expected utility maximizer with von Neuman-Morgenstern utility $U(W)$ equal to the square root of W. What is the maximum amount that Socrates would be willing to pay in order to be fully insured against the risk of losing his ship?
   a. $4 million
   b. $2 million
   c. $3.84 million
   d. $4.82 million
   e. $5.96 million

Difficulty: 2
Correct Answer: c

5. Buck Columbus is thinking of starting a pinball palace near a large midwestern university. Buck is an expected utility maximizer with a von Neuman-Morgenstern utility function, $U(W) = 1 - (6{,}000/W)$, where W is his wealth. Buck's total wealth is $24,000. With probability .2 the palace will be a failure and he'll lose $18,000, so that his wealth will be just $6,000. With probability .8 it will succeed and his wealth will grow to $$x$. What is the smallest value of x that would be sufficient to make Buck want to invest in the pinball palace rather than have a wealth of $24,000 with certainty?
   a. $28,500
   b. $150,000
   c. $96,000
   d. $72,000
   e. $30,000

Difficulty: 2
Correct Answer: d

6. Buck Columbus is thinking of starting a pinball palace near a large midwestern university. Buck is an expected utility maximizer with a von Neuman-Morgenstern utility function, $U(W) = 1 - (3{,}000/W)$, where W is his wealth. Buck's total wealth is $12,000. With probability .2 the palace will be a failure and he'll lose $9,000, so that his wealth will be just $3,000. With probability .8 it will succeed and his wealth will grow to $$x$. What is the smallest value of x that would be sufficient to make Buck want to invest in the pinball palace rather than have a wealth of $12,000 with certainty?
   a. $75,000
   b. $14,250
   c. $36,000
   d. $48,000
   e. $15,000

Difficulty: 2
Correct Answer: c

7. Oskar's preferences over gambles in which the probability of events 1 and 2 are both 1/2 can be represented by the von Neuman-Morgenstern utility function $.5y^{.5}_1 + .5y^{.5}_2$, where y_1 is his consumption if event 1 happens and y_2 is his consumption if event 2 happens. A gamble that allows him a consumption of $9 if event 1 happens and $25 if event 2 happens is exactly as good for Oskar as being sure to have an income of
   a. $12.5.
   b. $9.
   c. $16.
   d. $17.
   e. None of the above.

Difficulty: 2
Correct Answer: a

8. Mabel and Emil were contemplating marriage. They got to talking. Mabel said that she always acted according to the expected utility hypothesis, where she tried to maximize the expected value of the log of her income. Emil said that he too was an expected utility maximizer, but he tried to maximize the expected value of the square of his income. Mabel said, "I fear we must part. Our attitudes toward risk are too different." Emil said, "Never fear, my dear, the square of income is a monotonic increasing function of the log of

income, so we really have the same preferences." Who is right about whether their preferences toward risk are different?

a. Mabel is right.
b. Emil is right.
c. Emil is right about small risks but wrong about large risks.
d. Mabel is right about small risks but wrong about large risks.
e. They are both wrong.

Difficulty: 1
Correct Answer: e

9. Ronald has \$18,000. But he is forced to bet it on the flip of a fair coin. If he wins he has \$36,000. If he loses he has nothing. Ronald's expected utility function is $.5x^{.5} + .5y^{.5}$, where x is his wealth if heads comes up and y is his wealth if tails comes up. Since he must make this bet, he is exactly as well off as if he had a perfectly safe income of
   a. \$16,000.
   b. \$15,000.
   c. \$12,000.
   d. \$11,000.
   e. \$9,000.

Difficulty: 1
Correct Answer: a

10. Gary likes to gamble. Donna offers to bet him \$70 on the outcome of a boat race. If Gary's boat wins, Donna would give him \$70. If Gary's boat does not win, Gary would give her \$70. Gary's utility function is $U(c_1, c_2, p_1, p_2) = p_1c^2_1 + p_2c^2_1$, where p_1 and p_2 are the probabilities of events 1 and 2 and where c_1 and c_2 are his consumption if events 1 and 2 occur respectively. Gary's total wealth is currently only \$80 and he believes that the probability that he will win the race is .3.
   a. Taking the bet would increase his expected utility.
   b. Taking the bet would reduce his expected utility.
   c. Taking the bet would leave his expected utility unchanged.
   d. There is not enough information to determine whether taking the bet would increase or decrease his expected utility.
   e. The information given in the problem is self-contradictory.

Difficulty: 3
Correct Answer: a

11. Clancy has \$1,200. He plans to bet on a boxing match between Sullivan and Flanagan. For \$4, he can buy a coupon that pays \$10 if Sullivan wins and nothing otherwise. For \$6 he can buy a coupon that will pay \$10 if Flanagan wins and nothing otherwise. Clancy doesn't agree with these odds. He thinks that the two fighters each have a probability of 1/2 of winning. If he is an expected utility maximizer who tries to maximize the expected value of $\ln W$, where $\ln W$ is the natural log of his wealth, it would be rational for him to buy
   a. 50 Sullivan coupons and no Flanagan coupons.
   b. 100 Sullivan coupons and no Flanagan coupons.
   c. 50 Flanagan coupons and no Sullivan coupons.
   d. 100 Flanagan coupons and no Sullivan coupons.
   e. 100 of each kind of coupon.

Difficulty: 3
Correct Answer: e

12. Diego has \$6,400. He plans to bet on a soccer game. Team A is a favorite to win. Assume no ties can occur. For \$.80 one can buy a ticket that will pay \$1 if team A wins and nothing if B wins. For \$.20 one can buy a ticket that pays \$1 if team B wins and nothing if A wins. Diego thinks the two teams are equally likely to win. He buys tickets so as to maximize the expected value of $\ln W$ (the natural log of his wealth). After he buys his tickets, team A loses a star player and the ticket price moves to \$.50 for either team. Diego buys some new tickets and sells some of his old ones. The game is then played and team A wins. How much wealth does he end up with?
   a. \$5,000
   b. \$15,000
   c. \$6,400
   d. \$8,400
   e. \$10,000

Difficulty: 1
Correct Answer: c

13. Joe's wealth is \$100 and he is an expected utility maximizer with a von Neumann-Morgenstern utility function $U(W) = W^{1/2}$. Joe is afraid of oversleeping his economics exam. He figures there is only a 1 in 10 chance that he will, but if he does, it will cost him \$100 in fees to the university for taking an exam late. Joe's neighbor, Mary, never oversleeps. She offers to wake him one hour before the test, but he must pay her for this service. What is the most that Joe would be willing to pay for this wake-up service?
   a. \$10
   b. \$15
   c. \$19
   d. \$100
   e. \$50

Difficulty: 2
Correct Answer: a

14. Portia has waited a long time for her ship to come in, and she has concluded that it will arrive today with probability 1/4. If it does come, she will receive \$16. If it doesn't come in today, it never will and she will have zero wealth. She has a von Neumann-Morgenstern utility function equal to the square root of her total

income. What is the minimum price at which she would sell the rights to her ship?
a. $1
b. $2
c. $2.50
d. $4
e. None of the above.

Difficulty: 1
Correct Answer: b

15. Harley's current wealth is $600, but there is a .25 probability that he will lose $100. Harley is risk neutral. He has an opportunity to buy insurance that would restore his $100 if he lost it.
a. Harley would be willing to pay a bit more than $25 for this insurance.
b. Harley would be willing to pay up to $25 for this insurance.
c. Since Harley is risk neutral, he wouldn't be willing to pay anything for this insurance.
d. Since Harley's utility function is not specified, we can't tell how much he would be willing to pay for this insurance.
e. Harley would not be willing to pay more than $16.66 for this insurance.

Difficulty: 2
Correct Answer: b

16. After graduating, Sallie Handshake's best job offer will either be with a Big-8 accounting firm for $160,000 a year or as a State Farm agent in Grand Rapids, Michigan, for $40,000 a year. She can increase the probability of the former outcome by studying more, but such studying has its costs. If S represents her amount of studying (where $S = 0$ is no study and $S = 1$ is all-out effort), her probability of getting the job with a Big-8 firm just equals S. Her utility depends on how hard she studies and her subsequent annual income Y. She tries to maximize the expected value of the von Neuman-Morgenstern utility function $U(S, Y) = Y^{1/2} - 400S^2$. If she chooses S to maximize her expected utility, how much will she study?
a. $S = 0.1$.
b. $S = 0.25$.
c. $S = 0.5$.
d. $S = 0.75$.
e. $S = 0.9$.

Difficulty: 3
Correct Answer: d

17. Every $1 invested in Safe Sox will yield $2 for sure. Each $1 invested in Wobbly Umbrellas will yield $8 with probability 1/2 and $0 with probability 1/2. An investor has $10,000 to invest in these two companies and her von Neumann-Morgenstern utility function is the expected value of the natural logarithm of the total yield on her investments. If S is the amount of money that she invests in Safe Sox and $10,000 − S is the amount that she invests in Wobbly Umbrellas, what should S be to maximize her expected utility? (Pick the closest answer.)
a. $1,111
b. $3,333
c. $5,000
d. $6,667
e. $9,111

Difficulty: 2
Correct Answer: a

18. Billy Pigskin from your workbook has a von Neumann-Morgenstern utility function $U(c) = c^{1/2}$. If Billy is not injured this season, he will receive an income of $16 million. If he is injured, his income will be only $10,000. The probability that he will be injured is .1 and the probability that he will not be injured is .9. His expected utility is
a. 3,610.
b. between 15 million and 16 million.
c. 100,000.
d. 7,220.
e. 14,440.

Difficulty: 2
Correct Answer: d

19. Billy Pigskin from your workbook has a von Neumann-Morgenstern utility function $U(c) = c^{1/2}$. If Billy is not injured this season, he will receive an income of $25 million. If he is injured, his income will be only $10,000. The probability that he will be injured is .1 and the probability that he will not be injured is .9. His expected utility is
a. 100,000.
b. 9,020.
c. between 24 million and 25 million.
d. 4,510.
e. 18,040.

Difficulty:
Correct Answer: b

20. Willy's only source of wealth is his chocolate factory. He has the utility function $pc^{1/2}_f + (1 - p)c^{1/2}_{nf}$, where p is the probability of a flood, $1 - p$ is the probability of no flood, and c_f and c_{nf} are his wealth contingent on a flood and on no flood, respectively. The probability of a flood is $p = 1/6$. The value of Willy's factory is $500,000 if there is no flood and $0 if there is a flood. Willy can buy insurance where if he buys $$x$ worth of insurance, he must pay the insurance company $$2x/17$ whether there is a flood or not but he gets back $$x$ from the company if there is a flood. Willy should buy
a. no insurance since the cost per dollar of insurance exceeds the probability of a flood.

b. enough insurance so that if there is a flood, after he collects his insurance, his wealth will be 1/4 of what it would be if there were no flood.
c. enough insurance so that if there is a flood, after he collects his insurance, his wealth will be the same whether there was a flood or not.
d. enough insurance so that if there is a flood, after he collects his insurance, his wealth will be 1/3 of what it would be if there were no flood.
e. enough insurance so that if there is a flood, after he collects his insurance, his wealth will be 1/5 of what it would be if there were no flood.

Difficulty:
Correct Answer: a

21. Willy's only source of wealth is his chocolate factory. He has the utility function $pc^{1/2}_f + (1 - p)c^{1/2}_{nf}$, where p is the probability of a flood, $1 - p$ is the probability of no flood, and c_f and c_{nf} are his wealth contingent on a flood and on no flood, respectively. The probability of a flood is $p = 1/4$. The value of Willy's factory is \$300,000 if there is no flood and \$0 if there is a flood. Willy can buy insurance where if he buys \$$x$ worth of insurance, he must pay the insurance company \$$5x/18$ whether there is a flood or not but he gets back \$$x$ from the company if there is a flood. Willy should buy
a. enough insurance so that if there is a flood, after he collects his insurance, his wealth will be 1/25 of what it would be if there were no flood.
b. enough insurance so that if there is a flood, after he collects his insurance, his wealth will be the same whether there was a flood or not.
c. no insurance since the the cost per dollar of insurance exceeds the probability of a flood.
d. enough insurance so that if there is a flood, after he collects his insurance, his wealth will be 1/6 of what it would be if there were no flood.
e. enough insurance so that if there is a flood, after he collects his insurance his wealth will be 1/11 of what it would be if there were no flood.

Difficulty:
Correct Answer: c

22. Sally Kink is an expected utility maximizer with utility function $pu(c_1) + (1 - p)u(c_2)$, where for any $x <$ \$3,000, $u(x) = 2x$, and for x greater than or equal to \$3,000, $u(x) = 3{,}0001 + x$.
a. Sally will be risk averse if her income is less than \$3,000 but risk loving if her income is more than \$3,000.
b. Sally will be risk neutral if her income is less than \$3,000 and risk averse if her income is more than \$3,000.
c. For bets that involve no chance of her wealth exceeding \$3,000, Sally will take any bet that has a positive expected net payoff.
d. Sally will never take a bet if there is a chance that it leaves her with wealth less than \$6,000.
e. None of the above are true.

Difficulty:
Correct Answer: a

23. Sally Kink is an expected utility maximizer with utility function $pu(c_1) + (1 - p)u(c_2)$, where for any $x <$ \$2,000, $u(x) = 2x$, and for x greater than or equal to \$2,000, $u(x) = 2{,}000 + x$.
a. For bets that involve no chance of her wealth exceeding \$2,000, Sally will take any bet that has a positive expected net payoff.
b. Sally will be risk averse if her income is less than \$2,000 but risk loving if her income is more than \$2,000.
c. Sally will be risk neutral if her income is less than \$2,000 and risk averse if her income is more than \$2,000.
d. Sally will never take a bet if there is a chance that it leaves her with wealth less than \$4,000.
e. None of the above are true.

Difficulty:
Correct Answer: a

24. Yoram's expected utility function is $pc^{1/2}_1 + (1 - p)c^{1/2}_2$, where p is the probability that he consumes c_1 and $1 - p$ is the probability that he consumes c_2. Wilbur is offered a choice between getting a sure payment of \$Z or a lottery in which he receives \$2,500 with probability .30 and \$3,600 with probability .70. Wilbur will choose the sure payment if
a. $Z > 3{,}249$ and the lottery if $Z < 3{,}249$.
b. $Z > 2{,}874.50$ and the lottery if $Z < 2{,}874.50$.
c. $Z > 3{,}600$ and the lottery if $Z < 3{,}600$.
d. $Z > 3{,}424.50$ and the lottery if $Z < 3{,}424.50$.
e. $Z > 3{,}270$ and the lottery if $Z < 3{,}270$.

Difficulty:
Correct Answer: a

25. Quincy's expected utility function is $pc^{1/2}_1 + (1 - p)c^{1/2}_2$, where p is the probability that he consumes c_1 and $1 - p$ is the probability that he consumes c_2. Wilbur is offered a choice between getting a sure payment of \$$Z$ or a lottery in which he receives \$3,600 with probability .60 and \$12,100 with probability .40. Wilbur will choose the sure payment if
a. $Z > 6{,}400$ and the lottery if $Z < 6{,}400$.
b. $Z > 12{,}100$ and the lottery if $Z < 12{,}100$.
c. $Z > 9{,}250$ and the lottery if $Z < 9{,}250$.
d. $Z > 5{,}000$ and the lottery if $Z < 5{,}000$.
e. $Z > 7{,}000$ and the lottery if $Z < 7{,}000$.

Difficulty:
Correct Answer: b

26. Clancy has \$1,800. He plans to bet on a boxing match between Sullivan and Flanagan. He finds that he can buy coupons for \$9 that will pay off \$10 each if Sullivan wins. He also finds in another store some coupons that will pay off \$10 if Flanagan wins. The Flanagan tickets cost \$1 each. Clancy believes that the two fighters each have a probability of 1/2 of winning. Clancy is a risk averter who tries to maximize the expected value of the natural log of his wealth. Which of the following strategies would maximize his expected utility?
    a. Don't gamble at all.
    b. Buy 100 Sullivan tickets and 900 Flanagan tickets.
    c. Buy exactly as many Flanagan tickets as Sullivan tickets.
    d. Buy 50 Sullivan tickets and 450 Flanagan tickets.
    e. Buy 50 Sullivan tickets and 900 Flanagan tickets.

Difficulty:
Correct Answer: d

27. Clancy has \$5,000. He plans to bet on a boxing match between Sullivan and Flanagan. He finds that he can buy coupons for \$5 that will pay off \$10 each if Sullivan wins. He also finds in another store some coupons that will pay off \$10 if Flanagan wins. The Flanagan tickets cost \$5 each. Clancy believes that the two fighters each have a probability of 1/2 of winning. Clancy is a risk averter who tries to maximize the expected value of the natural log of his wealth. Which of the following strategies would maximize his expected utility?
    a. Buy exactly as many Flanagan tickets as Sullivan tickets.
    b. Buy 250 Sullivan tickets and 250 Flanagan tickets.
    c. Don't gamble at all.
    d. Buy 500 Sullivan tickets and 500 Flanagan tickets.
    e. Buy 250 Sullivan tickets and 500 Flanagan tickets.

Difficulty:
Correct Answer: c

28. Tom Cruiser's car is worth \$100,000. But Tom is careless and leaves the top down and the keys in the ignition. Consequently his car will be stolen with probability .5. If it is stolen, he will never get it back. Tom has \$100,000 in other wealth and his von Neumann-Morgenstern utility function for wealth is $u(w) = \ln(w)$. Suppose that Tom can buy \$$K$ worth of insurance at a price of \$.6K. How much insurance will Tom buy?
    a. \$0
    b. \$100,000
    c. More than \$0 but less than \$50,000
    d. More than \$50,000 but less than \$100,000
    e. Exactly \$50,000

PROBLEMS

Difficulty: 2

1. Gaston Gourmand loves good food. Due to an unusual ailment, he has a probability of 1/4 of losing his sense of smell, which would greatly reduce his enjoyment of food. Gaston finds an insurance company that will sell him insurance where Gaston gets \$3x if he loses his smell and pays \$$x$ if he doesn't. He can also buy negative insurance, where Gaston pays \$3x if he loses his sense of smell and gets \$$x$ if he doesn't. Gaston says, "Money will be only half as important to me if I lose my sense of smell." If we look at his expected utility function, we see what he means. Where c_1 is his consumption if he retains his sense of smell and c_2 is his income if he loses his sense of smell, Gaston has the expected utility function $U(c_1, c_2) = 3/4c^{1/2}{}_1 + 1/8c^{1/2}{}_2$. What insurance should he buy?

Answer: Negative insurance so that his wealth is 4 times as large if he doesn't lose his smell than if he does.

Difficulty: 2

2. Oliver takes his wealth of \$1,000 to a casino. He can bet as much as he likes on the toss of a coin but the "house" takes a cut. If Oliver bets \$$x$ on heads, then if heads comes up, he gets \$.8x and, if tails comes up, he pays \$$x$. Similarly if he bets \$$x$ on tails and if tails comes up, he wins \$.8x and, if heads comes up, he pays \$$x$. Draw a graph with dollars contingent on heads and dollars contingent on tails on the two axes. Show Oliver's budget constraint. Oliver is an expected utility maximizer with the utility function $U(h, t) = 1/2h^2 + 1/2t^2$, where h is his wealth if heads comes up and t is his wealth if tails comes up. Draw the highest indifference curve that Oliver can reach with his budget. What bets if any does he make?

Answer: His budget curve kinks at (1000, 1000); it meets the axes at (1800, 0) and (0, 1800). Indifference curves are quarter circles. Oliver will gamble his entire wealth, either betting it all on heads or all on tails.

Difficulty: 3

3. Linus Piecewise is an expected utility maximizer. There are two events, H and T, which each have probability 1/2. Linus's preferences over lotteries in which his wealth is h if event H happens and t if event

T happens are representable by the utility function $U(h, t) = u(h)/2 + u(t)/2$. The function u takes the following form. For any x, $u(x) = x$ if $x < 100$ and $u(x) = 100 + x/2$ if x is greater than or equal to 100. Draw a graph showing the indifference curves for Linus that pass through

a. the point (50, 0)
b. the point (50, 100)
c. the point (100, 100)
d. the point (150, 100)

Answer: Curve *a* is a line with slope −1. Curve *b* has 3 linear segments: a line from (100, 50) to (50, 100), a line with slope −2 to the left of (50, 100), and a line with slope −1/2 to the right of (100, 50). Curve *c* has two segments: a line with slope −2 going to the left of (100, 100) and a line with slope −1/2 to the right of (100, 100). Curve *d* has 3 segments: lines from (150, 100) to (100, 150), from (150, 100) to (200, 0), and from (0, 200) to (100, 150).

Difficulty: 2

4. The certainty equivalent of a gamble is defined to be the amount of money which, if you were promised it with certainty, would be indifferent to the gamble.
   a. If an expected utility maximizer has a von Neuman-Morgenstern utility function $U(W) = W^{1/2}$ (where W is wealth) and if the probability of events 1 and 2 are both 1/2, write a formula for the certainty equivalent of a gamble that gives you x if event 1 happens and y if event 2 happens.
   b. Generalize your formula in part (a) to the case where the probability of event 1 is p and the probability of event 2 is $1 - p$.
   c. Generalize the formula in part (a) to the case where $U(W) = W^a$ for a > 0.

Answer:

a. The certainty equivalent is $(1/2x^{1/2} + 1/2y^{1/2})^2$
b. $[px^{1/2} + (1 - p)y^{1/2}]^2$
c. $(1/2x^a + 1/2y^a)^{1/a}$

CHAPTER 13 Risky Assets

TRUE-FALSE

Difficulty: 1
Correct Answer: False

1. If two assets have the same expected rate of return but different variances, a risk-averse investor should always choose the one with the smaller variance, no matter what other assets she holds.

Difficulty: 1
Correct Answer: True

2. If the returns on two assets are negatively correlated, then a portfolio that contains some of each will have less variance in its return per dollar invested than either asset has by itself.

Difficulty: 1
Correct Answer: True

3. If the mean is plotted on the horizontal axis, and the variance on the vertical, then indifference curves for a risk averter must slope upward and to the right.

Difficulty: 1
Correct Answer: True

4. If you invest half your money in a risk-free asset and half your money in a risky asset such that the standard deviation of the return on the risky asset is s, then the standard deviation of the return on your investment portfolio is $s/2$.

MULTIPLE CHOICE

Difficulty: 2
Correct Answer: d

1. Firm A sells lemonade and firm B sells hot chocolate. If you invest \$100 if firm A, in one year you will get back $\$(30 + T)$ where T is the average temperature (Fahrenheit) during the summer. If you invest \$100 in firm B, in one year you will get back $\$(150 - T)$, where T is the average temperature during the summer. The expected value of T is 70 and the standard deviation of T is 10. If you invest \$50 in firm A and \$50 in firm B, what is the standard deviation of your return on your investment?
   a. 10
   b. 20
   c. 5
   d. 0
   e. None of the above.

Difficulty: 2
Correct Answer: a

2. A risk-free asset is available at 5% interest. Another asset is available with a mean rate of return of 15% but with a standard deviation of 5%. An investor is considering an investment portfolio consisting of some of each stock. On a graph with standard deviation on the horizontal axis and mean on the vertical axis, the budget line that expresses the alternative combinations of mean return and standard deviation possible with portfolios of these assets is a straight line with
   a. slope 2.
   b. slope -3.
   c. increasing slope as you move left.
   d. slope -1.
   e. slope $-1/3$.

Difficulty: 2
Correct Answer: a

3. Marvin is an expected utility maximizer. He chooses his portfolio so as to maximize the expected value of $2{,}000{,}000x - x^2$. If m is the mean of Marvin's income and s is the standard deviation, Marvin's income as a function of the mean and standard deviation is
   a. $U = 2{,}000{,}000m - s^2$.
   b. $U = 2{,}000{,}000m - s$.
   c. $U = m - s/2{,}000{,}000$.
   d. $U = 2{,}000{,}000 + s$.
   e. None of the above.

Difficulty: 1
Correct Answer: e

4. You have been hired as a portfolio manager for a stock brokerage. Your first job is to invest $100,000 in a portfolio of two assets. The first asset is a safe asset with a sure return of 4% interest. The second asset is a risky asset with a 26% expected rate of return, but the standard deviation of this return is 10%. Your client wants a portfolio with as high a rate of return as possible consistent with a standard deviation no larger than 4%. How much of her money do you invest in the safe asset?
   a. $22,000
   b. $40,000
   c. $64,000
   d. $36,000
   e. $60,000

Difficulty: 1
Correct Answer: b

5. Bill owns an export business. The expected profit from his business is $100,000 a year. For every 1% increase in the value of the Japanese yen relative to the dollar, its profits increase by $20,000. Bill plans to buy one of two firms. One is an import business which returns an expected profit of $70,000. For every 1% increase in the value of the Japanese yen relative to the dollar, the profits of this firm shrink by $5,000. The second is a safe domestic firm which is certain to yield him $70,000 a year. The two firms cost the same. If Bill is risk averse,
   a. he should buy the domestic firm.
   b. he should buy the import firm.
   c. he should buy half of each of these two firms.
   d. it doesn't matter which he buys.
   e. he should buy 80% of the domestic firm and 20% of the import firm.

Difficulty:
Correct Answer: c

6. Suppose that Ms. Lynch in *Workouts* Problem 13.1 can make up her portfolio using a risk-free asset that offers a surefire rate of return of 10% and a risky asset with an expected rate of return of 25%, with standard deviation 5. If she chooses a portfolio with an expected rate of return of 25%, then the standard deviation of her return on this portfolio will be
   a. 2.50%.
   b. 8%.
   c. 5%.
   d. 10%.
   e. None of the above.

Difficulty:
Correct Answer: c

7. Suppose that Ms. Lynch in *Workouts* Problem 13.1 can make up her portfolio using a risk-free asset that offers a surefire rate of return of 5% and a risky asset with an expected rate of return of 10%, with standard deviation 5. If she chooses a portfolio with an expected rate of return of 6.25%, then the standard deviation of her return on this portfolio will be
   a. 0.63%.
   b. 2.50%.
   c. 1.25%.
   d. 4.25%.
   e. None of the above.

Difficulty:
Correct Answer: c

8. Suppose that Ms. Lynch in *Workouts* Problem 13.1 can make up her portfolio using a risk-free asset that offers a surefire rate of return of 10% and a risky asset with an expected rate of return of 15%, with standard deviation 5. If she chooses a portfolio with an expected rate of return of 12.50%, then the standard deviation of her return on this portfolio will be
   a. 5%.
   b. 5.50%.
   c. 2.50%.
   d. 1.25%.
   e. None of the above.

Difficulty:
Correct Answer: a

9. Suppose that Fenner Smith of *Workouts* Problem 13.2 must divide his portfolio between two assets, one of which gives him an expected rate of return of 15% with zero standard deviation and one of which gives him an expected rate of return of 30% and has a standard deviation of 5%. He can alter the expected rate of return and the variance of his portfolio by changing the proportions in which he holds the two assets. If we draw a "budget line" with expected return on the vertical axis and standard deviation on the horizontal axis, depicting the combinations that Smith can obtain, the slope of this budget line is
   a. 3.
   b. −3.
   c. 1.50.
   d. −1.50.
   e. 4.50.

Difficulty:
Correct Answer: d

10. Suppose that Fenner Smith of *Workouts* Problem 13.2 must divide his portfolio between two assets, one of which gives him an expected rate of return of 10% with zero standard deviation and one of which gives him an expected rate of return of 25% and has a standard deviation of 5%. He can alter the expected rate of return and the variance of his portfolio by changing the proportions in which he holds the two assets. If we draw a "budget line" with expected return on the vertical axis and standard deviation on the horizontal axis, depicting the combinations that Smith can obtain, the slope of this budget line is
    a. 1.50.
    b. −1.50.
    c. −3.
    d. 3.
    e. 4.50.

Difficulty:
Correct Answer: c

11. Suppose that Fenner Smith of *Workouts* Problem 13.2 must divide his portfolio between two assets, one of which gives him an expected rate of return of 15% with zero standard deviation and one of which gives him an expected rate of return of 55% and has a standard deviation of 10%. He can alter the expected rate of return and the variance of his portfolio by changing the proportions in which he holds the two assets. If we draw a "budget line" with expected return on the vertical axis and standard deviation on the horizontal axis, depicting the combinations that Smith can obtain, the slope of this budget line is
    a. 2.
    b. −4.
    c. 4.
    d. −2.
    e. 6.

PROBLEM

Difficulty: 3

1. If you invest \$100 now in firm A, in one year you will get back \$$(30 + T)$, where T is the average temperature during the next summer. If you invest \$100 now in firm B, in one year you will get back \$$(180 - T)$. The expected value of T is 70 and the standard deviation of T is 10.
    a. Draw a graph showing the combinations of expected return and standard deviation that you can have by dividing \$100 between stock in A and stock in B. (Hint: Expected value has the property that $E(ax + b) = aE(x) + b$ and standard deviation has the property that $SD(ax + b) =$ [(absolute value of a) times $SD(x)] + b$.)
    b. What is the expected value and standard deviation of the safest investment strategy you can make by this means?
    c. What is the highest expected value you can achieve?

Answer:
   a. The locus includes the line segment from $(S, E) = (0,105)$ to $(S, E) = (10, 110)$ as well as the line segment from (0, 105) to (10, 100).
   b. 105 and 0.
   c. 110.

CHAPTER 14 Consumer's Surplus

TRUE-FALSE

Difficulty: 1
Correct Answer: False

1. Consumer's surplus is another name for excess demand.

Difficulty: 1
Correct Answer: True

2. There is a positive consumer's surplus when the total amount the consumer pays for something is less than the amount she would be willing to pay rather than do without it altogether.

Difficulty: 1
Correct Answer: False

3. The equivalent variation in income from a tax is the amount of extra income that a consumer would need in order to be as well off after the tax is imposed as he was originally.

Difficulty: 2
Correct Answer: True

4. With quasilinear preferences, the equivalent variation and the compensating variation in income due to a tax are the same.

Difficulty: 1
Correct Answer: False

5. Producer's surplus at price p is the vertical distance between the supply curve and the demand curve at price p.

Difficulty: 2
Correct Answer: False

6. If somebody is buying 10 units of x and the price of x falls by \$3, then that person's net consumer's surplus must increase by at least \$30.

Difficulty: 2
Correct Answer: False

7. If somebody is buying 10 units of x and the price of x falls by \$4, then that person's net consumer's surplus must increase by at least \$40.

Difficulty: 1
Correct Answer: False

8. If there is Cobb-Douglas utility, compensating and equivalent variation are the same.

Difficulty: 2
Correct Answer: False

9. Bernice has the utility function $U(x, y) = \min\{x, y\}$. The price of x used to be 3 but rose to 4. The price of y remained at 1. Her income is 12. The price increase was as bad for her as a loss of \$3 in income.

Difficulty:
Correct Answer: False

10. If there is a price increase for a good that Marilyn consumes, her compensating variation is the change in her income that allows her to purchase her new optimal bundle at the original prices.

Difficulty:
Correct Answer: False

11. If there is a price increase for a good that Susan consumes, her compensating variation is the change in her income that allows her to purchase her new optimal bundle at the original prices.

Difficulty: 2
Correct Answer: True

12. Bernice's utility function is $U(x, y) = \min\{x, y\}$. The price of x used to be 3 but rose to 4. The price of y remained at 1. Her income is 12. She would need an income of \$15 to be able to afford a bundle as good as her old one at the new prices.

MULTIPLE CHOICE

Difficulty: 1
Correct Answer: c

1. Ella's utility function is $\min\{5x, y\}$. If the price of x is \$10 and the price of y is \$15, how much money would she need to be able to purchase a bundle that she likes as well as the bundle $(x, y) = (10, 25)$?
   a. \$209
   b. \$440
   c. \$425
   d. \$475
   e. \$85

Difficulty: 1
Correct Answer: b

2. Ella's utility function is $\min\{5x, y\}$. If the price of x is \$20 and the price of y is \$20, how much money would she need to be able to purchase a bundle that she likes as well as the bundle $(x, y) = (7, 15)$?
   a. \$440
   b. \$360
   c. \$177
   d. \$372
   e. \$72

Difficulty: 3
Correct Answer: e

3. Reginald is fond of cigars. His utility function is $U(x, c) = x + 10c - .5c^2$, where c is the number of cigars he smokes per week and x is the money that he spends on the consumption of other goods. Reginald has \$200 a week to spend. Cigars used to cost him \$1 each, but their price went up to \$2 each. This price increase was as bad for him as losing income of
   a. \$5.
   b. \$7.25.
   c. \$9.
   d. \$8.
   e. \$8.50.

Difficulty: 2
Correct Answer: b

4. Sam's utility function is $U(x, y) = 2x + y$, where x is the number of x's he consumes per week and y is the number of y's he consumes per week. Sam has \$200 a week to spend. The price of x is \$4. Sam currently doesn't consume any y. Sam has received an invitation to join a club devoted to the consumption of y. If he joins the club, Sam can get a discount on the purchase of y. If he belonged to the club, he could buy y for \$1 a unit. How much is the most Sam would be willing to pay to join this club?
   a. Nothing
   b. \$100 a week
   c. \$50 a week
   d. \$40 a week
   e. None of the above.

Difficulty: 2
Correct Answer: a

5. Yoram's utility function is $U(x, y) = 2x + 5y$. The price of x is \$4 and the price of y is \$15. Yoram has \$150 a week to spend on x and y. Yoram is offered a chance to join a club of y consumers. If he joins, he can get y at a price of \$10. What is the most that Yoram would be willing to pay to join the club?
   a. Nothing
   b. \$30 a week
   c. \$50 a week
   d. \$75 a week
   e. None of the above.

Difficulty: 2
Correct Answer: e

6. Minnie gets 4 tapes for her birthday, but they are currently useless to her because she doesn't have a tape recorder and she cannot return them for a refund. Her utility function is $U(x, y, z) = x + f(y)z^5$, where z is the number of tapes she has, y is the number of tape recorders she has, and x is the money she has to spend on other stuff. Let $f(y) = 0$ if $y < 1$ and $f(y) = 7$ otherwise. The price of tapes is \$7.99. What is her reservation price for a tape recorder?
   a. \$20
   b. \$7
   c. \$24
   d. \$0
   e. None of the above.

Difficulty: 1
Correct Answer: a

7. Izaak likes to eat pizza and to fish. The more fishing he does the happier he is, up to 8 hours a day. If he fishes longer than 8 hours he gets a sore back and is less happy than if he hadn't fished at all. For y less than or equal to 8, his utility function is $U(x, y) = x + 3y$, where x is money spent on pizza and y is hours per day spent fishing. His income is \$40 a day and he has no expenses other than pizza. The Bureau of Fisheries has just decided to allow people without fishing licenses to fish only 3 hours a day. But if you buy a fishing license, you can fish as many hours as you wish. How much is Izaak willing pay for a license?
   a. \$15
   b. \$24
   c. \$18
   d. \$13
   e. \$0

Difficulty: 1
Correct Answer: b

8. Izaak likes to eat pizza and to fish. The more fishing he does the happier he is, up to 8 hours a day. If he fishes longer than 8 hours he gets a sore back and is less happy than if he hadn't fished at all. For y less than or equal to 8, his utility function is $U(x, y) = x + 6y$, where x is money spent on pizza and y is hours per day spent fishing. His income is $45 a day and he has no expenses other than pizza. The Bureau of Fisheries has just decided to allow people without fishing licenses to fish only 3 hours a day. But if you buy a fishing license, you can fish as many hours as you wish. How much is Izaak willing pay for a license?
   a. $33
   b. $30
   c. $48
   d. $28
   e. $0

Difficulty: 2
Correct Answer: d

9. Ellsworth's utility function is $U(x, y) = \min\{x, y\}$. Ellsworth has $150 and the price of x and the price of y are both $1. Ellsworth's boss is thinking of sending him to another town where the price of x is $1 and the price of y is $2. The boss offers no raise in pay. Ellsworth, who understands compensating and equivalent variation perfectly, complains bitterly. He says that although he doesn't mind moving for its own sake and the new town is just as pleasant as the old, having to move is as bad as a cut in pay of $$A$. He also says he wouldn't mind moving if when he moved he got a raise of $$B$. What are A and B?
   a. $A = 50$ and $B = 50$.
   b. $A = 75$ and $B = 75$.
   c. $A = 75$ and $B = 100$.
   d. $A = 50$ and $B = 75$.
   e. None of the above.

Difficulty: 1
Correct Answer: a

10. Kristina consumes only goods X and Y. Her income is $600 and her utility function is $U(x, y) = \max\{x, y\}$, where x is the number of units of X she consumes and y is the number of units of Y she consumes. The price of good Y is 1. The price of good X used to be 1/2 but is now 2. The equivalent variation of this price change for Kristina is
   a. $300.
   b. $600.
   c. $150.
   d. $800.
   e. None of the above.

Difficulty: 1
Correct Answer: d

11. Holly consumes only goods X and Y. Her income is $500 and her utility function is $U(x, y) = \max\{x, y\}$, where x is the number of units of X she consumes and y is the number of units of Y she consumes. The price of good Y is 1. The price of good X used to be 1/3 but is now 2. The equivalent variation of this price change for Holly is
   a. $111.11.
   b. $1,566.67.
   c. $1,000.
   d. $333.33.
   e. None of the above.

Difficulty: 2
Correct Answer: d

12. Poindexter's utility function is $U(x, y) = \min\{x + 2y, 3x + y\}$, where x is butter and y is guns. If the price of butter is $4 and the price of guns is $5, what would it cost Poindexter to buy the cheapest bundle that he likes as well as 4 units of butter and 3 units of guns?
   a. $31
   b. $32
   c. $29
   d. $28
   e. None of the above.

Difficulty: 3
Correct Answer: d

13. Albin has quasilinear preferences and he loves pretzels. His inverse demand function for pretzels is $p(x) = 49 - 6x$, where x is the number of pretzels that he consumes. He is currently consuming 8 pretzels at a price of $1 per pretzel. If the price of pretzels rises to $7 per pretzel, the change in Albin's consumer surplus is
   a. −$90.
   b. −$56.
   c. −$42.
   d. −$45.
   e. −$42.

Difficulty: 2
Correct Answer: d

14. Bernice's preferences can be represented by the utility function, $U(x, y) = \min\{x, y\}$. She faces prices ($2, $1), and her income is $12. If prices change to ($3, $1), the compensating variation
   a. equals the equivalent variation.
   b. is $2 greater than the equivalent variation.
   c. is $2 smaller than the equivalent variation.
   d. is $1 greater than the equivalent variation.
   e. There is not enough information to determine which variation is larger.

Difficulty: 1
Correct Answer: c

15. At the initial prices, Teodoro is a net seller of apples and a net buyer of bananas. If the price of apples decreases and the price of bananas does not change,
    a. the compensating variation must be negative and the equivalent variation positive.
    b. the compensating variation must be positive and the equivalent variation negative.
    c. both the compensating variation and the equivalent variation must be positive.
    d. both the compensating variation and the equivalent variation must be negative.
    e. the compensating variation must be negative but the equivalent variation could be of either sign.

Difficulty: 1
Correct Answer: b

16. Sam has quasilinear preferences and his demand function for x is $D(p) = 15 - p/3$. The price of x is initially \$15 per unit and increases to \$24 per unit. Sam's change in consumer's surplus is closest to
    a. -168.
    b. -76.
    c. -27.
    d. 75.
    e. Sam won't consume x at either of the prices.

Difficulty: 1
Correct Answer: b

17. Sir Plus has a demand function for mead that is given by the equation $D(p) = 100 - p$. If the price of mead is \$60, how much is Sir Plus's net consumer's surplus?
    a. \$40
    b. \$800
    c. \$1,600
    d. \$400
    e. \$3,900

Difficulty: 1
Correct Answer: c

18. Sir Plus has a demand function for mead that is given by the equation $D(p) = 100 - p$. If the price of mead is \$90, how much is Sir Plus's net consumer's surplus?
    a. \$25
    b. \$10
    c. \$50
    d. \$100
    e. \$8,550

Difficulty: 2
Correct Answer: a

19. Quasimodo from your workbook has the utility function $U(x, m) = 100x - x^2/2 + m$, where x is his consumption of earplugs and m is money left over to spend on other stuff. If he has \$10,000 to spend on earplugs and other stuff and if the price of earplugs rises from \$50 to \$70, then his net consumer's surplus
    a. falls by 800.
    b. falls by 2,800.
    c. falls by 600.
    d. increases by 400.
    e. increase by 1,600.

Difficulty: 2
Correct Answer: a

20. Quasimodo from your workbook has the utility function $U(x, m) = 100x - x^2/2 + m$, where x is his consumption of earplugs and m is money left over to spend on other stuff. If he has \$10,000 to spend on earplugs and other stuff and if the price of earplugs rises from \$50 to \$75, then his net consumer's surplus
    a. falls by 937.50.
    b. increases by 468.75.
    c. falls by 2,937.50.
    d. falls by 625.
    e. increases by 1,875.

Difficulty: 2
Correct Answer: b

21. Bernice has the utility function $u(x, y) = \min\{x, y\}$, where x is the number of pairs of earrings she buys per week and y is the number of dollars per week she has left to spend on other things. (We allow the possibility that she buys fractional numbers of pairs of earrings per week.) If she originally had an income of \$10 per week and was paying a price of \$8 per pair of earrings, then if the price of earrings rose to \$13 per pair, the compensating variation of that price change (measured in dollars per week) would be closest to
    a. \$3.57.
    b. \$5.56.
    c. \$12.11.
    d. \$11.11.
    e. \$10.11.

Difficulty: 2
Correct Answer: c

22. Bernice has the utility function $u(x, y) = \min\{x, y\}$, where x is the number of pairs of earrings she buys per week and y is the number of dollars per week she has left to spend on other things. (We allow the possibility that she buys fractional numbers of pairs of earrings per week.) If she originally had an income of \$18 per week and was paying a price of \$6 per pair of earrings, then if the price of earrings rose to \$10 per pair, the compensating variation of that price change (measured in dollars per week) would be closest to
    a. \$20.57.
    b. \$6.55.
    c. \$10.29.
    d. \$21.57.
    e. \$19.57.

Difficulty: 2
Correct Answer: a

23. If Bernice (whose utility function is $\min\{x, y\}$, where x is her consumption of earrings and y is money left for other stuff) had an income of \$15 and was paying a price of \$8 for a pair of earrings, then if the price of earrings went up to \$13, the equivalent variation of the price change would be
    a. \$5.36.
    b. \$8.33.
    c. \$16.67.
    d. \$2.68.
    e. \$6.85.

Difficulty: 2
Correct Answer: b

24. If Bernice (whose utility function is $\min\{x, y\}$, where x is her consumption of earrings and y is money left for other stuff) had an income of \$12 and was paying a price of \$4 for a pair of earrings, then if the price of earrings went up to \$6, the equivalent variation of the price change would be
    a. \$4.80.
    b. \$3.43.
    c. \$1.71.
    d. \$9.60.
    e. \$4.11.

Difficulty: 2
Correct Answer: a

25. Lolita, the Holstein cow, has a utility function is $U(x, y) = x - x^2/2 + y$, where x is her consumption of cow feed and y is her consumption of hay. If the price of cow feed is \$.30, the price of hay is \$1, and her income is \$4, and if Lolita chooses the combination of hay and cow feed that she likes best from among those combinations she can afford, her utility will be
    a. 4.25.
    b. 3.70.
    c. 0.25.
    d. 6.25.
    e. 2.25.

Difficulty: 2
Correct Answer: c

26. Lolita, the Holstein cow, has a utility function is $U(x, y) = x - x^2/2 + y$, where x is her consumption of cow feed and y is her consumption of hay. If the price of cow feed is \$.10, the price of hay is \$1, and her income is \$2, and if Lolita chooses the combination of hay and cow feed that she likes best from among those combinations she can afford, her utility will be
    a. 1.90.
    b. 3.40.
    c. 2.40.
    d. 0.40.
    e. 1.40.

Difficulty: 2
Correct Answer: b

27. The number of "Gore in 2004" buttons demanded on a certain university campus is given by $D(p) = 100 - p$, where p is the price of buttons measured in pennies. The supply function is $S(p) = p$. The current administration manages to enforce a price ceiling of 40¢ per button. The effect on net consumer's surplus is
    a. an increase of \$5.50.
    b. an increase of \$3.50.
    c. no change.
    d. a decrease of \$3.50.
    e. a decrease of \$5.50.

Difficulty: 2
Correct Answer: b

28. Pablo's utility function is $U(x, y) = x + 10y - y^2/2$, where x is the number of x's he consumes per week and y is the number of y's he consumes per week. Pablo has \$200 a week to spend. The price of x is \$1. The price of y is currently \$5 per unit. Pablo has received an invitation to join a club devoted to the consumption of y. If he joins the club, Pablo can get a discount on the purchase of y. If he belonged to the club, he could buy y for \$1 a unit. How much is the most Pablo would be willing to pay to join this club?
    a. \$8
    b. \$28
    c. \$36
    d. \$56
    e. None of the above.

Difficulty: 2
Correct Answer: d

29. Herbie's utility function is $U(x, y) = x + 8y - y^2/2$, where x is the number of x's he consumes per week and y is the number of y's he consumes per week. Herbie has \$200 a week to spend. The price of x is \$1. The price of y is currently \$4 per unit. Herbie has received an invitation to join a club devoted to the consumption of y. If he joins the club, Herbie can get a discount on the purchase of y. If he belonged to the club, he could buy y for \$1 a unit. How much is the most Herbie would be willing to pay to join this club?
    a. \$33
    b. \$21
    c. \$4.50
    d. \$16.50
    e. None of the above.

PROBLEM

Difficulty: 3

1. The indirect utility function for a consumer with a utility function $U(x_1, x_2)$ is defined to be a function $V(p_1, p_2, m)$ such that $V(p_1, p_2, m)$ is the maximum of $U(x_1, x_2)$ subject to the constraint that the consumer can afford (x_1, x_2) at the prices (p_1, p_2) with income m.
   a. Find the indirect utility function for someone with the utility function $U(x, y) = 2x + y$.
   b. Find the indirect utility function for someone with the utility function $U(x, y) = \min\{2x, y\}$. Explain how you got your answers.

Answer:

a. $m/(\min\{p_1/2, p_2\})$. Consumer spends entire income on x or y depending upon which gives more utility.
b. $m/(p_1 + 2p_2)$. To maximize utility, consumer spends income in increments of one x and 2 ys.

CHAPTER 15 Market Demand

TRUE-FALSE

Difficulty: 1
Correct Answer: True

1. The inverse demand curve $P(x)$ for a good x measures the price per unit at which the quantity x would be demanded.

Difficulty: 2
Correct Answer: False

2. In general, aggregate demand depends only on prices and total income and not on income distribution.

Difficulty: 1
Correct Answer: True

3. If consumer 1 has the demand function $x_1 = 1{,}000 - 2p$ and consumer 2 has the demand function $x_2 = 500 - p$, then the aggregate demand function for an economy with just these two consumers would be $x = 1{,}500 - 3p$ for $p < 500$.

Difficulty: 1
Correct Answer: True

4. If a consumer has to pay his reservation price for a good, then he gets no consumer surplus from purchasing it.

Difficulty: 1
Correct Answer: True

5. If a price changes, then changes in consumption at the intensive margin are changes that happen because consumers alter the amounts that they consume but do not either stop consuming or start consuming the good.

Difficulty: 1
Correct Answer: False

6. If the demand curve is a linear function of price, then the price elasticity of demand is the same at all prices.

Difficulty: 2
Correct Answer: False

7. If the demand function is $q = 3m/p$, where m is income and p is price, then the absolute value of the price elasticity of demand decreases as price increases.

Difficulty: 1
Correct Answer: False

8. If the elasticity of demand curve for barley is -1.50 at all prices higher than the current price, we would expect that when bad weather reduces the size of the barley crop, total revenue of barley producers will fall.

Difficulty: 1
Correct Answer: False

9. If the elasticity of demand curve for buckwheat is -1.25 at all prices higher than the current price, we would expect that when bad weather reduces the size of the buckwheat crop, total revenue of buckwheat producers will fall.

Difficulty: 2
Correct Answer: False

10. If the equation for the demand curve is $q = 20 - 2p$, then the ratio of marginal revenue to price is constant as price changes.

Difficulty: 2
Correct Answer: False

11. If the equation for the demand curve is $q = 50 - 4p$, then the ratio of marginal revenue to price is constant as price changes.

Difficulty: 3
Correct Answer: True

12. If a rational consumer must consume either zero or one unit of a good, then an increase in the price of that good with no change in income or in other prices can never lead to an increase in the consumer's demand for it.

Difficulty: 1
Correct Answer: False

13. In the reservation price model, either aggregate demand is zero or everyone demands one unit of the good.

Difficulty: 1
Correct Answer: False

14. The Laffer effect occurs only if there is a backward-bending labor supply curve.

Difficulty: 2
Correct Answer: True

15. If the demand curve were plotted on graph paper with logarithmic scales on both axes, then its slope would be the elasticity of demand.

Difficulty: 1
Correct Answer: True

16. The market demand curve is simply the horizontal sum of the individual demand curves.

Difficulty: 1
Correct Answer: False

17. The demand curve is inelastic for inferior goods and elastic for normal goods.

Difficulty: 1
Correct Answer: True

18. Marginal revenue is equal to price if the demand curve is horizontal.

Difficulty: 2
Correct Answer: False

19. If the amount of money that people are willing to spend on a good stays the same when its price doubles, then demand for that good must have a price elasticity of demand smaller in absolute value than 1.

Difficulty: 1
Correct Answer: True

20. If the price elasticity of demand for a normal good is constant, then a price increase of 10¢ will reduce demand by more if the original price is \$1 than if the original price is \$2.

Difficulty: 1
Correct Answer: True

21. The demand function for potatoes has the quantity $q = 1{,}000 - 10p$. As the price of potatoes changes from 10¢ to 20¢, the absolute value of the price elasticity of demand for potatoes increases.

Difficulty: 1
Correct Answer: True

22. If the demand curve for a good is given by the equation $q = 2/p$, where q is quantity and p is price, then at any positive price, the elasticity of demand will be -1.

Difficulty: 2
Correct Answer: True

23. If consumer 1 has the inverse demand function given by $p = 15 - x$ and consumer 2 has the inverse demand function given by $p = 20 - 3x$, then the total quantity demanded by the two consumers is $x = 7$ when the price p, is 11.

Difficulty: 2
Correct Answer: False

24. The inverse demand for a good is given by $p = 60 - 2q$. Suppose that the number of consumers doubles. (For each consumer in the market another consumer with an identical demand function appears.) The demand curve shifts to the right, doubling demand at every price, while the slope of the demand curve stays unchanged.

Difficulty: 1
Correct Answer: False

25. If Castor's demand curve is described by $q = 40 - p$ and Pollux's demand curve is given by $q = 60 - 2p$, then each of their demand curves will pass through the point $q = 20$, $p = 20$. Therefore if they are the only two consumers in a market, the market demand curve will also pass through $q = 20$, $p = 20$.

Difficulty: 2
Correct Answer: False

26. If the price of cucumbers falls by \$2 per pound, then the demand for cucumbers will rise by 10 pounds. Therefore we can conclude that the demand for cucumbers is elastic.

Difficulty: 2
Correct Answer: False

27. If the price of leeks falls by \$2 per pound, then the demand for leeks will rise by 10 pounds. Therefore we can conclude that the demand for leeks is elastic.

MULTIPLE CHOICE

Difficulty: 1
Correct Answer: e

1. A peck is 1/4 of a bushel. If the price elasticity of demand for oats is -0.60 when oats are measured in bushels, then when oats are measured in pecks, the price elasticity of demand for oats will be
   a. -0.15.
   b. -2.40.
   c. -0.30.
   d. -1.20.
   e. none of the above.

Difficulty: 1
Correct Answer: a

2. A peck is 1/4 of a bushel. If the price elasticity of demand for peas is -0.10 when peas are measured in bushels, then when peas are measured in pecks, the price elasticity of demand for peas will be
   a. -0.10.
   b. -0.40.
   c. -0.03.
   d. -0.20.
   e. none of the above.

Difficulty: 1
Correct Answer: b

3. The demand function is described by the equation $q(p) = 30 - p/3$. The inverse demand function is described by the equation
   a. $q(p) = 30 - 3p$.
   b. $p(q) = 90 - 3q$.
   c. $q(p) = 1/(30 - p/3)$.
   d. $p(q) = 1/30 - q/3$.
   e. $p(q) = 30 - q/3$.

Difficulty: 1
Correct Answer: a

4. The demand function is described by the equation $q(p) = 130 - p/5$. The inverse demand function is described by the equation
   a. $p(q) = 650 - 5q$.
   b. $p(q) = 1/130 - q/5$.
   c. $q(p) = 130 - 5p$.
   d. $q(p) = 1/(130 - p/5)$.
   e. $p(q) = 130 - q/5$.

Difficulty: 3
Correct Answer: a

5. If the demand function is $q = m - 2(\ln p)$ over some range of values of p, then at all such values of p, the absolute value of the price elasticity of demand
   a. increases as p increases.
   b. decreases as p increases.
   c. is constant as p changes.
   d. increases with p at small values and decreases with p at large values.
   e. decreases with p at large values and increases with p at small values.

Difficulty: 1
Correct Answer: c

6. If the demand function for tickets to a play is $q = 3{,}800 - 95p$, at what price will total revenue be maximized?
   a. \$80
   b. \$40
   c. \$20
   d. \$10
   e. none of the above.

Difficulty: 1
Correct Answer: c

7. If the demand function for tickets to a play is $q = 7{,}500 - 75p$, at what price will total revenue be maximized?
   a. \$100
   b. \$200
   c. \$50
   d. \$25
   e. none of the above.

Difficulty: 2
Correct Answer: d

8. Rollo would love to have a Mercedes. His preferences for consumption in the next year are represented by a utility function $U(x, y)$, where $x = 0$ if he has no Mercedes and $x = 1$ if he has a Mercedes for the year and where y is the amount of income he has left to spend on other stuff. If $U(0, y)$ = the square root of y and $U(1, y) = (10/9)(y^{.5})$ and if Rollo's income is \$50,000 a year, how much would he be willing to pay per year to have a Mercedes?
   a. \$5,555.55
   b. \$5,000
   c. \$12,200
   d. \$9,500
   e. \$10,000

Difficulty: 2
Correct Answer: c

9. In Ozone, California, people all have the same tastes and they all like hot tubs. Nobody wants more than one hot tub but a person with wealth \$$W$ will be willing to pay up to \$.01W for a hot tub. The number of people with a wealth greater than \$$W$ for any given W in Ozone is approximately 1,000,000/W. The price elasticity of demand for hot tubs in Ozone, California, is
   a. -0.1.
   b. -0.01.
   c. -1.
   d. -0.4.
   e. none of the above.

Difficulty: 2
Correct Answer: b

10. In Manifold, Missouri (pop. 1,000), people all have the same tastes and they all like Buicks. Nobody wants more than one Buick, but a person with income \$$M$ is willing to pay about \$.10M per year to have a Buick. Nobody in Manifold has an income greater than \$50,000 and nobody has an income less than \$10,000. For incomes, \$$M$, between \$10,000 and \$50,000, the number of people with incomes greater than \$$M$ is about $1{,}250 - .025M$. If it costs \$2,000 a year to have

a Buick, how many people in Manifold will demand Buicks?

a. 500
b. 750
c. 100
d. 600
e. 800

Difficulty: 2
Correct Answer: c

11. Rod cares about the number of cars he has and the amount of money he has to spend on other stuff. The only possibilities of interest for Rod are having 0, 1, or 2 cars. Where x is the number of cars he has and y is the money he has per year for other stuff, Rod's utility is $U(0, y) = y^{.5}$, $U(1, y) = (15/14)y^{.5}$, and $U(2, y) = (10/9)y^{.5}$. Rod's income is \$25,000 a year. It would cost Rod \$2,500 a year to have 1 car and \$3,500 a year to have 2 cars. How many cars will he choose?

a. 0
b. 1
c. 2
d. He is indifferent between buying 1 and buying 2 cars.
e. He is indifferent between buying 2 and buying 3 cars.

Difficulty: 2
Correct Answer: b

12. Dr. Social Science has recently figured out how to clone consumers. His first effort was done on the population of Walla, Washington. Each original citizen got a clone who had exactly the same income and preferences. Which of the following statements describes what happened to the demand function for tuna-fish casseroles in Walla?

a. The elasticity doubled and the slope remained constant.
b. The elasticity did not change at any price.
c. The elasticity of demand doubled and the slope doubled.
d. The elasticity halved and the slope remained constant.
e. none of the above.

Difficulty: 2
Correct Answer: a

13. At the price of \$100, tourists demand 267 airplane tickets. At the same price, business travelers demand 237. At the price \$110, tourists demand 127 tickets and business travelers demand 127. Assuming that the demand curves of business travelers and tourists are both linear over this price range, what is the price elasticity of demand at the price \$100?

a. −4.96
b. −25
c. −5.46
d. −0.05
e. none of the above.

Difficulty: 2
Correct Answer: a

14. At the price of \$100, tourists demand 237 airplane tickets. At the same price, business travelers demand 247. At the price \$110, tourists demand 127 tickets and business travelers demand 127. Assuming that the demand curves of business travelers and tourists are both linear over this price range, what is the price elasticity of demand at the price \$100?

a. −4.75
b. −5.23
c. −23
d. −0.05
e. none of the above.

Difficulty: 2
Correct Answer: e

15. The inverse demand function for grapes is described by the equation $p = 518 - 5q$, where p is the price in dollars per crate and q is the number of crates of grapes demanded per week. When $p = \$38$ per crate, what is the price elasticity of demand for grapes?

a. −190/96
b. −5/518
c. −5/96
d. −96/38
e. −38/480

Difficulty: 2
Correct Answer: e

16. The inverse demand function for grapes is described by the equation $p = 676 - 9q$, where p is the price in dollars per crate and q is the number of crates of grapes demanded per week. When $p = \$28$ per crate, what is the price elasticity of demand for grapes?

a. −9/676
b. −9/72
c. −72/28
d. −252/72
e. −28/648

Difficulty: 3
Correct Answer: a

17. If there are only two goods, an increase in the price of good 1 will increase the demand for good 2

a. if and only if the price elasticity of demand for good 2 is greater than 1 in absolute value.
b. whenever both goods are normal goods.
c. only if the two goods are perfect substitutes.
d. never.
e. none of the above.

Difficulty: 1
Correct Answer: b

18. The demand function for small business computers in the United States is given by $x = 200 - 10p$, where x is annual sales measured in thousands of computers and p is the price of a computer measured in thousands of dollars. Japanese firms supply a big share of these computers. They measure prices in yen where 150 yen equal 1 dollar. The price of 1 computer is \$10,000. Let E_u be the price elasticity of demand at this price as calculated by US firms who measure in dollars, and let E_j be the price elasticity of demand at the same \$10,000 price but measured in yen by the Japanese firms. Which of the following are the values of E_u and E_j, respectively?
   a. $-1, -150$
   b. $-1, -1$
   c. $-2, -2$
   d. $-2, -300$
   e. $-2, -0.0133$

Difficulty: 1
Correct Answer: a

19. An economy has 100 consumers of type 1 and 200 consumers of type 2. If the price of the good is less than \$10, then each type 1 consumer demands $10 - p$ units of the good; otherwise each type 1 demands zero. If the price of the good is less than 8, then each type 2 demands $24 - 3p$; otherwise each type 2 demands zero. If the price of the good is 6, then the total amount of the good demanded will be
   a. 1,600 units.
   b. 1,800 units.
   c. 2,000 units.
   d. 420 units.
   e. 1,200 units.

Difficulty: 1
Correct Answer: a

20. Harry's demand function for blueberries is $x = 20 - 2p$, where p is the price and x is the quantity demanded. If the price of blueberries is 3, then what is Harry's price elasticity of demand for blueberries?
   a. $-6/14$
   b. $-2/20$
   c. -2
   d. $-14/6$
   e. none of the above.

Difficulty: 1
Correct Answer: d

21. The inverse demand function for soybeans is $p = 30{,}000 - 6q$. Total revenue in this market will be maximized when the quantity of soybeans produced is
   a. 3,611 bushels.
   b. 5,000 bushels.
   c. 1,250 bushels.
   d. 2,500 bushels.
   e. none of the above.

Difficulty: 1
Correct Answer: c

22. The inverse demand function for soybeans is $p = 68{,}000 - 5q$. Total revenue in this market will be maximized when the quantity of soybeans produced is
   a. 3,400 bushels.
   b. 7,911 bushels.
   c. 6,800 bushels.
   d. 13,600 bushels.
   e. none of the above.

Difficulty: 2
Correct Answer: c

23. When the price of bananas is 50 cents a pound, the total demand is 100 pounds. If the price elasticity of demand for bananas is -2, what quantity would be demanded if the price rose to 60 cents a pound?
   a. 50 pounds
   b. 90 pounds
   c. 60 pounds
   d. 80 pounds
   e. 70 pounds

Difficulty: 1
Correct Answer: d

24. The inverse demand function for coffee is $p = 50{,}000 - 2q$, where q is the number of tons produced and p is the price per ton. Total revenue from coffee sales be maximized when the output level is
   a. 25,000 tons.
   b. 15,000 tons.
   c. 17,500 tons.
   d. 12,500 tons.
   e. none of the above.

Difficulty: 2
Correct Answer: b

25. Jen, Eric, and Kurt are all buyers of chain saws. Jen's demand function is $Q_j = 520 - 13P$, Eric's demand function is $Q_e = 40 - P$, and Kurt's demand function is $Q_k = 200 - 5P$. Together, these three constitute the entire demand for chainsaws. At what price will the price elasticity of market demand be -1?
   a. \$19
   b. \$20
   c. \$25
   d. \$15
   e. none of the above.

Difficulty: 2
Correct Answer: d

26. Given his current income, Rico's demand for bagels is related to the price of bagels by the equation $Q = 540 - 16P$. Rico's income elasticity of demand for bagels is known to be equal to 0.5 at all prices and incomes. If Rico's income quadruples, his demand for bagels will be related to the price of bagels by the equation
    a. $Q = 540 - 16P$.
    b. $Q = 2{,}160 - 64P$.
    c. $Q = 540 - 32P$.
    d. $Q = 1{,}080 - 32P$
    e. $Q = 1{,}080 - 16P$.

Difficulty: 2
Correct Answer: b

27. Given his current income, Rico's demand for bagels is related to the price of bagels by the equation $Q = 520 - 12P$. Rico's income elasticity of demand for bagels is known to be equal to 0.5 at all prices and incomes. If Rico's income quadruples, his demand for bagels will be related to the price of bagels by the equation
    a. $Q = 520 - 24P$.
    b. $Q = 1{,}040 - 24P$.
    c. $Q = 2{,}080 - 48P$.
    d. $Q = 520 - 12P$.
    e. $Q = 1{,}040 - 12P$.

Difficulty: 3
Correct Answer: e

28. A person with a quasilinear utility function will
    a. have a price elasticity of demand equal to zero for some goods.
    b. have an income elasticity of demand equal to one for some goods.
    c. necessarily consume zero quantity of some good.
    d. necessarily consume positive amounts of every good.
    e. none of the above.

Difficulty: 2
Correct Answer: c

29. In the village of Frankfurter, the demand function for sausages per person is $D(p) = 20 - 1.5p$, where p is the price of a single sausage. The present population of Frankfurter is 100 persons. Suppose that 10 more people move into town, each of whom has the same demand function as the old residents. At a price of \$2, the price elasticity of demand for sausages in Frankfurter is
    a. increased by 10%.
    b. decreased by 10%.
    c. unchanged.
    d. increased by 15%.
    e. none of the above.

Difficulty: 1
Correct Answer: b

30. A firm faces a demand function $D(p)$, for which the revenue-maximizing price is \$16. The demand function is altered to $2D(p)$. What is the new revenue-maximizing price?
    a. \$8
    b. \$16
    c. \$32
    d. There is insufficient information to determine this.
    e. none of the above.

Difficulty: 1
Correct Answer: c

31. A firm faces a demand function $D(p)$, for which the revenue-maximizing price is \$10. The demand function is altered to $2D(p)$. What is the new revenue-maximizing price?
    a. \$5
    b. \$20
    c. \$10
    d. There is insufficient information to determine this.
    e. none of the above.

Difficulty: 1
Correct Answer: c

32. If the supply curve for x is given by $x = 100p^2$, then the inverse supply curve is given by
    a. $100/p^2$.
    b. $x^2/100$.
    c. $x^{1/2}/10$.
    d. $p^{-2}/100$.
    e. none of the above.

Difficulty: 1
Correct Answer: c

33. Ed has 100 tons of manure. The lowest price at which he is willing to sell it is \$10 per ton. Fred wants to buy 100 tons of manure. The most he is willing to pay is \$8 per ton. The federal government offers to subsidize manure sales at a rate of \$1 per ton. If Ed and Fred are the only people who deal in manure, then the deadweight loss caused by the subsidy is
    a. \$100.
    b. \$50.
    c. \$0.
    d. \$200.
    e. none of the above.

Difficulty: 2
Correct Answer: e

34. Fred's price elasticity of demand for milk is -2 at today's prices when we measure price in dollars and quantity of milk in quarts. If the price per quart of milk stays the same but we measure quantity of milk in

gallons and price in dollars, then what will be the elasticity of demand for gallons of milk? (A gallon is four quarts.)

a. -1
b. $-1/2$
c. -8
d. -4
e. -2

Difficulty: 2
Correct Answer: d

35. In a small Kansas town, there are two kinds of gasoline consumers: 100 Buick owners and 50 Dodge owners. Each Buick owner has the demand function $D_b(p) = \max\{0, 20 - 5p\}$ and each Dodge owner has the demand function $D_d = \max\{0, 15 - 3p\}$. In this town, the market demand curve has
    a. no kinks but gets steeper as price rises.
    b. no kinks but gets flatter as price rises.
    c. constant slope since individual demand curves have constant slope.
    d. a kink at $p = 4$ and another at $p = 5$.
    e. a kink at $p = 35/8$.

Difficulty: 2
Correct Answer: a

36. In a certain city, the demand function for crack cocaine is $q = 1{,}000 - p$, where p is the street price. The cocaine industry is competitive. Cocaine distributors can buy as much cocaine as they wish at a price of $50 per unit from Colombian sources. Whenever the city narcotics police catch a cocaine dealer, they confiscate all the cocaine that he has. The jails are full so they do not imprison the dealers. The police are able to catch the dealers about half the time, so they get about half the cocaine that enters the city. Instead of destroying confiscated crack, the police simply resell it on the street. If the original supply curve of cocaine on the streets was horizontal, what is the net effect of police activities on the market for crack in this city?
    a. The amount purchased on the street is about 50 units smaller than it would be with no enforcement.
    b. There is no effect, since all of the drugs reach consumers anyway.
    c. Crack dealers will stop dealing in this city altogether, since they can make more money elsewhere.
    d. The amount of crack purchased on the street decreases by about half.
    e. The quantity purchased by dealers rises to make up for the amount that is confiscated.

Difficulty: 1
Correct Answer: c

37. If at current prices, the demand for a good is price-elastic, then for movements along the demand curve,
    a. increasing the price will increase revenue.
    b. decreasing the price will decrease revenue.
    c. increasing the quantity sold will increase revenue.
    d. increasing the quantity sold will decrease revenue.
    e. More than one of the above statements are true.

Difficulty: 2
Correct Answer: d

38. The demand curve for a good is given by $p = 160 - 6q$, where p is the price and q is the quantity of the good. Suppose that the number of consumers in the economy doubles; a "clone" of each consumer, who has exactly the same demand curve as the original consumer, appears. The demand curve for the doubled economy is described by
    a. $p = 320 - 6q$.
    b. $p = 320 - 12q$.
    c. $p = 160 - 12q$.
    d. $p = 160 - 3q$.
    e. $p = 80 - 3q$.

Difficulty: 2
Correct Answer: c

39. The demand curve for a good is given by $p = 60 - 8q$, where p is the price and q is the quantity of the good. Suppose that the number of consumers in the economy doubles; a "clone" of each consumer, who has exactly the same demand curve as the original consumer, appears. The demand curve for the doubled economy is described by
    a. $p = 60 - 16q$.
    b. $p = 120 - 8q$.
    c. $p = 60 - 4q$.
    d. $p = 120 - 16q$.
    e. $p = 30 - 4q$.

Difficulty: 2
Correct Answer: e

40. The demand for drangles is given by $D(p) = (p + 1)^{-2}$, where p is the price of drangles. If the price of drangles is $20, then the price elasticity of demand for drangles is
    a. -7.62
    b. -3.81
    c. -5.71
    d. -3.81
    e. -1.90

Difficulty: 2
Correct Answer: e

41. The demand for drangles is given by $D(p) = (p + 1)^{-2}$, where p is the price of drangles. If the price of drangles is \$19, then the price elasticity of demand for drangles is
   a. −3.80
   b. −7.60
   c. −5.70
   d. −3.80
   e. −1.90

Difficulty: 2
Correct Answer: c

42. The only quantities of good 1 that Irene can buy are 1 unit or 0 units. For all positive values of x_2, Irene's preferences are represented by the utility function $(x_1 + 10)(x_2 + 2)$. If her income is \$8 and the price of good 2 is \$1, then Irene's reservation price for good 1 is
   a. \$1.82.
   b. \$1.50.
   c. \$.91.
   d. \$5.
   e. \$.10.

Difficulty: 2
Correct Answer: c

43. The only quantities of good 1 that Tomoko can buy are 1 unit or 0 units. For all positive values of x_2, Tomoko's preferences are represented by the utility function $(x_1 + 14)(x_2 + 16)$. If her income is \$20 and the price of good 2 is \$1, then Tomoko's reservation price for good 1 is
   a. \$.88.
   b. \$8.50.
   c. \$2.40.
   d. \$4.80.
   e. \$1.04.

Difficulty:
Correct Answer: d

44. In Gas Pump, South Dakota, every Buick owner's demand for gasoline is $20 - 5p$ for p less than or equal to 4 and 0 for $p > 4$. Every Dodge owner's demand is $15 - 3p$ for p less than or equal to 5 and 0 for $p > 5$. Suppose that Gas Pump has 100 Buick owners and 100 Dodge owners. If the price of gasoline is \$4.50, what is the total amount of gasoline demanded in Gas Pump?
   a. 300 gallons
   b. 75 gallons
   c. 225 gallons
   d. 150 gallons
   e. none of the above.

Difficulty:
Correct Answer: a

45. In Gas Pump, South Dakota, every Buick owner's demand for gasoline is $20 - 5p$ for p less than or equal to 4 and 0 for $p > 4$. Every Dodge owner's demand is $15 - 3p$ for p less than or equal to 5 and 0 for $p > 5$. Suppose that Gas Pump has 100 Buick owners and 50 Dodge owners. If the price of gasoline is \$4.25, what is the total amount of gasoline demanded in Gas Pump?
   a. 112.50 gallons
   b. 225 gallons
   c. 168.75 gallons
   d. 56.25 gallons
   e. none of the above.

Difficulty:
Correct Answer: c

46. The only quantities of good 1 that Barbie can buy are 1 unit or 0 units. For x_1 equal to 0 or 1 and for all positive values of x_2, suppose that Barbie's preferences were represented by the utility function $(x_1 + 8)(x_2 + 16)$. Then if her income were \$4, her reservation price for good 1 would be
   a. \$4.44.
   b. \$8.50.
   c. \$2.22.
   d. \$.50.
   e. \$1.90.

Difficulty:
Correct Answer: b

47. The only quantities of good 1 that Barbie can buy are 1 unit or 0 units. For x_1 equal to 0 or 1 and for all positive values of x_2, suppose that Barbie's preferences were represented by the utility function $(x_1 + 4)(x_2 + 18)$. Then if her income were \$16, her reservation price for good 1 would be
   a. \$13.60.
   b. \$6.80.
   c. \$9.50.
   d. \$0.22.
   e. \$4.40.

Difficulty:
Correct Answer: a

48. At a large institution of higher learning, the demand for football tickets at each game is $100{,}000 - 8{,}000p$. If the capacity of the stadium at that university is 60,000 seats, what is the revenue maximizing price for this university to charge per ticket?
   a. \$6.25
   b. \$5
   c. \$12.50
   d. \$3.13
   e. \$18.75

Difficulty:
Correct Answer: b

49. At a large institution of higher learning, the demand for football tickets at each game is $100{,}000 - 6{,}000p$. If the capacity of the stadium at that university is 60,000 seats, what is the revenue maximizing price for this university to charge per ticket?
    a. \$16.67
    b. \$8.33
    c. \$6.67
    d. \$4.17
    e. \$25

Difficulty:
Correct Answer: e

50. The demand for tickets to a rock concert is given by $D(p) = 200{,}000 - 10{,}000p$, where p is the price of tickets. If the price of tickets is \$17, then the price elasticity of demand for tickets is
    a. −11.33.
    b. −8.50.
    c. −17.
    d. −2.83.
    e. −5.67.

Difficulty:
Correct Answer: e

51. The demand for tickets to a rock concert is given by $D(p) = 200{,}000 - 10{,}000p$, where p is the price of tickets. If the price of tickets is \$17, then the price elasticity of demand for tickets is
    a. −2.83.
    b. −11.33.
    c. −17.
    d. −8.50.
    e. −5.67.

Difficulty:
Correct Answer: e

52. The demand for watches is $Q = 1{,}000P^{-0.50}I^{-1}$. Assume that per capita income I is \$5,000. At a price P of \$50, the price elasticity of demand is
    a. 2.50.
    b. 1.0.
    c. −1.
    d. −1.50.
    e. 0.50.

Difficulty:
Correct Answer: e

53. The demand for watches is $Q = 1{,}000P^{-2.50}I^{2}$. Assume that per capita income I is \$6,000. At a price P of \$45, the price elasticity of demand is
    a. 1.0.
    b. 2.25.
    c. 2.
    d. −0.50.
    e. 2.50.

Difficulty:
Correct Answer: e

54. The demand for voice mail is $Q = 1{,}000 - 150P + 20I$. Assume that per capita disposable income I is \$900. At a price P of \$40, the income elasticity of demand is
    a. 2.
    b. 4.
    c. 1.0.
    d. 20.
    e. 1.38.

Difficulty:
Correct Answer: e

55. The demand for voice mail is $Q = 1{,}000 - 150P + 25I$. Assume that per capita disposable income I is \$900. At a price P of \$50, the income elasticity of demand is
    a. 1.0.
    b. 5.
    c. 2.50.
    d. 25.
    e. 1.41.

Difficulty:
Correct Answer: b

56. If the marginal cost of making a photocopy is 2 cents and the elasticity of demand is 2.50, the profit-maximizing price is
    a. 3 cents.
    b. 3.33 cents.
    c. 4 cents.
    d. 5 cents.
    e. 6 cents.

Difficulty:
Correct Answer: d

57. If the marginal cost of making a photocopy is 2 cents and the elasticity of demand is 3, the profit-maximizing price is
    a. 5 cents.
    b. 4 cents.
    c. 3.33 cents.
    d. 3 cents.
    e. 6 cents.

Difficulty:
Correct Answer: b

58. If the marginal cost of brewing beer is 40 cents and the profit-maximizing price is 90 cents, then the price elasticity of demand is
    a. −0.66.
    b. −1.8.
    c. −2.
    d. −2.33.
    e. −3.

Difficulty:
Correct Answer: b

59. If the marginal cost of brewing beer is 40 cents and the profit-maximizing price is 90 cents, then the price elasticity of demand is
 a. -2.
 b. -1.8.
 c. -2.33.
 d. -0.66.
 e. -3.

Difficulty:
Correct Answer: c

60. The constant elasticity of demand for cigarettes has been estimated to be 0.5. To reduce smoking by 75%, approximately how much tax needs to be added to a \$1 pack?
 a. \$.38.
 b. \$.75.
 c. \$1.50.
 d. \$2.25.
 e. \$4.

Difficulty:
Correct Answer: a

61. The constant elasticity of demand for cigarettes has been estimated to be 0.5. To reduce smoking by 25%, approximately how much tax needs to be added to a \$1 pack?
 a. \$.50.
 b. \$.75.
 c. \$.25.
 d. \$.13.
 e. \$4.

Difficulty:
Correct Answer: a

62. The demand for cable television hookups is $Q = 100 - 10P^{0.5} + 2I^2$, where P is price and I is per capita income. Cable TV is
 a. a normal good.
 b. a natural monopoly.
 c. an inferior good.
 d. a substitute good.
 e. a complement good.

Difficulty:
Correct Answer: b

63. The demand for cable television hookups is $Q = 100 - 10P^{0.5} + 2I^2$, where P is price and I is per capita income. Cable TV is
 a. a substitute good.
 b. a normal good.
 c. an inferior good.
 d. a natural monopoly.
 e. a complement good.

Difficulty:
Correct Answer: c

64. If the demand for the *Weekly World News* at a local grocery store is described by $Q = 2{,}500 - 400P - I/10$ for $I = \$15{,}000$ and $P = \$1.50$, the marginal revenue of an additional paper sold at this store is
 a. \$1.50.
 b. \$.38.
 c. \$.50.
 d. \$.15.
 e. \$1.

Difficulty:
Correct Answer: c

65. If the demand for the *Weekly World News* at a local grocery store is described by $Q = 2{,}500 - 400P - I/10$ for $I = \$15{,}000$ and $P = \$1.50$, the marginal revenue of an additional paper sold at this store is
 a. \$.15.
 b. \$.38.
 c. \$.50.
 d. \$1.50.
 e. \$1.

Difficulty:
Correct Answer: b

66. Demand for Barbara Streisand CDs is equal to $Q_s = P_s^{2.50} I^{1.80} P_c^{0.60}$, where Q_s is the number of CDs, P_s is the price of a Streisand CD, I is per capita income, and P_c is the price of a Karen Carpenter CD. Streisand and Carpenter CDs
 a. are inferior goods.
 b. are substitutes.
 c. are complements.
 d. have diminishing returns to scale.
 e. are not as good as the original 8-track tapes.

Difficulty:
Correct Answer: c

67. Demand for Barbara Streisand CDs is equal to $Q_s = P_s^{1.70} I^{2.20} P_c^{1.80}$, where *Qs* is the number of CDs, P_s is the price of a Streisand CD, I is per capita income, and *Pc* is the price of a Karen Carpenter CD. Streisand and Carpenter CDs
 a. are inferior goods.
 b. are complements.
 c. are substitutes.
 d. have diminishing returns to scale.
 e. are not as good as the original 8-track tapes.

PROBLEMS

Difficulty: 2

1. Suppose that the inverse demand function for wool is $p = A/q$ for some constant A. Suppose that 1/4 of the world's wool is produced in Australia.
   a. If Australian wool production increases by 1% and the rest of the world holds its output constant, what will be the effect on the world price of wool?
   b. How does the marginal revenue to Australia from an extra unit of wool relate to the price of wool?

Answer:
   a. Price will fall by about 0.25%.
   b. Marginal revenue is 75% of price.

Difficulty: 2

2. Bart Wurst runs the only hot-dog stand in a large park in a large boring town. On Sundays people in this town all sit in the park and sunbathe. For any t between 0 and 30, the number of people who are sitting within t minutes of Bart's stand is $10t^2$. People in Bart's town are lazy and hate to walk. They think that every minute of walking they do is as bad as spending \$.10. Everybody in the park has a reservation price of \$1 for a hot dog, where the cost of a hot dog includes the subjective cost of walking as well as the money price they have to pay when they get there. (Nobody has ever thought of fetching a hot dog for someone else.) Find a formula for the demand curve for Bart's hot dogs. Explain how you got it.

Answer: If Bart charges p, where $0 < p < 1$, his extensive margin is the customers who are at distance t^* from Bart where $p + .10t^* = 1$. Then $t^* = 10 - p$ and the demand for hot dogs at prices p is the number $(10 - p)2$ of people within t^* of Bart.

Difficulty: 3

3. In Tassel, Illinois (pop. 20,000), there are two kinds of families, those who like swimming pools and those who don't. Half of the population is of each type. Families who like swimming pools are willing to spend up to 5% of their income each year on a swimming pool. Families who don't like them would pay nothing for a swimming pool. Nobody wants more than one swimming pool and nobody has thought of sharing a swimming pool. Incomes in Tassel range between \$10,000 and \$110,000. For incomes M in this range, the number of families in Tassel with income greater than M is about $22{,}000 - .2M$. (The two types of families have the same income distribution.) Find the aggregate demand function for swimming pools in Tassel (demand for swimming pools as a function of the annual cost of having one).

Answer: The number of people willing to pay at least p is half of the number who have income at least \$20p. Therefore the aggregate demand function is $11{,}000 - 2p$.

Difficulty: 3

4. Ethel is trying to decide whether to have 0 cars, 1 car, or 2 cars. If x is the number of cars she has and y is the amount of money she has per year to spend on other stuff, Ethel's utility function is $U(x, y)$, where $U(0, y) = y^{1/2}$, $U(1, y) = (15/14)y^{1/2}$, and $U(2, y) = (10/9)y^{1/2}$. Suppose that it costs \$2,000 a year to have 1 car and \$4,000 a year to have 2 cars. Ethel finds that the right thing to do depends on her income.
   a. What is her willingness to pay for 1 car if her income is M?
   b. What is the lowest income at which she would have a car?
   c. What is the lowest income at which she would have 2 cars?

Answer:
   a. Her willingness to pay for 1 car is about .129M, where M is her income.
   b. The lowest income at which she would get a car is \$15,504.
   c. If we solve the equation $U(1, y - 2{,}000) = U(2, y - 4{,}000)$, we find \$55,143. At incomes above that she prefers 2 cars; below that she would be better off to have 1 car.

Difficulty:

5. Using the graph of a demand curve, explain why marginal revenue is less than price.

Answer: Since marginal revenue is the additional revenue received from selling an additional unit of output, it can be graphically represented as box A, increased revenue from an additional unit sold, minus box B, revenue lost from price cuts on units of output that would have been sold at the former price. Since box A has an area equal to the price P, then $MR < P$.

Difficulty:

6. The demand for Craftmatic Adjustable Beds is described by $Q_c = P^{-1.40}_c I^{-0.60} P^{0.20}_m A^{0.25}$, where Q_c is the number of Craftmatic Adjustable Beds demanded, P_c is the price of a Craftmatic Adjustable Bed, I is per capita income, P_m is the price of a battery-powered massage pillow, and A is the advertising budget.
   a. If the marginal cost of producing a Craftmatic Adjustable Bed is \$200, what is the profit-maximizing price?
   b. Per capita income in the United States is forecast to rise by 3% next year. How will this impact Craftmatic's sales?

c. The price of battery-powered massage pillows suddenly fell by 10%. How will this impace Craftmatic's sales?

Answer:

a. \$700.
b. Demand will decrease by 1.8%.
c. Demand will decrease by 2%.

Difficulty:

7. The demand for Craftmatic Adjustable Beds is described by $Q_c = P_c^{-1.60} I^{-0.80} P_m^{1.20} A^{0.25}$, where Qc is the number of Craftmatic Adjustable Beds demanded, P_c is the price of a Craftmatic Adjustable Bed, I is per capita income, P_m is the price of a battery-powered massage pillow, and A is the advertising budget.

a. If the marginal cost of producing a Craftmatic Adjustable Bed is \$200, what is the profit-maximizing price?
b. Per capita income in the United States is forecast to rise by 3% next year. How will this impact Craftmatic's sales?
c. The price of battery-powered massage pillows suddenly fell by 10%. How will this impace Craftmatic's sales?

Answer:

a. \$533.33.
b. Demand will change by −2.40%.
c. Demand will change by −12%.

CHAPTER 16 Equilibrium

TRUE-FALSE

Difficulty: 1
Correct Answer: True

1. If the supply curve is vertical, then the amount supplied is independent of price.

Difficulty: 1
Correct Answer: False

2. If the supply is perfectly elastic, then an upward shift of the demand curve will lead to a higher price and a higher quantity in equilibrium.

Difficulty: 1
Correct Answer: True

3. The supply curve slopes up and to the right. If the demand curve shifts upward to a new curve which is everywhere higher than the old curve (but possibly of different slope) and if the supply curve does not shift, then the equilibrium price and quantity must necessarily increase.

Difficulty: 1
Correct Answer: False

4. Supply and demand theory shows us that the burden of a sales tax is shared equally by suppliers and demanders whether the tax is collected from the sellers or collected from the buyers.

Difficulty: 1
Correct Answer: False

5. An economic situation is Pareto optimal only if there is no way to make someone better off.

Difficulty: 1
Correct Answer: True

6. The amount of a good supplied is independent of the price. If a sales tax is imposed on the good, then the price paid by consumers will not change at all.

Difficulty: 1
Correct Answer: False

7. If a quantity tax is collected from competitive suppliers of a good, placing a tax on the good causes the price paid by consumers to increase more than if the tax had been collected directly from the buyers.

Difficulty: 2
Correct Answer: True

8. The demand curve, which is a downward-sloping straight line, crosses the supply curve, which is an upward-sloping straight line. If a tax is introduced where sellers must pay a tax of $2 per unit sold, then the equilibrium price paid by demanders will rise by more than $1 if the absolute value of the slope of the demand curve is greater than the absolute value of the slope of the supply curve.

MULTIPLE CHOICE

Difficulty: 1
Correct Answer: b

1. The demand for pickles is given by $p = 131 - 2q$ and the supply is given by $p = 5 + 7q$. What is the equilibrium quantity?
   a. 11
   b. 14
   c. 19
   d. 103
   e. None of the above.

Difficulty: 1
Correct Answer: d

2. The demand for pickles is given by $p = 167 - 3q$ and the supply is given by $p = 5 + 6q$. What is the equilibrium quantity?
   a. 15
   b. 23
   c. 113
   d. 18
   e. None of the above.

Difficulty: 1
Correct Answer: b

3. The demand function for fresh strawberries is $q = 200 - 5p$ and the supply function is $q = 60 + 2p$. What is the equilibrium price?
   a. \$10
   b. \$20
   c. \$40
   d. \$50
   e. None of the above.

Difficulty: 1
Correct Answer: d

4. The inverse demand function for mangos is defined by the equation $p = 91 - 5q$, where q is the number of crates that are sold. The inverse supply function is defined by $p = 3 + 6q$. In the past there was no tax on mangos but now a tax of \$44 per crate has been imposed. What are the quantities produced before and after the tax was imposed?
   a. 5 crates before and 5 crates after
   b. 16 crates before and 9 crates after
   c. 14 crates before and 7 crates after
   d. 8 crates before and 4 crates after
   e. None of the above.

Difficulty: 1
Correct Answer: b

5. The inverse demand function for lemons is defined by the equation $p = 120 - 11q$, where q is the number of crates that are sold. The inverse supply function is defined by $p = 8 + 3q$. In the past there was no tax on lemons but now a tax of \$84 per crate has been imposed. What are the quantities produced before and after the tax was imposed?
   a. 4 crates before and 3 crates after
   b. 8 crates before and 2 crates after
   c. 16 crates before and 5 crates after
   d. 16 crates before and 5 crates after
   e. None of the above.

Difficulty: 1
Correct Answer: b

6. The inverse demand function for eggs is $p = 84 - 9q$, where q is the number of cases of eggs. The inverse supply is $p = 7 + 2q$. In the past, eggs were not taxed, but now a tax of 33 dollars per case has been introduced. What is the effect of the tax on the quantity of eggs supplied?
   a. Quantity drops by 2 cases.
   b. Quantity drops by 3 cases.
   c. Quantity drops by 6 cases.
   d. Quantity drops by 4 cases.
   e. None of the above.

Difficulty: 1
Correct Answer: c

7. The inverse demand function for eggs is $p = 125 - 6q$, where q is the number of cases of eggs. The inverse supply is $p = 5 + 6q$. In the past, eggs were not taxed, but now a tax of 72 dollars per case has been introduced. What is the effect of the tax on the quantity of eggs supplied?
   a. Quantity drops by 7 cases.
   b. Quantity drops by 5 cases.
   c. Quantity drops by 6 cases.
   d. Quantity drops by 12 cases.
   e. None of the above.

Difficulty: 1
Correct Answer: c

8. The inverse demand function for cases of whiskey defined by $p = 160 - 6q$, and the inverse supply function is defined by $p = 61 + 3q$. Originally there was no tax on whiskey. Then the government began to tax suppliers of whiskey \$27 for every case they sold. How much did the price paid by consumers rise when the new equilibrium was reached?
   a. It rose by \$27.
   b. It rose by \$29.
   c. It rose by \$18.
   d. It rose by \$16.
   e. None of the above.

Difficulty: 1
Correct Answer: b

9. The inverse demand function for cases of whiskey defined by $p = 186 - 6q$, and the inverse supply function is defined by $p = 90 + 2q$. Originally there was no tax on whiskey. Then the government began to tax suppliers of whiskey \$32 for every case they sold. How much did the price paid by consumers rise when the new equilibrium was reached?
   a. It rose by \$32.
   b. It rose by \$24.
   c. It rose by \$22.
   d. It rose by \$34.
   e. None of the above.

Difficulty: 1
Correct Answer: a

10. The inverse demand function for cigars is defined by $p = 240 - 2q$, and the inverse supply function is defined by $p = 3 + q$. Cigars are taxed at \$4 per box.
    a. The after-tax price paid by consumers rises by more than \$2, and the after-tax price received by suppliers falls by less than \$2.
    b. The after-tax price paid by consumers goes up by less than \$2, and the after-tax price received by suppliers rises.

c. Consumers and suppliers share the cost of the tax equally.
d. The after-tax price paid by consumers rises by \$4, and the after-tax price received by suppliers stays constant.
e. The after-tax price paid by consumers rises by less than \$2, and the after-tax price received by suppliers stays constant.

Difficulty: 2
Correct Answer: d

11. Xaquane and Yullare are obscure but talented eighteenth-century painters. The world's stock of Xaquanes is 100 and the world's stock of Yullares is 70. The demand for each painter's work depends on its own price and the price of the other painter's work. If P_x is the price of Xaquanes and P_y is the price of Yullares, the demand function for Xaquanes is $101 - 3P_x + 2P_y$ and the demand function for Yullares is $72 + P_x - P_y$. What is the equilibrium price for Yullare's paintings?
    a. \$5
    b. \$11
    c. \$12
    d. \$7
    e. None of the above.

Difficulty: 2
Correct Answer: c

12. In a certain kingdom, the demand function for rye bread was $q = 381 - 3p$ and the supply function was $q = 5 + 7p$, where p is the price in zlotys and q is loaves of bread. The king made it illegal to sell rye bread for a price above 32 zlotys per loaf. To avoid shortages, he agreed to pay bakers enough of a subsidy for each loaf of bread so as to make supply equal demand. How much would the subsidy per loaf have to be?
    a. 21 zlotys
    b. 14 zlotys
    c. 8 zlotys
    d. 20 zlotys
    e. None of the above.

Difficulty: 2
Correct Answer: c

13. In a certain kingdom, the demand function for rye bread was $q = 181 - 8p$ and the supply function was $q = 13 + 6p$, where p is the price in zlotys and q is loaves of bread. The king made it illegal to sell rye bread for a price above 6 zlotys per loaf. To avoid shortages, he agreed to pay bakers enough of a subsidy for each loaf of bread so as to make supply equal demand. How much would the subsidy per loaf have to be?
    a. 21 zlotys
    b. 20 zlotys
    c. 14 zlotys
    d. 14 zlotys
    e. None of the above.

Difficulty: 1
Correct Answer: a

14. The demand function for orange juice is $q = 269 - 9p$ and the supply function is $q = 9 + 4p$, where q is the number of units sold per year and p is the price per unit, expressed in dollars. The government decides to support the price of orange juice at a price floor of \$24 per unit by buying orange juice and destroying all that it has purchased. How many units must the government destroy per year?
    a. 52
    b. 56
    c. 25
    d. 61
    e. 57

Difficulty: 1
Correct Answer: d

15. The demand function for orange juice is $q = 247 - 8p$ and the supply function is $q = 19 + 4p$, where q is the number of units sold per year and p is the price per unit, expressed in dollars. The government decides to support the price of orange juice at a price floor of \$27 per unit by buying orange juice and destroying all that it has purchased. How many units must the government destroy per year?
    a. 105
    b. 104
    c. 40
    d. 96
    e. 101

Difficulty: 2
Correct Answer: b

16. The demand function for rental apartments is $q = 960 - 7p$ and the supply function is $q = 160 + 3p$. The government makes it illegal to charge a rent higher than \$35. How much excess demand will there be?
    a. 149
    b. 450
    c. 364
    d. 726
    e. 245

Difficulty: 1
Correct Answer: d

17. The demand function for abalone is $q = 30 - 9p$ and the supply function is $q = 6p$. Suddenly the yuppies discover abalone. The quantity demanded at every price doubles. The supply function, however, remains the

same as before. What is the effect on the equilibrium price and quantity?

a. The price doubles and the quantity remains constant.
b. The quantity doubles and the price remains constant.
c. Both price and quantity double.
d. Both price and quantity increase but neither doubles.
e. None of the above.

Difficulty: 3
Correct Answer: d

18. Remember King Kanuta and his tropical island? The demand function for coconuts by his subjects on the island is $D(p) = 1{,}200 - 100p$ and the supply function is $S(p) = 100p$. The law used to be that any subject who consumed a coconut had to pay another coconut to the king. King Kanuta then ate all the coconuts he got. But now the king, apparently fed up with coconuts, decides to sell the coconuts that he collects in the local market at the going selling price, p_s. In equilibrium, the number of coconuts that will now be produced is
a. 100.
b. 200.
c. 600.
d. 400.
e. 300.

Difficulty: 1
Correct Answer: a

19. The inverse demand function for video games is $p = 240 - 2q$ and the inverse supply function is $p = 3 + q$. When the government imposes a \$6 tax on each video game purchased,
a. consumer's surplus falls by more than producer's surplus.
b. producer's surplus falls by more than consumer's surplus.
c. consumer's surplus and producer's surplus fall by the same amount.
d. comsumer's surplus falls and producer's surplus increases.
e. producer's surplus falls and consumer's surplus increases.

Difficulty: 1
Correct Answer: a

20. The demand function for corn is $q = 200 - p$ and the supply function is $q = 50 + .5p$. The government sets the price of corn at \$150 and agrees to purchase and destroy any excess supply of corn at that price. How much money does it cost the government to buy this corn?
a. \$11,250
b. \$18,750
c. \$7,500
d. \$10,750
e. \$14,500

Difficulty: 3
Correct Answer: b

21. The market for tennis shoes has a horizontal supply curve and a linear, downward-sloping demand curve. Currently the government imposes a tax of t on every pair of tennis shoes sold and does not tax other goods. The government is considering a plan to double the tax on tennis shoes, while leaving other goods untaxed. If the tax is doubled, then
a. the total deadweight loss caused by the doubled tax will be exactly twice the original deadweight loss.
b. the total deadweight loss caused by the doubled tax will be more than twice the original deadweight loss.
c. the total deadweight loss caused by the doubled tax will be less than twice the original deadweight loss.
d. to know if doubling the tax would more than double the deadweight loss, we would have to know the slope of the demand curve.
e. None of the above.

Difficulty: 1
Correct Answer: d

22. The demand curve for rutabagas is a straight line with slope -3 and the supply curve is a straight line with slope 2. Suppose that a new tax of \$3 per sack of rutabagas is introduced.
a. The total number of rutabagas purchased increases.
b. The price paid by demanders rises by the same amount as the price received by suppliers falls.
c. The price received by suppliers falls by more than the price paid by demanders rises.
d. The price paid by demanders rises by more than the price received by suppliers falls.
e. The price paid by demanders rises by more than \$3.

Difficulty: 1
Correct Answer: d

23. The demand curve for rutabagas is a straight line with slope -6 and the supply curve is a straight line with slope 2. Suppose that a new tax of \$3 per sack of rutabagas is introduced.
a. The price received by suppliers falls by more than the price paid by demanders rises.
b. The total number of rutabagas purchased increases.
c. The price paid by demanders rises by the same amount as the price received by suppliers falls.
d. The price paid by demanders rises by more than the price received by suppliers falls.
e. The price paid by demanders rises by more than \$3.

Difficulty: 1
Correct Answer: a

24. The quantity q of grapefruits demanded at price p is given by $q = 30 - 3p$ and the supply schedule by $q = 6p$. The government imposes a quantity tax at some rate t, which it collects from buyers. What is the smallest tax rate that will result in no grapefruits being bought or sold?
 a. 10%
 b. 3.33%
 c. 3.67%
 d. 11.50%
 e. 13%

Difficulty: 1
Correct Answer: b

25. The quantity q of apricots demanded at price p is given by $q = 36 - 4p$ and the supply schedule by $q = 2p$. The government imposes a quantity tax at some rate t, which it collects from buyers. What is the smallest tax rate that will result in no apricots being bought or sold?
 a. 6.67%
 b. 9%
 c. 6%
 d. 10.50%
 e. 12%

Difficulty: 1
Correct Answer: b

26. The demand function for x is $D(p) = 65 - 2p$ and the supply function is $S(p) = 20 + p$. The price that should be set to restrict the quantity supplied to 30 units is closest to
 a. \$5.
 b. \$10.
 c. \$15.
 d. \$50.
 e. \$55.

Difficulty: 2
Correct Answer: d

27. The inverse demand function for apples is defined by the equation $p = 214 - 5q$, where q is the number of units sold. The inverse supply function is defined by $p = 7 + 4q$. A tax of \$36 is imposed on suppliers for each unit of apples that they sell. When the tax is imposed, the quantity of apples sold falls to
 a. 23.
 b. 14.
 c. 17.
 d. 19.
 e. 21.

Difficulty: 2
Correct Answer: a

28. The inverse demand function for cantaloupes is defined by the equation $p = 305 - 5q$, where q is the number of units sold. The inverse supply function is defined by $p = 8 + 4q$. A tax of \$45 is imposed on suppliers for each unit of cantaloupes that they sell. When the tax is imposed, the quantity of cantaloupes sold falls to
 a. 28.
 b. 33.
 c. 21.75.
 d. 26.
 e. 30.50.

Difficulty: 1
Correct Answer: c

29. In a crowded city far away, the civic authorities decided that rents were too high. The long-run supply function of two-room rental apartments was given by $q = 14 + 5p$, and the long-run demand function was given by $q = 329 - 5p$, where p is the rental rate in crowns per week. The authorities made it illegal to rent an apartment for more than 25 crowns per week. To avoid a housing shortage, the authorities agreed to pay landlords enough of a subsidy to make supply equal to demand. How much would the weekly subsidy per apartment have to be to eliminate excess demand at the ceiling price?
 a. 6.50 crowns
 b. 10 crowns
 c. 13 crowns
 d. 26 crowns
 e. 19.50 crowns

Difficulty: 1
Correct Answer: c

30. In a crowded city far away, the civic authorities decided that rents were too high. The long-run supply function of two-room rental apartments was given by $q = 5 + 2p$, and the long-run demand function was given by $q = 225 - 4p$, where p is the rental rate in crowns per week. The authorities made it illegal to rent an apartment for more than 30 crowns per week. To avoid a housing shortage, the authorities agreed to pay landlords enough of a subsidy to make supply equal to demand. How much would the weekly subsidy per apartment have to be to eliminate excess demand at the ceiling price?
 a. 10 crowns
 b. 17 crowns
 c. 20 crowns
 d. 40 crowns
 e. 30 crowns

Difficulty:
Correct Answer: b

31. The price elasticity of demand for a certain agricultural product is constant (over the relevant range of prices) and equal to -1.50. The supply elasticity for this product is constant and equal to 4. Originally the equilibrium price of this good was \$15 per unit. Then it was discovered that consumption of this product was unhealthy. The quantity that would be demanded at any price fell by 11%. The percent change in the long-run equilibrium consumption of this good was
   a. -11%.
   b. -8%.
   c. -2%.
   d. -12%.
   e. There is not enough information to determine the answer.

Difficulty:
Correct Answer: d

32. The price elasticity of demand for a certain agricultural product is constant (over the relevant range of prices) and equal to -2. The supply elasticity for this product is constant and equal to 3. Originally the equilibrium price of this good was \$45 per unit. Then it was discovered that consumption of this product was unhealthy. The quantity that would be demanded at any price fell by 100%. The percent change in the long-run equilibrium consumption of this good was
   a. -100%.
   b. -64%.
   c. -20%.
   d. -60%.
   e. There is not enough information to determine the answer.

Difficulty:
Correct Answer: a

33. Suppose that King Kanuta, whom you met in your workbook, demands that each of his subjects give him 1 coconut for every coconut that they consume. The king puts all of the coconuts that he collects in a large pile and burns them. The supply of coconuts is given by $S(p_s) = 100p_s$, where p_s is the price received by suppliers. The demand for coconuts by the king's subjects is given by $D(p_d) = 1{,}500 - 100p_d$, where p_d is the price paid by consumers. In equilibrium, the price received by suppliers will be
   a. \$6.
   b. \$9.
   c. \$7.50.
   d. \$15.
   e. None of the above.

Difficulty:
Correct Answer: b

34. Suppose that King Kanuta, whom you met in your workbook, demands that each of his subjects give him 2 coconuts for every coconut that they consume. The king puts all of the coconuts that he collects in a large pile and burns them. The supply of coconuts is given by $S(p_s) = 100p_s$, where p_s is the price received by suppliers. The demand for coconuts by the king's subjects is given by $D(p_d) = 6{,}000 - 100p_d$, where p_d is the price paid by consumers. In equilibrium, the price received by suppliers will be
   a. \$30.
   b. \$18.
   c. \$90.
   d. \$27.
   e. None of the above

Difficulty:
Correct Answer: a

35. Schrecklich and Lamerde are two obscure modernist painters, who are no longer alive but whose paintings are still enjoyed by persons of dubious taste. The demand function for Schrecklichs is $200 - 4P_S - 2P_L$ and the demand function for Lamerdes is $200 - 3P_L - P_S$, where P_S and P_L are respectively the price of Schrecklichs and Lamerdes. If the world supply of Schrecklichs is 110 and the world supply of Lamerdes is 110, then the equilibrium price of Schrecklichs is
   a. \$9.
   b. \$22.50.
   c. \$36.
   d. \$27.
   e. \$18.

Difficulty:
Correct Answer: b

36. Schrecklich and Lamerde are two obscure modernist painters, who are no longer alive but whose paintings are still enjoyed by persons of dubious taste. The demand function for Schrecklichs is $200 - 4P_S - 2P_L$ and the demand function for Lamerdes is $200 - 3P_L - P_S$, where P_S and P_L are respectively the price of Schrecklichs and Lamerdes. If the world supply of Schrecklichs is 100 and the world supply of Lamerdes is 70, then the equilibrium price of Schrecklichs is
   a. \$46.
   b. \$4.
   c. \$25.
   d. \$42.
   e. \$8.

Difficulty:
Correct Answer: a

37. Daily demand for gasoline at Billy-Bob's Mobile Station is described by $Q = 776 - 200p$, where Q are gallons of gasoline sold and p is the price in dollars. Billy-Bob's supply is $Q = -890 + 1{,}500p$. Suppose the state government places a tax of 20 cents on every gallon of gasoline sold. What is the deadweight loss resulting from this tax?
    a. 3.53 dollars
    b. 3.11 dollars
    c. 0.42 dollars
    d. 96.12 dollars
    e. 34.59 dollars

Difficulty:
Correct Answer: c

38. Daily demand for gasoline at Billy-Bob's Mobile Station is described by $Q = 980 - 300p$, where Q are gallons of gasoline sold and p is the price in dollars. Billy-Bob's supply is $Q = -2{,}980 + 3{,}000p$. Suppose the state government places a tax of 18 cents on every gallon of gasoline sold. What is the deadweight loss resulting from this tax?
    a. 4.02 dollars
    b. 0.40 dollars
    c. 4.42 dollars
    d. 93.42 dollars
    e. 58.91 dollars

PROBLEMS

Difficulty: 1

1. Use supply and demand analysis to examine the following statement: "The practice of giving food stamps is self-defeating. Food stamps effectively lower the price of food. When food becomes available at lower prices, demand will increase thereby forcing the price up to its initial level." Is this reasoning correct? Draw supply and demand curves to illustrate your answer.

Answer: The subsidy would shift the demand curve to the right, much as the quotation says, but if the supply curve slopes up, then the new equilibrium should take place with a greater supply and a lower net price for those who use food stamps. The market price will rise, but not by the full amount of the discount one gets with food stamps.

Difficulty: 2

2. Long ago, a kindly prince noticed the misery of his subjects. His subjects all had the same preferences and the same low incomes. The demand function of each subject for bread was $q = 26 - p$, where p is the price of bread and q is the number of loaves per week. The supply of bread per capita per week was given by the function $q = .3p$. The king declared since his subjects did not even get a loaf of bread per day, he would help them by making it illegal to sell bread for more than 10 groschens per loaf. Unhappily, a bread shortage arose and people waited in long lines to get bread.
    a. Draw a graph to show why. Put numerical labels on the important points on your graph.
    b. If the citizens could earn 4 groschens per hour at work that was exactly as unpleasant as waiting in line, what would be the equilibrium waiting time for a loaf of bread?

Answer: (b) 3.25 hours.

CHAPTER 17 Auctions

TRUE-FALSE

Difficulty:
Correct Answer: True

1. In a Dutch auction with rational bidders, it sometimes happens that the object being sold goes to someone whose value for the object is not as high as that of some other bidder(s).

Difficulty:
Correct Answer: True

2. In an English auction, with rational bidders, the object being sold always goes to the bidder who values it most highly.

Difficulty:
Correct Answer: True

3. An auction in which some bidders have different information about the value of an object than others is said to be an auction with private values.

Difficulty:
Correct Answer: True

4. In a private-values auction with rational bidders, we can expect the same outcome from an English auction as from a Vickrey auction.

Difficulty:
Correct Answer: False

5. An auctioneer allows bidders to examine a jar of pennies, but he does not allow them to open the jar and count the pennies. The jar is then sold by means of an English auction. Economists call an auction of this type a private-values auction, since opinions differ.

Difficulty:
Correct Answer: True

6. The reserve price in an auction is the lowest price at which the seller of a good will part with it.

Difficulty:
Correct Answer: False

7. If a good is sold in a Dutch auction and the bidders bid rationally, the price paid for the good will always be equal to the second-highest willingness to pay of auction participants.

Difficulty:
Correct Answer: False

8. The “winner’s curse” refers to the fact that in a sealed-bid auction with private values, the winning bidder often pays more than he would have to in order to win the object auctioned.

Difficulty:
Correct Answer: False

9. It is never a profit-maximizing strategy for a seller in an English auction to set a reserve price for the good he is selling so high that he might not be able to sell it at all.

Difficulty:
Correct Answer: True

10. It is often the case that a seller can increase his profit from an auction by setting a reserve price even if he has to destroy the object being auctioned if nobody bids as high as the reserve price.

Difficulty:
Correct Answer: True

11. The profit-maximizing strategy for a bidder in a Vickrey auction where there are common values for the object being sold is to bid less than her estimated value for the object, and the more bidders there are, the more the profit-maximizing bidder should shade her bid below her estimated value.

Difficulty:
Correct Answer: True

12. The optimal strategy for a bidder in a private-values Vickrey auction is to bid his true valuation.

Difficulty:
Correct Answer: True

13. In a common-value auction, the bids of other bidders can influence the maximum amount that one is willing to pay for an object, while in a private-value auction this is not the case.

MULTIPLE CHOICE

Difficulty:
Correct Answer: a

1. A first edition of Adam Smith's *Wealth of Nations* (published in 1776) is being auctioned via the internet. The current owner starts by posting his own "bid" for it. Bidders are allowed to submit bids at any time during a one-week interval. For the following week, bids will be accepted only if they exceed the currently posted high bid. Throughout the week, the highest bid that anyone has made so far will be posted. At the end of the week, the book will be sold to the highest bidder at the price that he or she bid for it. Assuming that bidders understand the rules of the auction, the outcome of this auction will be similar to that for
   a. an English auction with a reserve price equal to the owner's bid.
   b. a Dutch auction with a reserve price equal to the owner's bid.
   c. a sealed-bid auction in which the book is sold to the highest bidder at the highest bidder's bid price.
   d. a common-value auction.
   e. an English auction with no reserve price.

Difficulty:
Correct Answer: c

2. A stamp dealer is holding an auction for an English Penny Black postage stamp, issued in 1840. Potential buyers are asked to submit written bids for this stamp, and it will be sold to the highest bidder at a price equal to the bid submitted by the second-highest bidder. If bidders understand the logic of this auction and bid in their own self-interest,
   a. bidders will shade their bids by approximately 10%, and hence the stamp will be sold for about 10% less than the second-highest willingness to pay.
   b. bidders will bid more than their true valuation, since they only have to pay the second-highest bid and not their own bid.
   c. bidders will bid exactly their true valuation.
   d. the highest bidder will overstate his valuation and the second-highest bidder will understate his valuation.
   e. bidders will all bid $(n - 1/n)$ of their true valuations, where n is the number of bidders.

Difficulty:
Correct Answer: d

3. An antique cabinet is being sold by means of an English auction. There are four bidders, Zelda, Clara, Anneli, and Diana. These bidders are unacquainted with each other and do not collude. Zelda values the cabinet at $800, Clara values it at $550, Anneli values it at $1,300, and Diana values it at $300. If the bidders bid in their rational self-interest, the cabinet will be sold to
   a. Anneli for about $1,300.
   b. Zelda for about $800.
   c. either Anneli or Zelda for slightly more than $800. Which of them actually gets it is randomly determined.
   d. Anneli for slightly more than $800.
   e. None of the above.

Difficulty:
Correct Answer: d

4. An antique cabinet is being sold by means of an English auction. There are four bidders, Holly, Penelope, Minnie, and Sheila. These bidders are unacquainted with each other and do not collude. Holly values the cabinet at $1,600, Penelope values it at $1,350, Minnie values it at $2,100, and Sheila values it at $1,100. If the bidders bid in their rational self-interest, the cabinet will be sold to
   a. Holly for about $1,600.
   b. Minnie for about $2,100.
   c. either Minnie or Holly for slightly more than $1,600. Which of them actually gets it is randomly determined.
   d. Minnie for slightly more than $1,600.
   e. None of the above.

Difficulty:
Correct Answer: d

5. An antique cabinet is being sold by means of an English auction. There are four bidders, Penelope, Marilyn, Irene, and Betsy. These bidders are unacquainted with each other and do not collude. Penelope values the cabinet at $1,600, Marilyn values it at $1,350, Irene values it at $2,100, and Betsy values it at $1,100. If the bidders bid in their rational self-interest, the cabinet will be sold to
   a. Irene for about $2,100.
   b. either Irene or Penelope for slightly more than $1,600. Which of them actually gets it is randomly determined.
   c. Penelope for about $1,600.
   d. Irene for slightly more than $1,600.
   e. None of the above.

Difficulty:
Correct Answer: b

6. First Fiddler's Bank has foreclosed on a home mortgage and is selling the house at auction. There are three bidders for the house, Ernie, Minnie, and Betsy. First Fiddler's does not know the willingness to pay of these three bidders for the house, but on the basis of its previous experience, the bank believes that each of these bidders has a probability of 1/3 of valuing it at \$700,000, a probability of 1/3 of valuing at \$400,000, and a probability of 1/3 of valuing it at \$300,000. First Fiddler's believes that these probabilities are independent among buyers. If First Fiddler's sells the house by means of a second-bidder, sealed-bid auction (Vickrey auction), what will be the bank's expected revenue from the sale? (Choose the closest option.)
   a. \$400,000
   b. \$451,852
   c. \$466,667
   d. \$700,000
   e. \$300,000

Difficulty:
Correct Answer: b

7. First Fiddler's Bank has foreclosed on a home mortgage and is selling the house at auction. There are three bidders for the house, Ernie, Teresa, and Marilyn. First Fiddler's does not know the willingness to pay of these three bidders for the house, but on the basis of its previous experience, the bank believes that each of these bidders has a probability of 1/3 of valuing it at \$600,000, a probability of 1/3 of valuing at \$500,000, and a probability of 1/3 of valuing it at \$200,000. First Fiddler's believes that these probabilities are independent among buyers. If First Fiddler's sells the house by means of a second-bidder, sealed-bid auction (Vickrey auction), what will be the bank's expected revenue from the sale? (Choose the closest option.)
   a. \$433,333
   b. \$448,148
   c. \$600,000
   d. \$500,000
   e. \$200,000

Difficulty:
Correct Answer: d

8. First Fiddler's Bank has foreclosed on a home mortgage and is selling the house at auction. There are three bidders for the house, Zeke, Fanny, and Heidi. First Fiddler's does not know the willingness to pay of these three bidders for the house, but on the basis of its previous experience, the bank believes that each of these bidders has a probability of 1/3 of valuing it at \$800,000, a probability of 1/3 of valuing at \$600,000, and a probability of 1/3 of valuing it at \$300,000. First Fiddler's believes that these probabilities are independent among buyers. If First Fiddler's sells the house by means of a second-bidder, sealed-bid auction (Vickrey auction), what will be the bank's expected revenue from the sale? (Choose the closest option.)
   a. \$566,667
   b. \$600,000
   c. \$800,000
   d. \$574,074
   e. \$300,000

Difficulty:
Correct Answer: d

9. A dealer decides to sell an antique automobile by means of an English auction with a reservation price of \$2,700. There are two bidders. The dealer believes that there are only three possible values, \$5,400, \$3,600, and \$2,700, that each bidder's willingness to pay might take. Each bidder has a probability of 1/3 of having each of these willingness to pay, and the probabilities for each of the two bidders are independent of the other's valuation. Assuming that the two bidders bid rationally and do not collude, the dealer's expected revenue from selling the car is approximately
   a. \$4,500.
   b. \$3,900.
   c. \$3,600.
   d. \$3,300.
   e. \$5,400.

Difficulty:
Correct Answer: b

10. A dealer decides to sell an antique automobile by means of an English auction with a reservation price of \$900. There are two bidders. The dealer believes that there are only three possible values, \$7,200, \$3,600, and \$900, that each bidder's willingness to pay might take. Each bidder has a probability of 1/3 of having each of these willingnesses to pay, and the probabilities for each of the two bidders are independent of the other's valuation. Assuming that the two bidders bid rationally and do not collude, the dealer's expected revenue from selling the car is approximately
   a. \$3,600.
   b. \$2,500.
   c. \$3,900.
   d. \$5,400.
   e. \$7,200.

Difficulty:
Correct Answer: c

11. A dealer decides to sell an antique automobile by means of an English auction with a reservation price of \$1,800. There are two bidders. The dealer believes that there are only three possible values, \$6,300, \$3,600,

and $1,800, that each bidder's willingness to pay might take. Each bidder has a probability of 1/3 of having each of these willingnesses to pay, and the probabilities for each of the two bidders are independent of the other's valuation. Assuming that the two bidders bid rationally and do not collude, the dealer's expected revenue from selling the car is approximately

a. $4,950.
b. $3,600.
c. $2,900.
d. $3,900.
e. $6,300.

Difficulty:
Correct Answer: a

12. A dealer decides to sell an oil painting by means of an English auction with a reservation price just slightly below $45,000. If he fails to get his reservation price for the painting, he will burn it. There are two bidders. The dealer believes that there are only three possible values, $90,000, $45,000, and $18,000, that each bidder's willingness to pay might take. Each bidder has a probability of 1/3 of having each of these willingnesses to pay, and the probabilities for each of the two bidders are independent of the other's valuation. Assuming that the two bidders bid rationally and do not collude, the dealer's expected revenue from selling the painting is slightly less than

a. $40,000.
b. $45,000.
c. $18,000.
d. $31,500.
e. $51,000.

Difficulty:
Correct Answer: b

13. A dealer decides to sell an oil painting by means of an English auction with a reservation price just slightly below $72,000. If he fails to get his reservation price for the painting, he will burn it. There are two bidders. The dealer believes that there are only three possible values, $117,000, $72,000, and $27,000, that each bidder's willingness to pay might take. Each bidder has a probability of 1/3 of having each of these willingnesses to pay, and the probabilities for each of the two bidders are independent of the other's valuation. Assuming that the two bidders bid rationally and do not collude, the dealer's expected revenue from selling the painting is slightly less than

a. $72,000.
b. $69,000.
c. $49,500.
d. $27,000.
e. $78,000.

Difficulty:
Correct Answer: b

14. A dealer decides to sell an oil painting by means of an English auction with a reservation price just slightly below $54,000. If he fails to get his reservation price for the painting, he will burn it. There are two bidders. The dealer believes that there are only three possible values, $90,000, $54,000, and $45,000, that each bidder's willingness to pay might take. Each bidder has a probability of 1/3 of having each of these willingnesses to pay, and the probabilities for each of the two bidders are independent of the other's valuation. Assuming that the two bidders bid rationally and do not collude, the dealer's expected revenue from selling the painting is slightly less than

a. $54,000.
b. $52,000.
c. $49,500.
d. $45,000.
e. $63,000.

Difficulty:
Correct Answer: a

15. Herb's Auction House in Purloined Hubcap, Oregon, holds sealed-bid used-car auctions every Wednesday. Each car is sold to the highest bidder at the second-highest bidder's bid. On average, two-thirds of the cars that are auctioned are lemons and one-third are good used cars. A good car is worth $1,500 to any buyer. A lemon is worth only $150 to a buyer. Most buyers can do no better than random at picking good cars from the lot. There is only one exception, Al Crankcase. Al can sometimes but not always detect lemons by means of a subtle test. A good car will never fail Al's test, but approximately half of the lemons fail his test. Al attends every auction, tests every car, and always bids his expected value. Normal bidders bid less than the expected value for a randomly selected car but more than the value of a lemon.

a. Al will bid $825 for cars that pass his test and $150 for cars that fail his test. Normal bidders will get only lemons.
b. Al will bid $750 for cars that pass his test and $500 for cars that fail his test. Normal bidders will get only lemons.
c. Al will bid $500 for cars that pass his test and $150 for cars that fail his test. Normal bidders will get good cars only 1/6 of the time.
d. Al will bid $600 for cars that pass his test and $250 for cars that fail his test. Normal bidders will get good cars only 1/6 of the time.
e. Al will bid $300 for cars that pass his test and $150 for cars that fail his test. Normal bidders will get good cars 1/12 of the time.

Difficulty:
Correct Answer: b

16. A seller knows that there are two bidders for the object she is selling. She believes that with probability 1/2, one has a buyer value of $5 and the other has a buyer value of $10 and, with probability 1/2, one has a buyer value of $8 and the other has a buyer value of $15. She knows that bidders will want to buy the object so long as they can get it for their buyer value or less. She sells it in an English auction with a reserve price which she must set before the auction starts. To maximize her expected profits, she should set the reserve price at
    a. $5.ß∑
    b. $10.
    c. $8.
    d. $13.
    e. $15.

Difficulty:
Correct Answer: a

17. A seller knows that there are two bidders for the object he is selling. He believes that with probability 1/2, one has a buyer value of $5 and the other has a buyer value of $12 and, with probability 1/2, one has a buyer value of $10 and the other has a buyer value of $30. He knows that bidders will want to buy the object so long as they can get it for their buyer value or less. He sells it in an English auction with a reserve price which he must set before the auction starts. To maximize his expected profits, he should set the reserve price at
    a. $30.
    b. $5.
    c. $12.
    d. $10.
    e. $20.

Difficulty:
Correct Answer: c

18. A seller decides to sell an object by means of a sealed-bid second-price auction without a reservation price. There are two bidders. The seller believes that for each of the two bidders there is a probability of 1/2 that the bidder's value for the object is $600 and a probability of 1/2 that the bidder's value is $200. The seller believes that these probabilities are independent between bidders. If the bidders bid rationally, what is the seller's expected revenue from the auction?
    a. $600
    b. $400
    c. $300
    d. $280
    e. $360

Difficulty:
Correct Answer: a

19. A seller decides to sell an object by means of a sealed-bid second-price auction without a reservation price. There are two bidders. The seller believes that for each of the two bidders there is a probability of 1/2 that the bidder's value for the object is $400 and a probability of 1/2 that the bidder's value is $300. The seller believes that these probabilities are independent between bidders. If the bidders bid rationally, what is the seller's expected revenue from the auction?
    a. $325
    b. $400
    c. $350
    d. $320
    e. $340

Difficulty:
Correct Answer: c

20. A seller decides to sell an object by means of a sealed-bid, second-price auction without a reservation price. There are two bidders. The seller believes that for each of the two bidders there is a probability of 1/2 that the bidder's value for the object is $600 and a probability of 1/2 that the bidder's value is $300. The seller believes that these probabilities are independent between bidders. If the bidders bid rationally, what is the seller's expected revenue from the auction?
    a. $360
    b. $450
    c. $375
    d. $600
    e. $420

Difficulty:
Correct Answer: a

21. A seller decides to sell an object by means of an English auction without a reservation price. There are two bidders. The seller believes that for each of the two bidders there is a probability of 1/2 that the bidder's value for the object is $600 and a probability of 1/2 that the bidder's value is $200. The seller believes that these probabilities are independent between bidders. If the bidders bid rationally, what is the seller's expected revenue from the auction?
    a. $300
    b. $360
    c. $400
    d. $600
    e. $200

Difficulty:
Correct Answer: a

22. A seller decides to sell an object by means of an English auction without a reservation price. There are two bidders. The seller believes that for each of the two bidders there is a probability of 1/2 that the bidder's value for the object is \$400 and a probability of 1/2 that the bidder's value is \$100. The seller believes that these probabilities are independent between bidders. If the bidders bid rationally, what is the seller's expected revenue from the auction?
    a. \$175
    b. \$220
    c. \$400
    d. \$250
    e. \$100

Difficulty:
Correct Answer: c

23. A seller decides to sell an object by means of an English auction without a reservation price. There are two bidders. The seller believes that for each of the two bidders there is a probability of 1/2 that the bidder's value for the object is \$500 and a probability of 1/2 that the bidder's value is \$200. The seller believes that these probabilities are independent between bidders. If the bidders bid rationally, what is the seller's expected revenue from the auction?
    a. \$320
    b. \$350
    c. \$275
    d. \$500
    e. \$200

CHAPTER 18 Technology

TRUE-FALSE

Difficulty: 1
Correct Answer: False

1. The production set of a firm is the set of all products the firm can produce.

Difficulty: 1
Correct Answer: False

2. A production isoquant is a locus of combinations of inputs that are equally profitable.

Difficulty: 1
Correct Answer: False

3. If there are constant returns to scale, then doubling the amount of any input will exactly double the amount of output.

Difficulty: 1
Correct Answer: True

4. The economist's distinction between the long run and the short run captures the idea that quantities of some factor inputs can be varied in the short run but not in the long run.

Difficulty: 2
Correct Answer: True

5. If the production function is $f(x, y) = \min\{2x + y, x + 2y\}$, then there are constant returns to scale.

Difficulty: 2
Correct Answer: True

6. If the production function is $f(x, y) = x + \min\{x, y\}$, then there are constant returns to scale.

Difficulty: 2
Correct Answer: True

7. If the production function is $f(x, y) = \min\{12x, 3y\}$, then there is convexity in production.

Difficulty: 1
Correct Answer: False

8. If the production function is $f(x_1, x_2) = x_1x_2$, then there are constant returns to scale.

Difficulty: 2
Correct Answer: True

9. It is possible to have decreasing marginal products for all inputs, and yet have increasing returns to scale.

Difficulty: 1
Correct Answer: True

10. A production function has well-defined marginal products at every input combination. If factor x is shown on the horizontal axis and factor y is shown on the vertical axis, the slope of the isoquant through a point (x^*, y^*) is the negative of the ratio of the marginal product of x to the marginal product of y.

Difficulty: 1
Correct Answer: False

11. The production function $f(x, y) = x^{2/3} + y^{2/3}$ has increasing returns to scale.

Difficulty: 1
Correct Answer: True

12. The production function $f(x, y) = x + y$ has constant returns to scale.

Difficulty: 2
Correct Answer: True

13. If there is one input used in production and if there are decreasing returns to scale, then the marginal product for the input will be diminishing.

Difficulty: 1
Correct Answer: False

14. A firm's production function is $f(x_1, x_2) = x_1 + 2x_2$. This means that x_2 is twice as expensive as x_1.

Difficulty: 2
Correct Answer: True

15. A firm has two variable factors and a production function $f(x_1, x_2) = (2x_1 + 4x_2)^{1/2}$. The technical rate of substitution between x_1 and x_2 is constant.

Difficulty: 1
Correct Answer: False

16. If the marginal product of each factor decreases as the amount of that factor used increases, then there must be decreasing returns to scale.

MULTIPLE CHOICE

Difficulty: 1
Correct Answer: b

1. In any production process, the marginal product of labor equals
   a. the value of total output minus the cost of the fixed capital stock.
   b. the change in output per unit change in labor input for "small" changes in the amount of input.
   c. total output divided by total labor inputs.
   d. total output produced with the given labor inputs.
   e. the average output of the least-skilled workers employed by the firm.

Difficulty: 2
Correct Answer: a

2. If a firm moves from one point on a production isoquant to another point on the same isoquant, which of the following will certainly not happen?
   a. A change in the level of output
   b. A change in the ratio in which the inputs are combined
   c. A change in the marginal products of the inputs
   d. A change in the rate of technical substitution
   e. A change in profitability

Difficulty: 2
Correct Answer: a

3. A firm has the production function $f(x, y) = x_{.5} + y$, where x is the amount of factor x it uses and y is the amount of factor y. On a diagram we put x on the horizontal axis and y on the vertical axis. We draw some isoquants. Now we draw a straight line on the graph and we notice that the slopes of all the isoquants that it meets have the same slope at the point where they meet this line. The straight line we drew was
   a. vertical.
   b. horizontal.
   c. diagonal through the origin with slope 0.5.
   d. diagonal with slope 2.
   e. diagonal with slope greater than 2.

Difficulty: 2
Correct Answer: e

4. Which of the following production functions exhibit constant returns to scale? In each case y is output and K and L are inputs. (1) $y = K^{1/2}L^{2/3}$. (2) $y = 3K^{1/2}L^{1/2}$. (3) $y = K^{1/2} + L^{1/2}$. (4) $y = 2K + 3L$.
   a. 1, 2, and 4
   b. 2, 3, and 4
   c. 1, 3, and 4
   d. 2 and 3
   e. 2 and 4

Difficulty: 2
Correct Answer: d

5. A firm has the production function $f(x, y) = 60x^{4/5}y^{1/5}$. The slope of the firm's isoquant at the point $(x, y) = (40, 80)$ is (pick the closest one)
   a. −0.50.
   b. −4.
   c. −0.25.
   d. −8.
   e. −0.25.

Difficulty: 2
Correct Answer: a

6. A firm has the production function $f(x, y) = 20x^{3/5}y^{2/5}$. The slope of the firm's isoquant at the point $(x, y) = (20, 40)$ is (pick the closest one)
   a. −3.
   b. −0.67.
   c. −1.50.
   d. −0.50.
   e. −0.25.

Difficulty: 2
Correct Answer: d

7. A firm has the production function $f(x, y) = 20x^{3/5}y^{2/5}$. The slope of the firm's isoquant at the point $(x, y) = (50, 70)$ is (pick the closest one)
   a. −1.50.
   b. −0.67.
   c. −0.71.
   d. −2.10.
   e. −0.36.

Difficulty: 1
Correct Answer: c

8. A firm uses only two inputs to produce its output. These inputs are perfect substitutes. This firm
   a. must have increasing returns to scale.
   b. must have constant returns to scale.
   c. could have increasing returns to scale, constant returns to scale, or decreasing returns to scale.
   d. must have decreasing returns to scale.
   e. must have decreasing returns to scale in the short run and constant returns to scale in the long run.

Difficulty: 2
Correct Answer: c

9. A firm has the production function $f(X, Y) = X^{1/2}Y^{1/2}$, where X is the amount of factor x used and Y is the amount of factor y used. On a diagram we put X on the horizontal axis and Y on the vertical axis. We draw some isoquants. Now we draw a straight line on the graph and we notice that wherever this line meets an isoquant, the isoquant has a slope of -3. The straight line we drew
   a. is vertical.
   b. is horizontal.
   c. is a ray through the origin with slope 3.
   d. is a ray through the origin with slope 4.
   e. has a negative slope.

Difficulty: 2
Correct Answer: b

10. A firm has the production function $f(X, Y) = X^{3/4}Y^{1/4}$, where X is the amount of factor x used and Y is the amount of factor y used. On a diagram we put X on the horizontal axis and Y on the vertical axis. We draw some isoquants. Now we draw a straight line on the graph and we notice that wherever this line meets an isoquant, the isoquant has a slope of -9. The straight line we drew
   a. is horizontal.
   b. is a ray through the origin with slope 3.
   c. is vertical.
   d. is a ray through the origin with slope 4.
   e. has a negative slope.

Difficulty: 2
Correct Answer: a

11. A firm has the production function $f(X, Y) = X^{3/4}Y^{1/4}$, where X is the amount of factor x used and Y is the amount of factor y used. On a diagram we put X on the horizontal axis and Y on the vertical axis. We draw some isoquants. Now we draw a straight line on the graph and we notice that wherever this line meets an isoquant, the isoquant has a slope of -9. The straight line we drew
   a. is a ray through the origin with slope 3.
   b. is a ray through the origin with slope 4.
   c. is vertical.
   d. is horizontal.
   e. has a negative slope.

Difficulty: 1
Correct Answer: c

12. If output is produced with two factors of production and with increasing returns to scale,
   a. there cannot be diminishing marginal rate of substitution.
   b. all inputs must have increasing marginal products.
   c. on a graph of production isoquants, moving along a ray from the origin, output more than doubles as the distance from the origin doubles.
   d. the marginal product of at least one input must be increasing.
   e. all inputs must have decreasing marginal products.

Difficulty: 2
Correct Answer: b

13. A firm has the production function $f(x_1, x_2) = (x^b{}_1 + x_b{}^2)c$, where $b > 0$ and $c > 0$. This firm will have
   a. increasing returns to scale if and only if $2b + c > 1$.
   b. increasing returns to scale if and only if $bc > 1$.
   c. increasing returns to scale if and only if $b + c > 1$.
   d. constant returns to scale if and only if $c = 1$.
   e. constant returns to scale if and only if $b = c$.

Difficulty:
Correct Answer: c

14. A firm has the production function $f(x, y) = x + \min\{x, y\}$. The isoquants for the firm
   a. are L-shaped with the corners of the L's on the line $y = x$.
   b. are L-shaped with the corners of the L's on the line $y = x + 1$.
   c. consist of two line segments, one vertical and the other with a slope of -1.
   d. consist of two line segments, one horizontal and the other with a slope of -1.
   e. are upside down L-shaped.

Difficulty: 3
Correct Answer: d

15. Suppose that the production function is $f(x_1, x_2) = (x^a{}_1 + x^a{}_2)b$, where a and b are positive constants. For what values of a and b is there a diminishing technical rate of substitution?
   a. For any value of a if $b < 1$
   b. For any values of a and b if $ab < 1$
   c. For any values of a and b if $a > b$
   d. For any value of b if $a < 1$
   e. None of the above.

Difficulty:
Correct Answer: d

16. A firm has the production function $f(x_1, x_2) = x^{0.60}{}_1x^{0.30}{}_2$. The isoquant on which output is $80^{3/10}$ has the equation
   a. $x_2 = 80x^{-2}{}_1$.
   b. $x_2 = 80x^{3.33}{}_1$.
   c. $x_1/x_2 = 2$.
   d. $x_2 = 80x^{-0.30}{}_1$.
   e. $x_1 = 0.30x^{-0.70}{}_2$.

Difficulty:
Correct Answer: c

17. A firm has the production function $f(x_1, x_2) = x^{11}x^{0.50}_2$. The isoquant on which output is $30^{5/10}$ has the equation
   a. $x_2 = 30x^{-21}$.
   b. $x_2 = 30x^{21}$.
   c. $x_2 = 30x^{-0.50}_1$.
   d. $x_1/x_2 = 2$.
   e. $x_1 = 0.50x^{-0.50}_2$.

Difficulty:
Correct Answer: d

18. A firm has the production function $f(x_1, x_2) = x^{0.80}_1 x^{0.20}_2$. The isoquant on which output is $70^{2/10}$ has the equation
   a. $x_2 = 70x^5_1$.
   b. $x_1/x2 = 4$.
   c. $x_2 = 70x^{-4}_1$.
   d. $x_2 = 70x^{-0.20}_1$.
   e. $x_1 = 0.20x^{-0.80}_2$.

Difficulty: 1
Correct Answer: e

19. A firm has the production function $f(x, y) = x^{1.40}y^1$. This firm has
   a. decreasing returns to scale and diminishing marginal products for factor x.
   b. increasing returns to scale and decreasing marginal product of factor x.
   c. decreasing returns to scale and increasing marginal product for factor x.
   d. constant returns to scale.
   e. None of the above.

Difficulty: 1
Correct Answer: e

20. A firm has the production function $f(x, y) = x^{1.40}y^{0.90}$. This firm has
   a. decreasing returns to scale and increasing marginal product for factor x.
   b. constant returns to scale.
   c. increasing returns to scale and decreasing marginal product of factor x.
   d. decreasing returns to scale and diminishing marginal products for factor x.
   e. None of the above.

Difficulty: 1
Correct Answer: d

21. A firm has the production function $f(x, y) = x^{0.90}y^{0.80}$. This firm has
   a. constant returns to scale.
   b. decreasing returns to scale and dimininishing marginal products for factor x.
   c. decreasing returns to scale and increasing marginal product for factor x.
   d. increasing returns to scale and decreasing marginal product of factor x.
   e. None of the above.

Difficulty: 1
Correct Answer: b

22. A firm uses 3 factors to produce its output. Its production function is $f(x, y, z) = \min\{x^3/y, y^2, (z^4 - x^4)/y^2\}$. If the amount of each input is multiplied by 3, its output will be multiplied by
   a. 27.
   b. 9.
   c. 3.
   d. 0.30.
   e. The answer depends on the original choice of x, y, and z.

Difficulty: 1
Correct Answer: c

23. A firm uses 3 factors to produce its output. Its production function is $f(x, y, z) = \min\{x^3/y, y^2, (z^4 - x^4)/y^2\}$. If the amount of each input is multiplied by 3, its output will be multiplied by
   a. 0.30.
   b. 3.
   c. 9.
   d. 27.
   e. The answer depends on the original choice of x, y, and z.

Difficulty: 1
Correct Answer: b

24. A firm uses 3 factors to produce its output. Its production function is $f(x, y, z) = \min\{x^3/y, y^2, (z^4 - x^4)/y^2\}$. If the amount of each input is multiplied by 2, its output will be multiplied by
   a. 2.
   b. 4.
   c. 8.
   d. 0.40.
   e. The answer depends on the original choice of x, y, and z.

Difficulty: 2
Correct Answer: a

25. A firm has a production function $f(x, y) = 1.40(x^{0.60} + y^{0.60})^2$ whenever $x > 0$ and $y > 0$. When the amounts of both inputs are positive, this firm has
   a. increasing returns to scale.
   b. decreasing returns to scale.
   c. constant returns to scale.
   d. increasing returns to scale if $x + y > 1$ and decreasing returns to scale otherwise.
   e. increasing returns to scale if output is less than 1 and decreasing returns to scale if output is greater than 1.

Difficulty: 2
Correct Answer: d

26. A firm has a production function $f(x, y) = 1.80(x^{0.80} + y^{0.80})2$ whenever $x > 0$ and $y > 0$. When the amounts of both inputs are positive, this firm has
   a. decreasing returns to scale.
   b. constant returns to scale.
   c. increasing returns to scale if $x + y > 1$ and decreasing returns to scale otherwise.
   d. increasing returns to scale.
   e. increasing returns to scale if output is less than 1 and decreasing returns to scale if output is greater than 1.

Difficulty: 2
Correct Answer: d

27. A firm has a production function $f(x, y) = 1.80(x^{0.80} + y^{0.80})^3$ whenever $x > 0$ and $y > 0$. When the amounts of both inputs are positive, this firm has
   a. increasing returns to scale if $x + y > 1$ and decreasing returns to scale otherwise.
   b. decreasing returns to scale.
   c. constant returns to scale.
   d. increasing returns to scale.
   e. increasing returns to scale if output is less than 1 and decreasing returns to scale if output is greater than 1.

Difficulty:
Correct Answer: c

28. The production function $Q = 50K^{0.25}L^{0.25}$ exhibits
   a. increasing returns to scale.
   b. constant returns to scale.
   c. decreasing returns to scale.
   d. increasing, then diminishing returns to scale.
   e. negative returns to scale.

Difficulty:
Correct Answer: d

29. The production function $Q = 50K^{0.25}L^{0.75}$ exhibits
   a. increasing, then diminishing returns to scale.
   b. increasing returns to scale.
   c. decreasing returns to scale.
   d. constant returns to scale.
   e. negative returns to scale.

Difficulty:
Correct Answer: c

30. The production function $Q = 50K^{0.25}L^{0.75}$ exhibits
   a. increasing returns to scale.
   b. decreasing returns to scale.
   c. constant returns to scale.
   d. increasing, then diminishing returns to scale.
   e. negative returns to scale.

Difficulty:
Correct Answer: c

31. The UJava espresso stand needs two inputs, labor and coffee beans, to produce its only output, espresso. Producing an espresso always requires the same amount of coffee beans and the same amount of time. Which of the following production functions would appropriately describe the production process at UJava, where B represents ounces of coffee beans, and L represents hours of labor?
   a. $Q = B^{0.60}L^{0.40}$.
   b. $Q = B/2 + L/30$.
   c. $Q = \min(2B, 60L)$.
   d. $Q = 0.5B + 0.5L^{0.5}$.
   e. None of the above.

Difficulty:
Correct Answer: a

32. The UJava espresso stand needs two inputs, labor and coffee beans, to produce its only output, espresso. Producing an espresso always requires the same amount of coffee beans and the same amount of time. Which of the following production functions would appropriately describe the production process at UJava, where B represents ounces of coffee beans, and L represents hours of labor?
   a. $Q = \min(2B, 60L)$.
   b. $Q = B^{0.40}L^{0.60}$.
   c. $Q = B/2 + L/30$.
   d. $Q = 0.5B + 0.5L^{0.5}$.
   e. None of the above.

Difficulty:
Correct Answer: c

33. The UJava espresso stand needs two inputs, labor and coffee beans, to produce its only output, espresso. Producing an espresso always requires the same amount of coffee beans and the same amount of time. Which of the following production functions would appropriately describe the production process at UJava, where B represents ounces of coffee beans, and L represents hours of labor?
   a. $Q = 0.5B + 0.5L^{0.5}$.
   b. $Q = B^{0.80}L^{0.20}$.
   c. $Q = \min(2B, 60L)$.
   d. $Q = B/2 + L/30$.
   e. None of the above.

PROBLEMS

Difficulty: 2

1. On separate axes, draw typical production isoquants for each of the following production functions.
   a. $f(x, y) = \min\{2x, x + y\}$.
   b. $f(x, y) = xy$.
   c. $f(x, y) = x + \min\{x, y\}$.
   d. $f(x, y) = x + y^{1/2}$.

Answer:

a. The isoquants have a kink at the line $x = y$. At a typical point on this line, say $x = y = 3$, the isoquant has a vertical segment going all the way to the sky and another segment running from (3, 3) to (6, 0).
b. These are rectangular hyperbolas.
c. If x is on the horizontal axis and y is on the vertical axis, an isoquant has a kink on the line $x = y$. To the left of this line, an isoquant has the slope -1; to the right of this line, an isoquant has slope -1. Above this line the isoquant is vertical.
d. The isoquants are convex to the origin. If you draw a horizontal line through two or more isoquants, they will all have the same slope where they meet this line.

Difficulty:

2. For each of the following production functions, comment on the ability to substitute capital for labor.
   a. $Q = K + L$.
   b. $Q = K^{0.5}L^{0.5}$.
   c. $Q = \min(K, L)$.

Answer:

a. Perfect substitutability.
b. Limited substitutability.
c. No substitutability.

Difficulty:

3. For each of the following production functions, draw a diagram showing the general shape of its corresponding isoquant. Comment on the ease at which labor and capital can be substituted for one another relative to the other two production functions.
   a. $Q = K + L$.
   b. $Q = K^{0.5}L^{0.5}$.
   c. $Q = \min(K, L)$.

Answer:

a. Isoquants are straight lines from the horizontal axis to the vertical axis. Perfect substitutability.
b. Isoquants are curves with slope -1 in the middle and asymptotically approaching both the vertical and horizontal axes. Limited substitutability.
c. Isoquants are L-shaped. No substitutability.

CHAPTER 19 Profit Maximization

TRUE-FALSE

Difficulty: 1
Correct Answer: False

1. The weak axiom of profit-maximizing behavior states that in a modern mixed economy, firms have only a weak incentive to maximize profits.

Difficulty: 1
Correct Answer: False

2. A fixed factor is a factor of production that is used in fixed proportion to the level of output.

Difficulty: 1
Correct Answer: True

3. The marginal product of a factor is just the derivative of the production function with respect to the amount of this factor, holding the amounts of other factor inputs constant.

Difficulty: 2
Correct Answer: False

4. If the value of the marginal product of factor x increases as the quantity of x increases and the value of the marginal product of x is equal to the wage rate, then the profit-maximizing amount of x is being used.

Difficulty: 2
Correct Answer: True

5. If the price of the output of a profit-maximizing, competitive firm rises and all other prices stay constant, then the firm's output cannot fall.

Difficulty: 1
Correct Answer: True

6. If a profit-maximizing competitive firm has constant returns to scale, then its long-run profits must be zero.

Difficulty: 2
Correct Answer: False

7. Just as in the theory of utility-maximizing consumers, the theory of profit-maximizing firms allows the possibility of Giffen factors. These are factors for which a fall in price leads to a fall in demand.

Difficulty: 1
Correct Answer: False

8. If the value of the marginal product of labor exceeds the wage rate, then a competitive, profit-maximizing firm would want to hire less labor.

Difficulty: 2
Correct Answer: False

9. A firm produces one output with one input and has decreasing returns to scale. The price that it pays per unit of input and the price it gets per unit of output are independent of the amount that this firm buys or sells. If the government taxes its net profits at some percentage rate and subsidizes its inputs at the same percentage rate, the firm's profit-maximizing output will not change.

MULTIPLE CHOICE

Difficulty: 2
Correct Answer: d

1. A competitive firm produces output using three fixed factors and one variable factor. The firm's short-run production function is $q = 305x - 2x^2$, where x is the amount of variable factor used. The price of the output is \$2 per unit and the price of the variable factor is \$10 per unit. In the short run, how many units of x should the firm use?
   a. 37
   b. 150
   c. 21
   d. 75
   e. None of the above.

Difficulty: 2
Correct Answer: d

2. A competitive firm produces output using three fixed factors and one variable factor. The firm's short-run

production function is $q = 524x - 4x^2$, where x is the amount of variable factor used. The price of the output is \$3 per unit and the price of the variable factor is \$12 per unit. In the short run, how many units of x should the firm use?
a. 130
b. 32
c. 25
d. 65
e. None of the above.

Difficulty: 2
Correct Answer: a

3. A competitive firm produces output using three fixed factors and one variable factor. The firm's short-run production function is $q = 154x - 5x^2$, where x is the amount of variable factor used. The price of the output is \$2 per unit and the price of the variable factor is \$8 per unit. In the short run, how many units of x should the firm use?
a. 15
b. 30
c. 17
d. 7
e. None of the above.

Difficulty: 2
Correct Answer: a

4. A competitive firm produces a single output using several inputs. The price of output rises by \$4 per unit. The price of one of the inputs increases by \$2 and the quantity of this input that the firm uses increases by 8 units. The prices of all other inputs stay unchanged. From the weak axiom of profit maximization we can tell that
a. the output of the good must have increased by at least 4 units.
b. the inputs of the other factors must have stayed constant.
c. the output of the good must have decreased by at least 2 units.
d. the inputs of at least one of the other factors must have decreased by at least 8 units.
e. the inputs of at least one of the other factors must have increased by at least 8 units.

Difficulty: 2
Correct Answer: c

5. A competitive firm produces a single output using several inputs. The price of output rises by \$4 per unit. The price of one of the inputs increases by \$4 and the quantity of this input that the firm uses increases by 16 units. The prices of all other inputs stay unchanged. From the weak axiom of profit maximization we can tell that
a. the inputs of the other factors must have stayed constant.
b. the inputs of at least one of the other factors must have decreased by at least 16 units.
c. the output of the good must have increased by at least 16 units.
d. the output of the good must have decreased by at least 8 units.
e. the inputs of at least one of the other factors must have increased by at least 16 units.

Difficulty: 2
Correct Answer: a

6. A competitive firm produces a single output using several inputs. The price of output rises by \$3 per unit. The price of one of the inputs increases by \$6 and the quantity of this input that the firm uses increases by 12 units. The prices of all other inputs stay unchanged. From the weak axiom of profit maximization we can tell that
a. the output of the good must have increased by at least 24 units.
b. the inputs of the other factors must have stayed constant.
c. the output of the good must have decreased by at least 12 units.
d. the inputs of at least one of the other factors must have decreased by at least 12 units.
e. the inputs of at least one of the other factors must have increased by at least 12 units.

Difficulty: 2
Correct Answer: e

7. If there is perfect certainty, a competitive firm will necessarily
a. seek to maximize its immediate profits rather than long-run returns because otherwise it will go broke.
b. maximize the ratio of the present value of its sales to the present value of its costs.
c. equalize its profits in all periods.
d. equalize its sales in all periods.
e. None of the above.

Difficulty: 2
Correct Answer: b

8. A firm produces one output using one input. When the cost of the input was \$3 and the price of the output was \$3, the firm used 6 units of input to produce 18 units of output. Later, when the cost of the input was \$7 and the price of the output was \$4, the firm used 5 units of input to produce 20 units of output. This behavior
a. is consistent with WAPM.
b. is not consistent with WAPM.
c. is impossible no matter what the firm is trying to do.
d. suggests the presence of increasing returns to scale.
e. suggests the presence of decreasing returns to scale.

Difficulty: 1
Correct Answer: c

9. A profit-maximizing competitive firm uses just one input, x. Its production function is $q = 4x^{1/2}$. The price of output is \$28 and the factor price is \$7. The amount of the factor that the firm demands is
   a. 8.
   b. 16.
   c. 64.
   d. 60.
   e. None of the above.

Difficulty: 1
Correct Answer: a

10. A profit-maximizing competitive firm uses just one input, x. Its production function is $q = 4x^{1/2}$. The price of output is \$12 and the factor price is \$3. The amount of the factor that the firm demands is
    a. 64.
    b. 16.
    c. 60.
    d. 8.
    e. None of the above.

Difficulty: 1
Correct Answer: c

11. A profit-maximizing competitive firm uses just one input, x. Its production function is $q = 8x^{1/2}$. The price of output is \$24 and the factor price is \$8. The amount of the factor that the firm demands is
    a. 11.
    b. 128.
    c. 144.
    d. 27.71.
    e. None of the above.

Difficulty: 2
Correct Answer: a

12. A competitive, profit-maximizing firm uses two inputs a and b. Its production function is $F(a, b) = a^{1/2} + b^{1/2}$. Its output sells for \$5 per unit. The price of input a is \$1 per unit. If the price of output rises to \$6 per unit but factor prices do not change.
    a. it will increase its purchases of factor a by 11/4 units.
    b. it will increase its purchases of factor a by 9/4 units.
    c. it will increase its purchases of factor a by 3/4 units.
    d. we need to know the price of factor b to be able to determine the change in demand for a.
    e. None of the above.

Difficulty: 2
Correct Answer: a

13. A competitive firm's production function is $f(x_1, x_2) = 12x^{1/2}{}_1 + 4x^{1/2}{}_2$. The price of factor 1 is \$1 and the price of factor 2 is \$2. The price of output is \$4. What is the profit-maximizing quantity of output?
    a. 304
    b. 608
    c. 300
    d. 612
    e. 292

Difficulty: 2
Correct Answer: b

14. A competitive firm's production function is $f(x_1, x_2) = 6x^{1/2}{}_1 + 8x^{1/2}{}_2$. The price of factor 1 is \$1 and the price of factor 2 is \$4. The price of output is \$8. What is the profit-maximizing quantity of output?
    a. 416
    b. 208
    c. 204
    d. 419
    e. 196

Difficulty: 2
Correct Answer: a

15. A competitive firm's production function is $f(x_1, x_2) = 8x^{1/2}{}_1 + 8x^{1/2}{}_2$. The price of factor 1 is \$1 and the price of factor 2 is \$3. The price of output is \$6. What is the profit-maximizing quantity of output?
    a. 256
    b. 512
    c. 252
    d. 516
    e. 244

Difficulty: 2
Correct Answer: b

16. Jiffy-Pol Consultants is paid \$1,000,000 for each percentage of the vote that Senator Sleaze receives in the upcoming election. Sleaze's share of the vote is determined by the number of slanderous campaign ads run by Jiffy-Pol according to the function $S = 100N/(N + 1)$, where N is the number of ads. If each ad costs \$4,900 approximately how many ads should Jiffy-Pol buy in order to maximize its profits?
    a. 2,853
    b. 1,428
    c. 98
    d. 1,477
    e. 714

Difficulty: 2
Correct Answer: c

17. Jiffy-Pol Consultants is paid \$1,000,000 for each percentage of the vote that Senator Sleaze receives in the upcoming election. Sleaze's share of the vote is determined by the number of slanderous campaign ads run by Jiffy-Pol according to the function $S = 100N/(N + 1)$, where N is the number of ads. If each ad costs \$10,000 approximately how many ads should Jiffy-Pol buy in order to maximize its profits?
   a. 200
   b. 1,995
   c. 999
   d. 1,099
   e. 500

Difficulty: 2
Correct Answer: c

18. Jiffy-Pol Consultants is paid \$1,000,000 for each percentage of the vote that Senator Sleaze receives in the upcoming election. Sleaze's share of the vote is determined by the number of slanderous campaign ads run by Jiffy-Pol according to the function $S = 100N/(N + 1)$, where N is the number of ads. If each ad costs \$3,600 approximately how many ads should Jiffy-pol buy in order to maximize its profits?
   a. 3,329
   b. 72
   c. 1,666
   d. 1,702
   e. 833

Difficulty: 2
Correct Answer: c

19. A competitive firm uses a single input x to produce its output y. The firm's production function is given by $y = x^{3/2}$ for quantities of x between 0 and 4. For quantities of a greater than 4, the firm's output is $y = 4 + x$. If the price of the output y is \$1 and the price of the input x is \$3, how much x should the firm use to maximize its profit?
   a. 16/9
   b. 4
   c. 0
   d. 4/3
   e. 9/2

Difficulty: 1
Correct Answer: b

20. The production function is given by $F(L) = 6L^{2/3}$. Suppose that the cost per unit of labor is \$16 and the price of output is \$8. How many units of labor will the firm hire?
   a. 16
   b. 8
   c. 4
   d. 24
   e. None of the above.

Difficulty: 1
Correct Answer: b

21. The production function is given by $F(L) = 6L^{2/3}$. Suppose that the cost per unit of labor is \$16 and the price of output is \$16. How many units of labor will the firm hire?
   a. 192
   b. 64
   c. 32
   d. 128
   e. None of the above.

Difficulty: 1
Correct Answer: c

22. The production function is given by $F(L) = 6L^{2/3}$. Suppose that the cost per unit of labor is \$16 and the price of output is \$12. How many units of labor will the firm hire?
   a. 54
   b. 13.50
   c. 27
   d. 81
   e. None of the above.

Difficulty: 1
Correct Answer: a

23. The production function is given by $f(x) = 4x^{1/2}$. If the price of the commodity produced is \$60 per unit and the cost of the input is \$10 per unit, how much profit will the firm make if it maximizes profit s?
   a. \$1,440
   b. \$718
   c. \$2,884
   d. \$1,425
   e. \$723

Difficulty: 1
Correct Answer: c

24. The production function is given by $f(x) = 4x^{1/2}$. If the price of the commodity produced is \$60 per unit and the cost of the input is \$20 per unit, how much profit will the firm make if it maximizes profits?
   a. \$1,444
   b. \$705
   c. \$720
   d. \$358
   e. \$363

Difficulty: 1
Correct Answer: c

25. The production function is given by $f(x) = 4x^{1/2}$. If the price of the commodity produced is \$80 per unit and the cost of the input is \$40 per unit, how much profits will the firm make if it maximizes profits?
    a. \$318
    b. \$1,284
    c. \$640
    d. \$625
    e. \$323

Difficulty: 1
Correct Answer: c

26. The production function is $f(x_1, x_2) = x^{1/2}{}_1 x^{1/2}{}_2$. If the price of factor 1 is \$12 and the price of factor 2 is \$24, in what proportions should the firm use factors 1 and 2 if it wants to maximize profits?
    a. $x_1 = x_2$.
    b. $x_1 = 0.50x_2$.
    c. $x_1 = 2x_2$.
    d. $x_1 = 24x_2$.
    e. We can't tell without knowing the price of the output.

Difficulty: 1
Correct Answer: c

27. The production function is $f(x_1, x_2) = x^{1/2}{}_1 x^{1/2}{}_2$. If the price of factor 1 is \$6 and the price of factor 2 is \$12, in what proportions should the firm use factors 1 and 2 if it wants to maximize profits?
    a. $x_1 = 12x_2$.
    b. $x_1 = 0.50x_2$.
    c. $x_1 = 2x_2$.
    d. $x_1 = x_2$.
    e. We can't tell without knowing the price of the output.

Difficulty: 1
Correct Answer: a

28. The production function is $f(x_1, x_2) = x^{1/2}{}_1 x^{1/2}{}_2$. If the price of factor 1 is \$10 and the price of factor 2 is \$15, in what proportions should the firm use factors 1 and 2 if it wants to maximize profits?
    a. $x_1 = 1.50x_2$.
    b. $x_1 = x_2$.
    c. $x_1 = 15x_2$.
    d. $x_1 = 0.67x_2$.
    e. We can't tell without knowing the price of the output.

Difficulty: 2
Correct Answer: a

29. When Farmer Hoglund applies N pounds of fertilizer per acre, the marginal product of fertilizer is $1 - N/200$ bushels of corn. If the price of corn is \$4 per bushel and the price of fertilizer is \$1.20 per pound, then how many pounds of fertilizer per acre should Farmer Hoglund use in order to maximize his profits?
    a. 140
    b. 280
    c. 74
    d. 288
    e. 200

Difficulty: 2
Correct Answer: d

30. When Farmer Hoglund applies N pounds of fertilizer per acre, the marginal product of fertilizer is $1 - N/200$ bushels of corn. If the price of corn is \$1 per bushel and the price of fertilizer is \$.20 per pound, then how many pounds of fertilizer per acre should Farmer Hoglund use in order to maximize his profits?
    a. 84
    b. 328
    c. 320
    d. 160
    e. 200

Difficulty: 2
Correct Answer: c

31. When Farmer Hoglund applies N pounds of fertilizer per acre, the marginal product of fertilizer is $1 - N/200$ bushels of corn. If the price of corn is \$2 per bushel and the price of fertilizer is \$.40 per pound, then how many pounds of fertilizer per acre should Farmer Hoglund use in order to maximize his profits?
    a. 320
    b. 328
    c. 160
    d. 84
    e. 200

Difficulty:
Correct Answer: e

32. If the short-run marginal costs of producing a good are \$40 for the first 200 units and \$50 for each additional unit beyond 200, then in the short run, if the market price of output is \$46, a profit-maximizing firm will
    a. produce a level of output where marginal revenue equals marginal costs.
    b. produce as much output as possible since there are constant returns to scale.
    c. produce up to the point where average costs equal \$46.
    d. not produce at all, since marginal costs are increasing.
    e. produce exactly 200 units.

Difficulty:
Correct Answer: e

33. If the short-run marginal costs of producing a good are \$20 for the first 400 units and \$30 for each additional

unit beyond 400, then in the short run, if the market price of output is $21, a profit-maximizing firm will

a. produce a level of output where marginal revenue equals marginal costs.
b. not produce at all, since marginal costs are increasing.
c. produce up to the point where average costs equal $21.
d. produce as much output as possible since there are constant returns to scale.
e. produce exactly 400 units.

Difficulty:
Correct Answer: e

34. If the short-run marginal costs of producing a good are $20 for the first 400 units and $30 for each additional unit beyond 400, then in the short run, if the market price of output is $24, a profit-maximizing firm will
 a. not produce at all, since marginal costs are increasing.
 b. produce as much output as possible since there are constant returns to scale.
 c. produce up to the point where average costs equal $24.
 d. produce a level of output where marginal revenue equals marginal costs.
 e. produce exactly 400 units.

Difficulty:
Correct Answer: d

35. Diesel Dan is a contract truck driver. While his revenue is $2.50 per mile driven, the faster he drives, the greater the risk of a speeding ticket. The cost of driving his truck 1 hour at a speed of S miles per hour is $C(S) = e^{S-(60/5)}$. To maximize his profit, Dan should drive
 a. 60 miles per hour.
 b. 60.92 miles per hour.
 c. 64.58 miles per hour.
 d. 72.63 miles per hour.
 e. 79.56 miles per hour.

Difficulty:
Correct Answer: c

36. Diesel Dan is a contract truck driver. While his revenue is $2 per mile driven, the faster he drives, the greater the risk of a speeding ticket. The cost of driving his truck 1 hour at a speed of S miles per hour is $C(S) = e^{S-(65/3)}$. To maximize his profit, Dan should drive
 a. 65.69 miles per hour.
 b. 65 miles per hour.
 c. 70.38 miles per hour.
 d. 67.08 miles per hour.
 e. 74.53 miles per hour.

Difficulty:
Correct Answer: c

37. Diesel Dan is a contract truck driver. While his revenue is $1.50 per mile driven, the faster he drives, the greater the risk of a speeding ticket. The cost of driving his truck 1 hour at a speed of S miles per hour is $C(S) = e^{S-(60/4)}$. To maximize his profit, Dan should drive
 a. 60.41 miles per hour.
 b. 61.62 miles per hour.
 c. 67.17 miles per hour.
 d. 60 miles per hour.
 e. 72.71 miles per hour.

Difficulty:
Correct Answer: b

38. During the height of the pet rock craze in the 1970s, the price elasticity of demand was estimated to be 1.20. Since pet rocks have a marginal cost of zero, a profit-maximizing seller of pet rocks would
 a. increase prices.
 b. decrease prices.
 c. leave prices unchanged.
 d. need more-detailed market information before making any pricing changes.
 e. diversify into selling Karen Carpenter LPs.

Difficulty:
Correct Answer: c

39. During the height of the pet rock craze in the 1970s, the price elasticity of demand was estimated to be 1.20. Since pet rocks have a marginal cost of zero, a profit-maximizing seller of pet rocks would
 a. leave prices unchanged.
 b. need more-detailed market information before making any pricing changes.
 c. decrease prices.
 d. increase prices.
 e. diversify into selling Karen Carpenter LPs.

Difficulty:
Correct Answer: b

40. During the height of the pet rock craze in the 1970s, the price elasticity of demand was estimated to be 1.80. Since pet rocks have a marginal cost of zero, a profit-maximizing seller of pet rocks would
 a. leave prices unchanged.
 b. decrease prices.
 c. increase prices.
 d. need more-detailed market information before making any pricing changes.
 e. diversify into selling Karen Carpenter LPs.

Difficulty:
Correct Answer: b

41. Philip owns and operates a gas station. Philip works 40 hours a week managing the station but doesn't draw a salary. He could earn \$700 a week doing the same work for Terrance. The station owes the bank \$100,000 and Philip has invested \$100,000 of his own money. If Philip's accounting profits are \$1,000 per week while the interest on his bank debt is \$400 per week, the business's economic profits are
    a. \$0 per week.
    b. −\$100 per week.
    c. \$600 per week.
    d. \$300 per week.
    e. \$1,000 per week.

Difficulty:
Correct Answer: a

42. Philip owns and operates a gas station. Philip works 40 hours a week managing the station but doesn't draw a salary. He could earn \$800 a week doing the same work for Terrance. The station owes the bank \$100,000 and Philip has invested \$100,000 of his own money. If Philip's accounting profits are \$1,000 per week while the interest on his bank debt is \$300 per week, the business's economic profits are
    a. −\$100 per week.
    b. \$200 per week.
    c. \$0 per week.
    d. \$700 per week.
    e. \$1,000 per week.

Difficulty:
Correct Answer: b

43. Philip owns and operates a gas station. Philip works 40 hours a week managing the station but doesn't draw a salary. He could earn \$600 a week doing the same work for Terrance. The station owes the bank \$100,000 and Philip has invested \$100,000 of his own money. If Philip's accounting profits are \$1,000 per week while the interest on his bank debt is \$500 per week, the business's economic profits are
    a. \$500 per week.
    b. −\$100 per week.
    c. \$400 per week.
    d. \$0 per week.
    e. \$1,000 per week.

PROBLEM

Difficulty: 3

1. A competitive firm has a production function described as follows. "Weekly output is the square root of the minimum of the number of units of capital and the number of units of labor employed per week." Suppose that in the short run this firm must use 16 units of capital but can vary its amount of labor freely.
    a. Write down a formula that describes the marginal product of labor in the short run as a function of the amount of labor used. (Be careful at the boundaries.)
    b. If the wage is $w = \$1$ and the price of output is $p = \$4$, how much labor will the firm demand in the short run?
    c. What if $w = \$1$ and $p = \$10$?
    d. Write down an equation for the firm's short-run demand for labor as a function of w and p.

Answer:
    a. $MP = 1/(2L^{1/2})$ if $L < 16$, $MP = 0$ if $L > 16$.
    b. 4.
    c. 16.
    d. $L = (p/2w)^2$.

CHAPTER 20 Cost Minimization

TRUE-FALSE

Difficulty: 2
Correct Answer: True

1. Quasi-fixed costs are those costs that can be avoided if and only if a firm produces zero output.

Difficulty: 1
Correct Answer: True

2. If there are increasing returns to scale, then average costs are a decreasing function of output.

Difficulty: 2
Correct Answer: False

3. If there are increasing returns to scale, then costs per unit of output decrease as you move downward and to the right along an isocost line.

Difficulty: 2
Correct Answer: False

4. If the production function is $f(x_1, x_2) = \min\{x_1, x_2\}$, then the cost function is $c(w_1, w_2, y) = \min\{w_1, w_2\}y$.

Difficulty: 1
Correct Answer: False

5. The conditional factor demand function for factor 1 is a function $x_1(w_1, w_2, y)$ that tells the ratio of price to output for an optimal factor choice of the firm.

Difficulty: 1
Correct Answer: False

6. The cost function $c(w_1, w_2, y)$ expresses the cost per unit of output of producing y units of output if equal amounts of both factors are used.

Difficulty: 2
Correct Answer: False

7. A competitive, cost-minimizing firm has the production function $f(x, y) = x + 2y$ and uses positive amounts of both inputs. If the price of x doubles and the price of y triples, then the cost of production will more than double.

Difficulty: 2
Correct Answer: False

8. The total cost function $c(w_1, w_2, y)$ expresses the cost per unit of output as a function of input prices and output.

Difficulty: 3
Correct Answer: False

9. A firm uses a single variable input x to produce outputs according to the production function $f(x) = 300x - 6x^2$. This firm has fixed costs of \$400. This firm's short-run marginal cost curve lies below its short-run average variable cost curve for all positive values of x.

Difficulty: 3
Correct Answer: False

10. A firm uses a single variable input x to produce outputs according to the production function $f(\mathrm{x}) = 300x - 6x^2$. This firm has fixed costs of \$300. This firm's short-run marginal cost curve lies below its short-run average variable cost curve for all positive values of x.

MULTIPLE CHOICE

Difficulty: 1
Correct Answer: b

1. Lars runs a cookie factory. His cookies are made with sugar, peanut oil, and soybean oil. The number of boxes of cookies that he produces is $f(su, po, so) = \min\{su, po + 2so\}$, where su is the number of bags of sugar, po the number of canisters of peanut oil, and so the number of canisters of soybean oil that he uses. The price of a bag of sugar is \$5. The price of a canister of peanut oil is \$9. The price of a canister of soybean oil is \$19. If Lars makes 254 boxes of cookies in the

cheapest way possible, how many canisters of soybean oil will he use?

a. 127
b. 0
c. 84.67
d. 169.33
e. 42.33

Difficulty: 1
Correct Answer: c

2. Ben runs a cookie factory. His cookies are made with sugar, peanut oil, and soybean oil. The number of boxes of cookies that he produces is $f(su, po, so) = \min\{su, po + 2so\}$, where *su* is the number of bags of sugar, *po* the number of canisters of peanut oil, and *so* the number of canisters of soybean oil that he uses. The price of a bag of sugar is $12. The price of a canister of peanut oil is $6. The price of a canister of soybean oil is $19. If Ben makes 254 boxes of cookies in the cheapest way possible, how many canisters of soybean oil will he use?

a. 169.33
b. 127
c. 0
d. 84.67
e. 42.33

Difficulty: 1
Correct Answer: a

3. A firm's production function is $q = 12x^{0.50}y^{0.50}$, where x and y are the amounts of factors x and y that the firm uses as inputs. If the firm is minimizing unit costs and if the price of factor x is 5 times the price of factor y, the ratio in which the firm will use factors x and y is closest to

a. $x/y = 0.20$.
b. $x/y = 0.40$.
c. $x/y = 1$.
d. $x/y = 1.67$.
e. $x/y = 5$.

Difficulty: 1
Correct Answer: a

4. A firm's production function is $q = 26x^{0.33}y^{0.67}$, where x and y are the amounts of factors x and y that the firm uses as inputs. If the firm is minimizing unit costs and if the price of factor x is 6 times the price of factor y, the ratio in which the firm will use factors x and y is closest to

a. $x/y = 0.08$.
b. $x/y = 0.25$.
c. $x/y = 0.50$.
d. $x/y = 2.40$.
e. $x/y = 12$.

Difficulty: 1
Correct Answer: d

5. A firm has fixed costs of $4,000. Its short-run production function is $y = 4x^{1/2}$, where x is the amount of variable factor it uses. The price of the variable factor is $4,000 per unit. Where y is the amount of output, the short-run total cost function is

a. $4{,}000/y + 4{,}000$.
b. $8{,}000y$.
c. $4{,}000 + 4{,}000y$.
d. $4{,}000 + 250y^2$.
e. $4{,}000 + 0.25y^2$.

Difficulty: 1
Correct Answer: d

6. A firm has fixed costs of $2,000. Its short-run production function is $y = 4x^{1/2}$, where x is the amount of variable factor it uses. The price of the variable factor is $3,000 per unit. Where y is the amount of output, the short-run total cost function is

a. $5{,}000y$.
b. $2{,}000 + 3{,}000y$.
c. $2{,}000/y + 3{,}000$.
d. $2{,}000 + 187.50y^2$.
e. $2{,}000y + 0.19y^2$.

Difficulty: 2
Correct Answer: c

7. A firm has two factories. One factory has the cost function $c_1(y_1) = 2y^2_1 + 90$ and the other has the cost function $c_2(y_2) = 6y^2_2 + 40$. If the firm wishes to produce a total of 32 units as cheaply as possible, how many units will be produced in the second factory?

a. 7
b. 2
c. 8
d. 14
e. None of the above.

Difficulty: 1
Correct Answer: a

8. A company can rent one of two copying machines. The first costs $34 a month to rent and costs an additional 2 cents per copy to use. The second costs $107 a month to rent and an additional 1 cent per copy to use. How many copies would the company need to make per month in order for it to be worthwhile to rent the second machine?

a. 7,300
b. 13,300
c. 12,400
d. 6,900
e. None of the above.

Difficulty: 2
Correct Answer: a

9. A firm produces Ping-Pong balls using two inputs. When input prices are (\$15, \$7) the firm uses the input bundle (17, 71). When the input prices are (\$12, \$24) the firm uses the bundle (77, 4). The amount of output is the same in both cases. Is this behavior consistent with WACM?
   a. Yes.
   b. No.
   c. It depends on the level of the fixed costs.
   d. We have to know the price of the output before we can test WACM.
   e. It depends on the ratio of variable to fixed costs.

Difficulty: 1
Correct Answer: b

10. As assistant vice president in charge of production for a computer firm, you are asked to calculate the cost of producing 170 computers. The production function is $q = \min\{x, y\}$ where x and y are the amounts of two factors used. The price of x is \$18 and the price of y is \$10. What is your answer?
   a. \$2,580
   b. \$4,760
   c. \$8,460
   d. \$6,180
   e. None of the above.

Difficulty: 3
Correct Answer: b

11. As head of the planning commission of Eastern Motors, your job is to determine where to locate a new plant. The only inputs used in your cars are steel and labor and the production function is Cobb-Douglas where $f(S, L) = S^{.5}L^{.5}$, where S is tons of steel and L is units of labor. You can locate your plant either in country A or country B. In country A, steel costs \$7 a ton and labor costs \$7 per unit. In country B, steel costs \$8 per ton and labor costs \$6 per unit. In which country should the company locate its new plant so as to minimize costs per unit of output?
   a. Country A.
   b. Country B.
   c. It doesn't matter, because the two locations are equally costly.
   d. Country A if output is greater than 14, and country B otherwise.
   e. There is not enough information to enable us to tell.

Difficulty: 2
Correct Answer: d

12. A competitive firm uses two inputs, x and y. Total output is the square root of x times the square root of y. The price of x is \$17 and the price of y is \$11. The company minimizes its costs per unit of output and spends \$517 on x. How much does it spend on y?
   a. \$766
   b. \$480
   c. \$655
   d. \$517
   e. None of the above.

Difficulty: 3
Correct Answer: b

13. A firm has the production function $Q = KL$, where K is the amount of capital and L is the amount of labor it uses as inputs. The cost per unit of capital is a rental fee r and the cost per unit of labor is a wage w. The conditional labor demand function $L(Q, w, r)$ is
   a. Qwr.
   b. the square root of Qr/w.
   c. Qw/r.
   d. the square root of Q/rw.
   e. Q/wr.

Difficulty: 2
Correct Answer: c

14. Joe's Bar and Grill uses two inputs, beer and pretzels. When the price of beer was \$10 a case and the price of pretzels was \$20 a case, Joe used 1 case of beer and 2 cases of pretzels a day. When the price of beer was \$20 a case and the price of pretzels was \$10 a case, Joe used 2 cases of beer and 1 case of pretzels a day. Joe produced the same output in each of these circumstances.
   a. Joe has a constant returns to scale production function.
   b. Joe has a cost function that exhibits increasing returns.
   c. Joe is not minimizing costs.
   d. Joe's behavior is consistent with profit maximization.
   e. Joe's production function exhibits diminishing marginal product.

Difficulty: 3
Correct Answer: d

15. The production function for drangles is $f(x_1, x_2) = (\min\{x_1, 3x_2\})^{1/2}$, where x_1 is the amount of sugar and x_2 is the amount of dough used. At the factor prices, $w_1 = w_2 = \$1$, the minimum cost of producing y drangles is
   a. $4y^{1/2}$.
   b. $(3/4)y^{1/2}$.
   c. $(3/4)y^2$.
   d. $(4/3)y^2$.
   e. None of the above.

Difficulty: 1
Correct Answer: b

16. An orange grower has discovered a process for producing oranges that requires two inputs. The production function is $Q = \min\{2x_1, x_2\}$, where x_1 and x_2 are the amounts of inputs 1 and 2 that he uses. The prices of these two inputs are $w_1 = \$5$ and $w_2 = \$2$, respectively. The minimum cost of producing 140 units is therefore
    a. \$980.
    b. \$630.
    c. \$1,400.
    d. \$280.
    e. \$700.

Difficulty: 1
Correct Answer: a

17. An orange grower has discovered a process for producing oranges that requires two inputs. The production function is $Q = \min\{2x_1, x_2\}$, where x_1 and x_2 are the amounts of inputs 1 and 2 that he uses. The prices of these two inputs are $w_1 = \$5$ and $w_2 = \$10$, respectively. The minimum cost of producing 160 units is therefore
    a. \$2,000.
    b. \$2,400.
    c. \$800.
    d. \$8,000.
    e. \$1,600.

Difficulty: 2
Correct Answer: b

18. Roberta runs a dress factory. She produces 50 dresses per day, using labor and electricity. She uses a combination of labor and electricity that produces 50 dresses per day in the cheapest possible way. She can hire as much labor as she wants at a cost of 20 cents per minute. She can use as much electricity as she wants at a cost of 10 cents per minute. Her production isoquants are smooth curves without kinks and she uses positive amounts of both inputs.
    a. The marginal product of a kilowatt-hour of electricity is twice the marginal product of a minute of labor.
    b. The marginal product of a minute of labor is twice the marginal product of a kilowatt-hour of electricity.
    c. The marginal product of a minute of labor is equal to the marginal product of a kilowatt-hour of electricity.
    d. There is not enough information to determine the ratio of marginal products. We'd have to know the production function to know this.
    e. The marginal product of a minute of labor plus the marginal product of a kilowatt-hour of labor must equal 50/(20 + 10).

Difficulty: 2
Correct Answer: d

19. A competitive firm has the three-factor production function $f(x, y, z) = (x + y)^{1/2}z^{1/2}$. The factor prices used to be $w_x = \$1$, $w_y = \$2$, and $w_z = \$3$. Suppose that the price of factor y doubled while the other two prices stayed the same. Then the cost of production
    a. increased by more than 10% but less than 50%.
    b. increased by 50%.
    c. doubled.
    d. stayed the same.
    e. increased by more than 50% but did not double.

Difficulty: 2
Correct Answer: c

20. A competitive firm uses three factors of production. Its production function is $f(x, y, z) = (x + y)^{1/2}z^{1/2}$. Originally the factor prices were $w_x = \$1$, $w_y = \$2$, and $w_z = \$3$. The prices of factors x and z decreased to half of their previous levels, but the price of factor y stayed constant. The cost of production
    a. decreased by more than 1/2.
    b. decreased by 1/3.
    c. decreased by exactly 1/2.
    d. stayed constant.
    e. decreased by less than 1/3.

Difficulty:
Correct Answer: c

21. A competitive firm with output y has a production function $y = (2x_1 + x_2)^{1/2}$, where x_1 and x_2 are inputs used in production. The firm produces the output minimizing cost. With input prices w_1 and w_2, which of the following is true?
    a. The firm has *L*-shaped isoquants.
    b. The firm must use the cheaper input.
    c. The firm must use only input x_1 if $w_1 < 2w_2$.
    d. The technology has increasing returns to scale.
    e. More than one of the above is true.

Difficulty:
Correct Answer: d

22. Suppose that the production function is $f(x_1, x_2) = (\min\{x_1, 2x_2\})^{.5}$.
    a. There are constant returns to scale.
    b. The cost function is a min function.
    c. If the price of x_1 is more than twice the price of x_2, only x_2 is used in production.
    d. A cost-minimizing firm producing 5 units of output will use 25 units of x_1 and some x_2.
    e. The cost function is a linear function of output.

Difficulty: 2
Correct Answer: b

23. If the production function is given by $f(x_1, x_2, x_3, x_4) = \min\{x_1, x_2\} + \min\{x_3, x_4\}$ and the prices of inputs (x_1, x_2, x_3, x_4) are (2, 1, 5, 3), the minimum cost of producing 1 unit of output is closest to
    a. \$1.
    b. \$3.
    c. \$4.
    d. \$8.
    e. \$11.

Difficulty: 2
Correct Answer: a

24. Two firms, Wickedly Efficient Widgets (WEW) and Wildly Nepotistic Widgets (WNW), both produce widgets, using the same production function $y = K^{1/2}L^{1/2}$, where K is the amount of labor used and L is the amount of capital used. Each company can hire labor at \$1 per unit of labor and capital at \$1 per unit. Each company produces 10 widgets per week. WEW chooses its input combinations to produce in the cheapest way possible. Although it produces the same output per week as WEW, WNW is required by its dotty CEO to use twice as much labor as WEW. How much higher are WNW's total costs per week than WEW's?
    a. \$5
    b. \$10
    c. \$15
    d. \$2.50
    e. \$2

Difficulty: 2
Correct Answer: d

25. Two firms, Wickedly Efficient Widgets (WEW) and Wildly Nepotistic Widgets (WNW), both produce widgets, using the same production function $y = K^{1/2}L^{1/2}$, where K is the amount of labor used and L is the amount of capital used. Each company can hire labor at \$1 per unit of labor and capital at \$9 per unit. Each company produces 90 widgets per week. WEW chooses its input combinations to produce in the cheapest way possible. Although it produces the same output per week as WEW, WNW is required by its dotty CEO to use twice as much labor as WEW. How much higher are WNW's total costs per week than WEW's?
    a. \$270
    b. \$67.50
    c. \$275
    d. \$135
    e. \$132

Difficulty: 2
Correct Answer: c

26. A new metal alloy is discovered that uses copper and zinc in fixed proportions where each unit of the alloy requires 4 units of zinc and 2 units of copper. If no other inputs are required, if the price of zinc is \$2 per unit, and the price of copper is \$5 per unit and if total output is 4,000 units, what is the average cost per unit of output?
    a. \$.50
    b. \$2
    c. \$18
    d. \$20
    e. \$25

Difficulty: 2
Correct Answer: c

27. A new metal alloy is discovered that uses copper and zinc in fixed proportions where each unit of the alloy requires 2 units of zinc and 2 units of copper. If no other inputs are required, if the price of zinc is \$3 per unit, and the price of copper is \$3 per unit and if total output is 5,000 units, what is the average cost per unit of output?
    a. \$6
    b. \$1.50
    c. \$12
    d. \$15
    e. \$18

Difficulty:
Correct Answer: a

28. The production function is $f(L, M) = 4L^{1/2}M^{1/2}$, where L is the number of units of labor and M is the number of machines. If the amounts of both factors can be varied and if the cost of labor is \$64 per unit and the cost of using machines is \$1 per machine, then the total cost of producing 20 units of output is
    a. \$80.
    b. \$650.
    c. \$20.
    d. \$320.
    e. \$40.

Difficulty:
Correct Answer: d

29. The production function is $f(L, M) = 5L^{1/2}M^{1/2}$, where L is the number of units of labor and M is the number of machines. If the amounts of both factors can be varied and if the cost of labor is \$9 per unit and the cost of using machines is \$64 per machine, then the total cost of producing 12 units of output is
    a. \$438.
    b. \$108.
    c. \$576.
    d. \$115.20.
    e. \$57.60.

Difficulty: 2
Correct Answer: d

30. Douffelberry juice is a mild intoxicant, prized for facilitating conversation among university administrators but not otherwise valued. The berry does not travel well, so it must be squeezed on the farm where it is grown. Baskets of berries, B, are produced using ounces of seeds, S, and hours of labor, L, according to a production function $B = S^{1/2}L^{1/2}$. Gallons of juice, J, are made from baskets of berries and hours of labor according to the production function $J = \min\{B, L\}$. If seeds cost \$16 per ounce and labor costs \$1 per hour, what is the cost of producing each gallon of douffelberry juice?
    a. \$18
    b. \$8
    c. \$4
    d. \$9
    e. Since there are not constant returns to scale, the cost per gallon depends on the number of gallons produced.

Difficulty: 2
Correct Answer: a

31. Douffelberry juice is a mild intoxicant, prized for facilitating conversation among university administrators but not otherwise valued. The berry does not travel well, so it must be squeezed on the farm where it is grown. Baskets of berries, B, are produced using ounces of seeds, S, and hours of labor, L, according to a production function $B = S^{1/2}L^{1/2}$. Gallons of juice, J, are made from baskets of berries and hours of labor according to the production function $J = \min\{B, L\}$. If seeds cost \$9 per ounce and labor costs \$9 per hour, what is the cost of producing each gallon of douffelberry juice?
    a. \$27
    b. \$54
    c. \$9
    d. \$18
    e. Since there are not constant returns to scale, the cost per gallon depends on the number of gallons produced.

Difficulty:
Correct Answer: b

32. Nadine has a production function $2x_1 + x_2$. If the factor prices are \$8 for factor 1 and \$5 for factor 2, how much will it cost her to produce 70 units of output?
    a. \$1,470
    b. \$280
    c. \$350
    d. \$910
    e. \$315

Difficulty:
Correct Answer: b

33. Nadine has a production function $4x_1 + x_2$. If the factor prices are \$12 for factor 1 and \$2 for factor 2, how much will it cost her to produce 30 units of output?
    a. \$795
    b. \$60
    c. \$90
    d. \$1,500
    e. \$75

Difficulty: 2
Correct Answer: a

34. The production function is $f(L, M) = 4L^{1/2}M^{1/2}$, where L is the number of units of labor and M is the number of machines used. If the cost of labor is \$49 per unit and the cost of machines is \$16 per unit, then the total cost of producing 5 units of output will be
    a. \$70.
    b. \$162.50.
    c. \$80.
    d. \$140.
    e. None of the above.

Difficulty: 2
Correct Answer: b

35. The production function is $f(L, M) = 4L^{1/2}M^{1/2}$, where L is the number of units of labor and M is the number of machines used. If the cost of labor is \$36 per unit and the cost of machines is \$4 per unit, then the total cost of producing 6 units of output will be
    a. \$72.
    b. \$36.
    c. \$120.
    d. \$24.
    e. None of the above.

Difficulty: 2
Correct Answer: e

36. In the short run, a firm which has production function $f(L, M) = 4L^{1/2}M^{1/2}$ must use 4 machines. If the cost of labor is \$4 per unit and the cost of machines is \$10 per unit, the short-run total cost of producing 72 units of output is
    a. \$504.
    b. \$288.
    c. \$720.
    d. \$728.
    e. \$364.

Difficulty: 2
Correct Answer: e

37. In the short run, a firm which has production function $f(L, M) = 4L^{1/2}M^{1/2}$ must use 4 machines. If the cost of labor is \$4 per unit and the cost of machines is \$4 per unit, the short-run total cost of producing 48 units of output is
   a. \$192.
   b. \$196.
   c. \$198.
   d. \$320.
   e. \$160.

Difficulty:
Correct Answer: a

38. Al's production function for deer is $f(x_1, x_2) = (2x_1 + x_2)^{1/2}$, where x_1 is the amount of plastic and x_2 is the amount of wood used. If the cost of plastic is \$6 per unit and the cost of wood is \$1 per unit, then the cost of producing 5 deer is
   a. \$25.
   b. \$65.
   c. \$75.
   d. \$5.
   e. \$15.

Difficulty:
Correct Answer: b

39. Al's production function for deer is $f(x_1, x_2) = (2x_1 + x_2)^{1/2}$, where x_1 is the amount of plastic and x_2 is the amount of wood used. If the cost of plastic is \$6 per unit and the cost of wood is \$1 per unit, then the cost of producing 7 deer is
   a. \$147.
   b. \$49.
   c. \$7.
   d. \$91.
   e. \$21.

Difficulty:
Correct Answer: d

40. A firm has production function $f(x_1, x_2, x_3, x_4) = \min\{x_1, x_2\} + \min\{x_3, x_4\}$. This firm faces competitive factor markets where the prices for the four factors are $w_1 = \$7$, $w_2 = \$8$, $w_3 = \$6$, and $w_4 = \$5$. The firm must use at least 20 units of factor 2. The cost of producing 100 units in the cheapest possible way is
   a. \$1,400.
   b. \$1,200.
   c. \$1,340.
   d. \$1,180.
   e. \$500.

Difficulty:
Correct Answer: c

41. A firm has production function $f(x_1, x_2, x_3, x_4) = \min\{x_1, x_2\} + \min\{x_3, x_4\}$. This firm faces competitive factor markets where the prices for the four factors are $w_1 = \$4$, $w_2 = \$8$, $w_3 = \$5$, and $w_4 = \$3$. The firm must use at least 20 units of factor 2. The cost of producing 100 units in the cheapest possible way is
   a. \$700.
   b. \$1,040.
   c. \$880.
   d. \$1,300.
   e. \$300.

Difficulty:
Correct Answer: c

42. The law firm of Dewey, Cheatham, and Howe specializes in accident injury claims. The firm charges its clients 25% of any damage award given. The only cost to the firm of producing an accident injury claim is the time spent by a junior partner working on the case. Junior partners are paid \$100 per hour for this drudgery. If the firm is suing for damages of \$640,000 and if its chances of winning a case are $1 - 1/25h$, where h is the number of hours spent working on the case, then to maximize its profits, how many hours should it have the junior partner spend working on the case?
   a. 24
   b. 40
   c. 8
   d. 12
   e. None of the above.

Difficulty:
Correct Answer: b

43. The law firm of Dewey, Cheatham, and Howe specializes in accident injury claims. The firm charges its clients 25% of any damage award given. The only cost to the firm of producing an accident injury claim is the time spent by a junior partner working on the case. Junior partners are paid \$100 per hour for this drudgery. If the firm is suing for damages of \$250,000 and if its chances of winning a case are $1 - 1/25h$, where h is the number of hours spent working on the case, then to maximize its profits, how many hours should it have the junior partner spend working on the case?
   a. 7.50
   b. 5
   c. 25
   d. 15
   e. None of the above.

Difficulty: 3
Correct Answer: b

44. A firm with the production function $f(x_1, x_2, x_3, x_4) = \min\{x_1, x_2, x_3, x_4\}$ faces input prices $w_1 = \$1$, $w_2 = \$5$, $w_3 = \$5$, $w_4 = \$3$ for factors 1, 2, 3, and 4. The firm must use at least 10 units of factor 2. The lowest cost at which it can produce 100 units of output is
    a. \$800.
    b. \$440.
    c. \$1,400.
    d. \$770.
    e. \$400.

Difficulty: 3
Correct Answer: c

45. A firm with the production function $f(x_1, x_2, x_3, x_4) = \min\{x_1, x_2, x_3, x_4\}$ faces input prices $w_1 = \$1$, $w_2 = \$2$, $w_3 = \$2$, $w_4 = \$5$ for factors 1, 2, 3, and 4. The firm must use at least 17 units of factor 2. The lowest cost at which it can produce 100 units of output is
    a. \$1,000.
    b. \$400.
    c. \$317.
    d. \$615.
    e. \$300.

Difficulty:
Correct Answer: d

46. If output is produced according to $Q = 4L + 6K$, the price of K is \$24, and the price of L is \$20, then the cost-minimizing combination of K and L capable of producing 72 units of output is
    a. $L = 9$ and $K = 6$.
    b. $L = 20$ and $K = 24$.
    c. $L = 18$ and $K = 12$.
    d. $L = 0$ and $K = 12$.
    e. $L = 18$ and $K = 0$.

Difficulty:
Correct Answer: b

47. If output is produced according to $Q = 4L + 6K$, the price of K is \$12, and the price of L is \$20, then the cost-minimizing combination of K and L capable of producing 96 units of output is
    a. $L = 20$ and $K = 12$.
    b. $L = 0$ and $K = 16$.
    c. $L = 24$ and $K = 16$.
    d. $L = 12$ and $K = 8$.
    e. $L = 24$ and $K = 0$.

Difficulty:
Correct Answer: b

48. If output is produced according to $Q = 4LK$, the price of K is \$10, and the price of L is \$40, then the cost-minimizing combination of K and L capable of producing 64 units of output is
    a. $L = 16$ and $K = 1$.
    b. $L = 2$ and $K = 8$.
    c. $L = 2$ and $K = 2$.
    d. $L = 32$ and $K = 32$.
    e. $L = 1$ and $K = 16$.

Difficulty:
Correct Answer: b

49. If output is produced according to $Q = 4LK$, the price of K is \$10, and the price of L is \$5, then the cost-minimizing combination of K and L capable of producing 2 units of output is
    a. $L = 0.35$ and $K = 0.35$.
    b. $L = 1$ and $K = 0.50$.
    c. $L = 0.50$ and $K = 1$.
    d. $L = 1$ and $K = 1$.
    e. $L = 1$ and $K = 0.50$.

Difficulty:
Correct Answer: e

50. If it costs \$20 to set up and later clean a bagel press and bagels cost \$1 per week per bagel to store, how many times should the bagel press be run each week to produce 1,000 bagels a week to be sold continuously?
    a. Once
    b. Twice
    c. 3 times
    d. 4 times
    e. 5 times

Difficulty:
Correct Answer: d

51. If it costs \$20 to set up and later clean a bagel press and bagels cost \$1 per week per bagel to store, how many times should the bagel press be run each week to produce 360 bagels a week to be sold continuously?
    a. Twice
    b. 4 times
    c. Once
    d. 3 times
    e. 5 times

Difficulty:
Correct Answer: c

52. A politician facing reelection can win votes according to the following process: $V = 500S^{0.20}M^{0.60}$, where S is hours of making campaign speeches and M is the number of flyers mailed. Making speeches costs \$10 per hour, mailing flyers costs \$.50 per flyer, and \$8,000 are available to spend on the campaign. Assuming the politician wants to maximize votes, how should the budget be allocated between speeches and mailing flyers?

a. No speeches should be given; 16,000 flyers should be mailed.
b. 400 hours of speeches should be given; 8,000 flyers should be mailed out.
c. 200 hours of speeches should be given; 12,000 flyers should be mailed out.
d. 2,000 hours of speeches should be given; 6,000 flyers should be mailed out.
e. 800 hours speeches should be given; no flyers should be mailed out.

Difficulty:
Correct Answer: c

53. A politician facing reelection can win votes according to the following process: $V = 500S^{0.20}M^{0.60}$, where S is hours of making campaign speeches and M is the number of flyers mailed. Making speeches costs \$10 per hour, mailing flyers costs \$.50 per flyer, and \$2,000 are available to spend on the campaign. Assuming the politician wants to maximize votes, how should the budget be allocated between speeches and mailing flyers?
a. No speeches should be given; 4,000 flyers should be mailed.
b. 100 hours of speeches should be given; 2,000 flyers should be mailed out.
c. 50 hours of speeches should be given; 3,000 flyers should be mailed out.
d. 500 hours of speeches should be given; 1,500 flyers should be mailed out.
e. 200 hours speeches should be given; no flyers should be mailed out.

Difficulty:
Correct Answer: b

54. The Chrysler Belvedere Truck Plant is attempting to minimize production costs. Over one month, 3,200 fenders are needed on the production line, which runs continuously. If it costs \$400 to set up the stamping press to produce fenders and \$1 per month to store produced fenders, how many times should the stamping press be run per month?
a. Once
b. Twice
c. 3 times
d. 4 times
e. 5 times

Difficulty:
Correct Answer: b

55. The Chrysler Belvedere Truck Plant is attempting to minimize production costs. Over one month, 1,600 fenders are needed on the production line, which runs continuously. If it costs \$200 to set up the stamping press to produce fenders and \$1 per month to store produced fenders, how many times should the stamping press be run per month?
a. 4 times
b. Twice
c. Once
d. 3 times
e. 5 times

Difficulty:
Correct Answer: a

56. A lobbyist in our nation's capitol must buy 250 votes in the House of Representatives and Senate to win passage of a bill to add Millard Fillmore's face to Mount Rushmore. Votes in Congress can be purchased according to the following process: $V = CM/100{,}000$, where C is the number of dollars contributed to campaign funds and M is the number of three-martini lunches. If three-martini lunches cost \$64 each, what is the smallest expenditure the lobbyist could make to ensure Mr. Fillmore's proper place in history?
a. \$80,000
b. \$390,625
c. \$25,000,064
d. \$325,000
e. \$25,000,000

Difficulty:
Correct Answer: d

57. A lobbyist in our nation's capitol must buy 250 votes in the House of Representatives and Senate to win passage of a bill to add Millard Fillmore's face to Mount Rushmore. Votes in Congress can be purchased according to the following process: $V = CM/100{,}000$, where C is the number of dollars contributed to campaign funds and M is the number of three-martini lunches. If three-martini lunches cost \$25 each, what is the smallest expenditure the lobbyist could make to ensure Mr. Fillmore's proper place in history?
a. \$1,000,000
b. \$25,000,025
c. \$130,000
d. \$50,000
e. \$25,000,000

Difficulty:
Correct Answer: b

58. The editors at *Snoozeweek*, a news magazine, constantly alter the proportion of celebrity photographs and mundane news stories so as to maximize the number of copies sold. A statistical consultant has estimated sales to be $S = 1{,}000C^{0.60}N^{0.60}$, where C is the number of celebrity photographs and N is column inches of news stories. If the editors only have \$8,000 to spend on each

edition with celebrity photos costing $200 each and news stories costing $10 per column inch, what should the editors do?

a. Purchase 23 celebrity photos and 340 column inches of news stories.
b. Purchase 20 celebrity photos and 400 column inches of news stories.
c. Purchase 25 celebrity photos and 300 column inches of news stories.
d. Purchase 16 celebrity photos and 480 column inches of news stories.
e. Purchase 15 celebrity photos and 500 column inches of news stories.

Difficulty:
Correct Answer: b

59. The editors at *Snoozeweek*, a news magazine, constantly alter the proportion of celebrity photographs and mundane news stories so as to maximize the number of copies sold. A statistical consultant has estimated sales to be $S = 1{,}000C^{0.60}N^{0.50}$, where C is the number of celebrity photographs and N is column inches of news stories. If the editors only have $11,000 to spend on each edition with celebrity photos costing $400 each and news stories costing $10 per column inch, what should the editors do?

a. Purchase 10 celebrity photos and 700 column inches of news stories.
b. Purchase 15 celebrity photos and 500 column inches of news stories.
c. Purchase 11 celebrity photos and 660 column inches of news stories.
d. Purchase 13 celebrity photos and 580 column inches of news stories.
e. Purchase 20 celebrity photos and 300 column inches of news stories.

Difficulty:
Correct Answer: c

60. Vincent Smudge, an avant-garde New York artist, creates "living sculpture" by smearing paint slowly all over himself. S hours of "living sculpture" can be created by $S = \min\{L, T/3\}$, where L is hours of labor by Mr. Smudge and T is tubes of water-soluble paint. Since Mr. Smudge is a highly renowned artist, his labor costs $50 per hour, while paint costs $10 per tube. Using a $3,000 grant from the National Endowment for the Arts, how many hours of "living sculpture" can Mr. Smudge create?

a. 50
b. 56.25
c. 37.50
d. 750
e. 2,250

Difficulty:
Correct Answer: d

61. Vincent Smudge, an avant-garde New York artist, creates "living sculpture" by smearing paint slowly all over himself. S hours of "living sculpture" can be created by $S = \min\{L, T/5\}$, where L is hours of labor by Mr. Smudge and T is tubes of water-soluble paint. Since Mr. Smudge is a highly renowned artist, his labor costs $200 per hour, while paint costs $40 per tube. Using a $10,000 grant from the National Endowment for the Arts, how many hours of "living sculpture" can Mr. Smudge create?

a. 1,666.67
b. 48.08
c. 41.67
d. 25
e. 8,333.33

Difficulty:
Correct Answer: a

62. Using existing plant and equipment, Priceless Moments Figurines can be manufactured using plastic, clay, or any combination of these materials. A figurine can be manufactured by $F = 4P + 2C$, where P is pounds of plastic and C is pounds of clay. Plastic costs $2 per pound and clay costs $5 per pound. What would be the lowest cost of producing 40,000 figurines?

a. $20,000
b. $100,000
c. $60,000
d. $10,000
e. $40,000

Difficulty:
Correct Answer: b

63. Using existing plant and equipment, Priceless Moments Figurines can be manufactured using plastic, clay, or any combination of these materials. A figurine can be manufactured by $F = 2P + 5C$, where P is pounds of plastic and C is pounds of clay. Plastic costs $5 per pound and clay costs $2 per pound. What would be the lowest cost of producing 60,000 figurines?

a. $30,000
b. $24,000
c. $87,000
d. $150,000
e. $60,000

Difficulty:
Correct Answer: c

64. Rocco's Pasta Bar makes manicotti according to an old family recipe which states $M = \min\{3/2C, 3P\}$, where M, C, and P are pounds of manicotti, cheese, and pasta respectively. If cheese costs $3 per pound and pasta

costs \$1 per pound, how much would it cost to produce 10 pounds of manicotti in the cheapest way possible?
a. \$3.33
b. \$20
c. \$23.33
d. \$35
e. \$10

Difficulty:
Correct Answer: a

65. Rocco's Pasta Bar makes manicotti according to an old family recipe which states $M = \min\{5/4C, 5P\}$, where M, C, and P are pounds of manicotti, cheese, and pasta respectively. If cheese costs \$3 per pound and pasta costs \$4 per pound, how much would it cost to produce 20 pounds of manicotti in the cheapest way possible?
a. \$64
b. \$48
c. \$16
d. \$33.33
e. \$20

PROBLEMS

Difficulty: 1

1. A firm has a production function described as follows: "Weekly output is equal to the square root of the minimum of the amount of capital and the number of hours of labor used per week." Suppose that the cost of a unit of capital is r and the price of a unit of labor is w and the level of output is y. Write down the long-run total cost as a function of w, r, and y.

Answer: $c(w, r, y) = (w + r)y^2$.

Difficulty: 2

2. The production function for good y is $y = \max\{10x_1, 4x_2\}$, where x_1 and x_2 are the amounts of factors 1 and 2. Find the cost function for good y.

Answer: The cost function is $\min\{p_1y/10, p_2y/4\}$.

Difficulty: 2

3. If the production function for tuna casseroles is $\min\{x_1, x^2{}_2\}$, where x_1 is the amount of factor 1 and x_2 is the amount of factor x_2, find the cost function for tuna casseroles.

Answer: $c(w_1, w_2) = p_1x + p_2y^{1/2}$.

Difficulty: 2

4. The cost function $c(w_1, w_2, y)$ of a firm gives the cost of producing y units of output when the wage of factor 1 is w_1 and the wage of factor 2 is w_2. Find the cost functions for the following firms:
a. A firm with production function $f(x_1, x_2) = \min\{2x_1, 3x_2\}$
b. A firm with production function $f(x_1, x_2) = 2x_1 + 3x_2$
c. A firm with production function $f(x_1, x_2) = \max\{2x_1, 3x_2\}$

Answer:
a. $w_1/2 + w_2/3$.
b. $\min\{w_1/2, w_2/3\}$.
c. $\min\{w_1/2, w_2/3\}$.

CHAPTER 21 Cost Curves

TRUE-FALSE

Difficulty: 1
Correct Answer: False

1. The average variable cost curve must always be U-shaped.

Difficulty: 1
Correct Answer: False

2. The marginal cost curve passes through the minimum point of the average fixed cost curve.

Difficulty: 1
Correct Answer: True

3. If the average cost curve is U-shaped, then the marginal cost curve must cross the average cost curve at the bottom of the U.

Difficulty: 1
Correct Answer: True

4. The cost function $C(y) = 10 + 3y$ has marginal cost less than average cost for all levels of output.

Difficulty: 1
Correct Answer: False

5. The cost function $C(y) = 100 + 3y^2$ has marginal cost less than average cost for all positive levels of output.

Difficulty: 1
Correct Answer: False

6. If a competitive firm uses two inputs and has the production function $F(x_1, x_2) = x^{1/2}{}_1 + x^{1/2}{}_2$, then its marginal cost curve is horizontal.

Difficulty: 2
Correct Answer: False

7. Average cost can never rise while marginal costs are declining.

Difficulty: 1
Correct Answer: False

8. The area under the marginal cost curve measures total fixed costs.

Difficulty: 1
Correct Answer: False

9. If marginal costs increase as output increases, then the average fixed cost curve will be U-shaped.

Difficulty: 1
Correct Answer: False

10. Average fixed cost curves will be U-shaped if the marginal cost curve is upward sloping.

MULTIPLE CHOICE

Difficulty: 1
Correct Answer: b

1. The marginal cost curve of a firm is $MC = 6y$. Total variable costs to produce 10 units of output are
   a. \$120.
   b. \$300.
   c. \$80.
   d. \$400.
   e. \$26.

Difficulty: 1
Correct Answer: b

2. The marginal cost curve of a firm is $MC = 8y$. Total variable costs to produce 11 units of output are
   a. \$484.
   b. \$484.
   c. \$176.
   d. \$88.
   e. \$30.

Difficulty: 1
Correct Answer: d

3. The following relationship must hold between the average total cost (ATC) curve and the marginal cost curve (MC):
   a. If MC is rising, ATC must be rising.
   b. If MC is rising, ATC must be greater than MC.

c. If *MC* is rising, *ATC* must be less than *MC*.
d. If *ATC* is rising, *MC* must be greater than *ATC*.
e. If *ATC* is rising, *MC* must be less than *ATC*.

Difficulty: 1
Correct Answer: c

4. A goatherd has the cost function $c(y) = 4y^2$, where y is the number of tubs of goat cheese she makes per month. She faces a competitive market for goat cheese, with a price of \$40 a tub. How many tubs should she produce per month?
a. The square root of 40
b. 16
c. 5
d. The square root of 10
e. 2.50

Difficulty: 1
Correct Answer: a

5. A goatherd has the cost function $c(y) = 2y^2$, where y is the number of tubs of goat cheese she makes per month. She faces a competitive market for goat cheese, with a price of \$40 a tub. How many tubs should she produce per month?
a. 10
b. The square root of 40
c. 4
d. The square root of 20
e. 5

Difficulty: 2
Correct Answer: c

6. A firm has a short-run cost function $c(y) = 3y + 11$ for $y > 0$ and $c(0) = 8$. The firm's quasi-fixed costs are
a. \$8.
b. \$11.
c. \$3.
d. \$7.
e. They are not possible to determine from this information.

Difficulty: 2
Correct Answer: b

7. A firm has a short-run cost function $c(y) = 3y + 14$ for $y > 0$ and $c(0) = 10$. The firm's quasi-fixed costs are
a. \$10.
b. \$4.
c. \$9.
d. \$14.
e. They are not possible to determine from this information.

Difficulty: 3
Correct Answer: c

8. A competitive firm has the short-run cost function $c(y) = 2y^3 - 16y^2 + 64y + 50$. The firm will produce a positive amount in the short run if and only if the price is greater than
a. \$16.
b. \$64.
c. \$32.
d. \$35.
e. \$31.

Difficulty: 3
Correct Answer: d

9. A competitive firm has the short-run cost function $c(y) = 2y^3 - 16y^2 + 128y + 10$. The firm will produce a positive amount in the short run if and only if the price is greater than
a. \$192.
b. \$48.
c. \$99.
d. \$96.
e. \$95.

Difficulty:
Correct Answer: a

10. The production function of a competitive firm is described by the equation $y = 8x^{1/2}{}_1\ x^{1/2}{}_2$. The factor prices are p_1 = \$1 and p_2 = \$4 and the firm can hire as much of either factor it wants at these prices. The firm's marginal cost is
a. constant and equal to .50.
b. constant and equal to 3.
c. increasing.
d. decreasing.
e. None of the above.

Difficulty:
Correct Answer: c

11. The production function of a competitive firm is described by the equation $y = 4x^{1/2}{}_1\ x^{1/2}{}_2$. The factor prices are p_1 = \$1 and p_2 = \$36 and the firm can hire as much of either factor it wants at these prices. The firm's marginal cost is
a. decreasing.
b. constant and equal to 19.
c. constant and equal to 3.
d. increasing.
e. None of the above.

Difficulty: 2
Correct Answer: a

12. A firm has the short-run total cost function $c(y) = 4y^2 + 100$. At what quantity of output is short-run average cost minimized?
a. 5
b. 2
c. 25
d. 0.40
e. None of the above.

Difficulty: 2
Correct Answer: a

13. A firm has the short-run total cost function $c(y) = 9y^2 + 144$. At what quantity of output is short-run average cost minimized?
    a. 4
    b. 16
    c. 0.75
    d. 3
    e. None of the above.

Difficulty: 2
Correct Answer: a

14. A firm has the production function $Q = X^{1/2}{}_1X_2$. In the short run it must use exactly 15 units of factor 2. The price of factor 1 is \$75 per unit and the price of factor 2 is \$2 per unit. The firm's short-run marginal cost function is
    a. $MC(Q) = 10Q/15$.
    b. $MC(Q) = 30Q^{-1/2}$.
    c. $MC(Q) = 30 + 75Q^2$.
    d. $MC(Q) = 2Q$.
    e. $MC(Q) = 15Q^{-1/2}$.

Difficulty: 2
Correct Answer: b

15. A firm has the production function $Q = X^{1/2}{}_1X_2$. In the short run it must use exactly 35 units of factor 2. The price of factor 1 is \$105 per unit and the price of factor 2 is \$3 per unit. The firm's short-run marginal cost function is
    a. $MC(Q) = 105Q^{-1/2}$.
    b. $MC(Q) = 6Q/35$.
    c. $MC(Q) = 105 + 105Q^2$.
    d. $MC(Q) = 3Q$.
    e. $MC(Q) = 35Q^{-1/2}$.

Difficulty: 1
Correct Answer: a

16. Mr. Dent Carr's total costs are $2s^2 + 40s + 40$. If he repairs 10 cars, his average variable costs will be
    a. \$60.
    b. \$64.
    c. \$80.
    d. \$120.
    e. \$40.

Difficulty: 1
Correct Answer: b

17. Mr. Dent Carr's total costs are $2s^2 + 45s + 30$. If he repairs 15 cars, his average variable costs will be
    a. \$77.
    b. \$75.
    c. \$150.
    d. \$105.
    e. \$52.50.

Difficulty:
Correct Answer: a

18. Rex Carr could pay \$10 for a shovel that lasts one year and pay \$5 a car to his brother Scoop to bury the cars, or he could buy a low-quality car smasher that costs \$200 a year to own and that smashes cars at a marginal cost of \$1 per car. If it were also possible for Rex to buy a high-quality hydraulic car smasher that cost \$650 per year to own and if with this smasher he could dispose of cars at a cost of \$.67 per car, it would be worthwhile for him to buy this high-quality smasher if he needed to dispose of
    a. at least 1,350 cars per year.
    b. no more than 675 cars per year.
    c. at least 1,360 cars per year.
    d. no more than 1,350 cars per year.
    e. at least 675 cars per year.

Difficulty:
Correct Answer: d

19. Rex Carr could pay \$10 for a shovel that lasts one year and pay \$5 a car to his brother Scoop to bury the cars, or he could buy a low-quality car smasher that costs \$200 a year to own and that smashes cars at a marginal cost of \$1 per car. If it were also possible for Rex to buy a high-quality hydraulic car smasher that cost \$550 per year to own and if with this smasher he could dispose of cars at a cost of \$.67 per car, it would be worthwhile for him to buy this high-quality smasher if he needed to dispose of
    a. no more than 525 cars per year.
    b. no more than 1,050 cars per year.
    c. at least 1,060 cars per year.
    d. at least 1,050 cars per year.
    e. at least 525 cars per year.

Difficulty:
Correct Answer: c

20. Mary Magnolia from your workbook has variable costs equal to y^2/F, where y is the number of bouquets she sells per month and where F is the number of square feet of space in her shop. If Mary has signed a lease for a shop with 200 square feet, if she is not able to get out of the lease or to expand her store in the short run, and if the price of a bouquet is \$6 per unit, how many bouquets per month should she sell in the short run?
    a. 200
    b. 100
    c. 600
    d. 900
    e. 660

Difficulty:
Correct Answer: d

21. Mary Magnolia from your workbook has variable costs equal to y^2/F, where y is the number of bouquets she sells per month and where F is the number of square feet of space in her shop. If Mary has signed a lease for a shop with 600 square feet, if she is not able to get out of the lease or to expand her store in the short run, and if the price of a bouquet is $4 per unit, how many bouquets per month should she sell in the short run?
    a. 600
    b. 1,800
    c. 300
    d. 1,200
    e. 1,320

Difficulty:
Correct Answer: a

22. Touchie McFeelie from your workbook has a production function $.1J^{1/2}L^{3/4}$, where J is the number of old jokes used and L is the number of hours of cartoonists' labor. Touchie is stuck with 400 old jokes for which he paid 4 dollars each. If the hourly wage rate for cartoonists is 5 dollars, then the total cost of producing 16 comics books is
    a. 1,680 dollars.
    b. 840 dollars.
    c. 2,520 dollars.
    d. 1,696 dollars.
    e. 420 dollars.

Difficulty:
Correct Answer: a

23. Touchie McFeelie from your workbook has a production function $.1J^{1/2}L^{3/4}$, where J is the number of old jokes used and L is the number of hours of cartoonists' labor. Touchie is stuck with 400 old jokes for which he paid 6 dollars each. If the hourly wage rate for cartoonists is 4 dollars, then the total cost of producing 16 comics books is
    a. 2,464 dollars.
    b. 1,232 dollars.
    c. 2,480 dollars.
    d. 3,696 dollars.
    e. 616 dollars.

Difficulty:
Correct Answer: e

24. Touchie McFeelie's production function for comic books is $.1J^{1/2}L^{3/4}$, where J is the number of jokes and L is the number of hours of cartoonists labor that he uses. If Touchie can vary both jokes and cartoonists' labor and if old jokes cost $3 each and cartoonists' labor costs $18 per hour, then the cheapest way to produce comics books requires using jokes and labor in the ratio J/L =
    a. 6.
    b. 8.
    c. 2.
    d. 2/3.
    e. 4.

Difficulty:
Correct Answer: e

25. Touchie McFeelie's production function for comic books is $.1J^{1/2}L^{3/4}$, where J is the number of jokes and L is the number of hours of cartoonists labor that he uses. If Touchie can vary both jokes and cartoonists' labor and if old jokes cost $2 each and cartoonists' labor costs $18 per hour, then the cheapest way to produce comics books requires using jokes and labor in the ratio J/L =
    a. 3.
    b. 12.
    c. 9.
    d. 2/3.
    e. 6.

Difficulty:
Correct Answer: a

26. A firm's production function is given by $q = \min\{M, L^{1/2}\}$, where M is the number of machines and L is the amount of labor that it uses. The price of labor is $1 and the price of machines is $2 per unit. The firm's long-run marginal cost curve is
    a. a straight line with slope 2.
    b. upward sloping and gets flatter as Q increases.
    c. upward sloping and gets steeper as Q increases.
    d. a straight line with slope 1.
    e. a straight line with slope 2.

Difficulty:
Correct Answer: b

27. A firm's production function is given by $q = \min\{M, L^{1/2}\}$, where M is the number of machines and L is the amount of labor that it uses. The price of labor is $1 and the price of machines is $4 per unit. The firm's long-run marginal cost curve is
    a. upward sloping and gets flatter as Q increases.
    b. a straight line with slope 2.
    c. a straight line with slope 1.
    d. upward sloping and gets steeper as Q increases.
    e. a straight line with slope 4.

Difficulty:
Correct Answer: c

28. In the reclining chair industry (which is perfectly competitive), two different technologies of production exist. These technologies exhibit the following total cost functions:

$$C_1(Q) = 1{,}000 + 600Q - 40Q^2 + Q^3$$
$$C_2(Q) = 200 + 145Q - 10Q^2 + Q^3$$

Due to foreign competition, the market price of reclining chairs has fallen to \$190. In the short run, firms using technology 1

a. and firms using technology 2 will remain in business.
b. will remain in business and firms using technology 2 will shut down.
c. will shut down and firms using technology 2 will remain in business.
d. and firms using technology 2 will shut down.
e. More information is needed to make a judgment.

Difficulty:
Correct Answer: b

29. In the reclining chair industry (which is perfectly competitive), two different technologies of production exist. These technologies exhibit the following total cost functions:

$$C_1(Q) = 500 + 560Q - 40Q^2 + Q^3$$
$$C_2(Q) = 600 + 280Q - 20Q^2 + Q^3$$

Due to foreign competition, the market price of reclining chairs has fallen to \$170. In the short run, firms using technology 1

a. and firms using technology 2 will remain in business.
b. will remain in business and firms using technology 2 will shut down.
c. will shut down and firms using technology 2 will remain in business.
d. and firms using technology 2 will shut down.
e. More information is needed to make a judgment.

Difficulty:
Correct Answer: d

30. A firm has the long-run cost function $C(Q) = 4Q^2 + 64$. In the long run, it will supply a positive amount of output, so long as the price is greater than

a. \$64.
b. \$72.
c. \$16.
d. \$32.
e. \$37.

Difficulty:
Correct Answer: c

31. A firm has the long-run cost function $C(Q) = 4Q^2 + 196$. In the long run, it will supply a positive amount of output, so long as the price is greater than

a. \$120.
b. \$112.
c. \$56.
d. \$28.
e. \$61.

Difficulty:
Correct Answer: b

32. The VCR manufacturing business is perfectly competitive. Suppose that currently, firms that manufacture VCRs utilize either technology 1 or technology 2, whose cost functions are

$$TC_1(Q) = 340 - 20Q + Q^2$$
$$TC_2(Q) = 405 - 30Q + Q^2$$

In the long run, assuming no new manufacturing technologies, what will happen in this industry?

a. Firms utilizing technology 1 and firms utilizing technology 2 will stay in business.
b. Firms utilizing technology 1 will stay in business, but firms utilizing technology 2 will shut down.
c. Firms utilizing technology 1 will shut down, but firms utilizing technology 2 will stay in business.
d. Firms utilizing technology 1 and firms utilizing technology 2 will shut down.
e. None of the above.

Difficulty:
Correct Answer: b

33. The VCR manufacturing business is perfectly competitive. Suppose that currently, firms that manufacture VCRs utilize either technology 1 or technology 2, whose cost functions are

$$TC_1(Q) = 1{,}120 - 60Q + Q^2$$
$$TC_2(Q) = 300 - 20Q + Q^2$$

In the long run, assuming no new manufacturing technologies, what will happen in this industry?

a. Firms utilizing technology 1 and firms utilizing technology 2 will stay in business.
b. Firms utilizing technology 1 will shut down, but firms utilizing technology 2 will stay in business.
c. Firms utilizing technology 1 will stay in business, but firms utilizing technology 2 will shut down.
d. Firms utilizing technology 1 and firms utilizing technology 2 will shut down.
e. None of the above.

Difficulty:
Correct Answer: b

34. The snow removal business in East Icicle, Minnesota, is a competitive industry. All snowplow operators have the cost function $C = Q^2 + 4$, where Q is the number of driveways cleared. Demand for snow removal in the town is given by $Q_d = 120 - P$. The long-run equilibrium number of firms in this industry is

a. 29.
b. 58.

c. 56.
d. 120.
e. 59.

Difficulty:
Correct Answer: d

35. The snow removal business in East Icicle, Minnesota, is a competitive industry. All snowplow operators have the cost function $C = Q^2 + 4$, where Q is the number of driveways cleared. Demand for snow removal in the town is given by $Q_d = 120 - P$. The long-run equilibrium number of firms in this industry is
   a. 120.
   b. 29.
   c. 56.
   d. 58.
   e. 59.

Difficulty:
Correct Answer: e

36. Florence's Restaurant estimates that its total costs of providing Q meals per month is given by $TC = 8{,}000 + 6Q$. If Florence charges $7 per meal, what is its break-even level of output?
   a. 1,333.33 meals
   b. 1,142.86 meals
   c. 615.38 meals
   d. 16,000 meals
   e. 8,000 meals

Difficulty:
Correct Answer: e

37. Florence's Restaurant estimates that its total costs of providing Q meals per month is given by $TC = 8{,}000 + 5Q$. If Florence charges $9 per meal, what is its break-even level of output?
   a. 4,000 meals
   b. 571.43 meals
   c. 888.89 meals
   d. 1,600 meals
   e. 2,000 meals

Difficulty:
Correct Answer: d

38. If Green Acres Turf Farm's total cost of producing acres of sod is $TC = 4Q^2 + 25Q + 30$, the marginal cost of producing the 20th acre of sod is
   a. $30.
   b. $25.
   c. $105.
   d. $185.
   e. $345.

Difficulty:
Correct Answer: a

39. If Green Acres Turf Farm's total cost of producing acres of sod is $TC = 5Q^2 + 25Q + 40$, the marginal cost of producing the 10th acre of sod is
   a. $125.
   b. $40.
   c. $25.
   d. $75.
   e. $275.

PROBLEMS

Difficulty: 1

1. Not long ago, the Canadian edition of a famous textbook on principles of economics had a diagram depicting a U-shaped average fixed cost curve. This occasioned great mirth around the campfires of some economists in the Great White North and did much to shorten a long hard winter. Explain what is wrong with drawing a U-shaped average fixed cost curve.

Answer: Average fixed cost must decline monotonically with output and would asymptotically approach zero. Remember that average fixed cost is just a constant divided by output.

Difficulty: 3

2. Hildegard, an intelligent and charming Holstein cow, grazes in a very large, mostly barren pasture with a few patches of lush grass. When she finds a new grassy area, the amount of grass she gets from it is equal to the square root of the number of hours, h, that she spends grazing there. Finding a new patch of grass on which to graze takes her 1 hour. Since Hildegard does not have pockets, the currency in which her costs are measured is time.
   a. What is the total cost to Hildegard of finding a new plot of grass and getting y units of grass from it?
   b. Find an expression for her marginal costs and her average cost per patch of grass as a function of the amount of grass she gets from each patch.
   c. How much time would she spend in each plot if she wanted to maximize her food intake? (Hint: Minimize average costs per unit of grass eaten.)

Answer:
   a. $1 + y^2$.
   b. $2y$, $1/y + y$.
   c. 1 hour.

Difficulty: 2

3. A competitive firm has the short-run cost function $c(y) = y^3 - 2y^2 + 5y + 6$. Write down equations for:
   a. The firm's average variable cost function
   b. The firm's marginal cost function
   c. At what level of output is average variable cost minimized?
   d. Graph the short-run supply function for this firm, being careful to label the key points on the graph with the numbers specifying the exact prices and quantities at these points.

Answer:

   a. $y^2 - 2y + 5$.
   b. $3y^2 - 4y + 5$.
   c. $y = 1$.
   d. The AVC curve is U-shaped with its bottom at $y = 1$, $c = 2$. The marginal cost curve is also U-shaped. It bottoms out at $y = 2/3$ and crosses the AVC curve from below at $y = 1$.

Difficulty:

4. North American Manufacturing has the production function $Q = \min\{0.25K, 0.5L\}$, where K is units of capital and L is hours of labor.
   a. Without any warning, the price of capital doubles. What should North American Manufacturing do in response?
   b. If North American were planning a new manufacturing plant, would there be any advantages to a larger facility?

Answer:

   a. North American Manufacturing must use K and L in fixed proportions. Nothing can be done.
   b. No.

CHAPTER 22 Firm Supply

TRUE-FALSE

Difficulty: 2
Correct Answer: False

1. A firm in a competitive industry takes account of the fact that the demand curve it confronts has a significant negative slope.

Difficulty: 1
Correct Answer: True

2. In a perfectly competitive industry, the demand curve for the total output of the industry may be downward sloping.

Difficulty: 1
Correct Answer: False

3. Price equals marginal cost is a sufficient condition for profit maximization.

Difficulty: 3
Correct Answer: True

4. A firm faces competitive markets both for its inputs and its outputs. If its long-run supply curve is $q = 3p$, then it cannot have constant returns to scale.

Difficulty: 1
Correct Answer: False

5. A firm with the cost function $c(y) = 20y^2 + 500$ has a U-shaped cost curve.

Difficulty: 2
Correct Answer: False

6. Mr. O. Carr has the cost function $c(y) = y^2 + 64$ if his output, y, is positive and $c(0) = 0$. If the price of output is 12, Mr. Carr's profit-maximizing output is zero.

Difficulty: 2
Correct Answer: False

7. Mr. O. Carr has the cost function $c(y) = y^2 + 100$ if his output, y, is positive and $c(0) = 0$. If the price of output is 25, Mr. Carr's profit-maximizing output is zero.

Difficulty: 2
Correct Answer: False

8. Mr. O. Carr has the cost function $c(y) = y^2 + 144$ if his output, y, is positive and $c(0) = 0$. If the price of output is 18, Mr. Carr's profit-maximizing output is zero.

Difficulty: 2
Correct Answer: True

9. A firm produces one output, using one input, with the production function $f(x) = 2x^{1/3}$, where x is the amount of input. The cost function for this firm is proportional to the price of the input times the cube of the amount of output.

Difficulty: 2
Correct Answer: True

10. A competitive firm has a continuous marginal cost curve. It finds that as output increases, its marginal cost curve first rises, then falls, then rises again. If it wants to maximize profits, the firm should never produce at a positive output where price equals marginal cost and marginal cost decreases as output increases.

Difficulty: 2
Correct Answer: False

11. Two firms have the same technology and must pay the same wages for labor. They have identical factories, but firm 1 paid a higher price for its factory than firm 2 did. If they are both profit maximizers and have upward-sloping marginal cost curves, then we would expect firm 1 to have a higher output than firm 2.

Difficulty: 2
Correct Answer: True

12. The area under the marginal cost curve measures total variable costs.

Difficulty: 1
Correct Answer: True

13. Average fixed costs never increase with output.

Difficulty: 1
Correct Answer: False

14. The change in producer's surplus when the market price changes from p_1 to p_2 is half of the area to the left of the marginal cost curve between p_1 and p_2.

MULTIPLE CHOICE

Difficulty: 2
Correct Answer: d

1. A profit-maximizing firm continues to operate even though it is losing money. It sells its product at a price of $100.
   a. Average total cost is less than $100.
   b. Average fixed cost is less than $100.
   c. Marginal cost is increasing.
   d. Average variable cost is less than $100.
   e. Marginal cost is decreasing.

Difficulty: 1
Correct Answer: c

2. A profit-maximizing dairy farm is currently producing 10,000 gallons of milk per day. The government is considering two alternative policies. One is to give the farm a lump sum subsidy of $500 per month. The other policy is to give the farm a subsidy of $.05 per gallon of output.
   a. Both kinds of subsidy will increase production at this farm.
   b. Neither subsidy will affect production at this farm, since output is determined by profit maximization.
   c. Production at this farm will be increased if the per-unit subsidy is adopted but not if the lump sum subsidy is adopted.
   d. Which subsidy has the greater effect on production at this farm depends on whether fixed costs are greater than variable costs.
   e. Production will be increased by either kind of subsidy if and only if there are not decreasing returns to scale.

Difficulty: 1
Correct Answer: c

3. Marge Costa produces plastic dog dishes using a process that requires only labor and plastic as inputs and has constant returns to scale. With the process she is currently using, a laborer can turn out 30 dog dishes an hour. The wage rate is $9 per hour. The plastic in a dog dish costs Marge $.10. She has no other costs besides labor and plastic. Marge faces a perfectly competitive market for plastic dog dishes, and she decides that she is maximizing profits when she makes 300 dog dishes an hour. What is the market price of dog dishes?
   a. $.21
   b. $.32
   c. $.40
   d. $.27
   e. $.28

Difficulty: 3
Correct Answer: e

4. A competitive firm uses two variable factors to produce its output, with a production function $q = \min\{x_1, x_2\}$. The price of factor 1 is $8 and the price of factor 2 is $5. Due to a lack of warehouse space, the company cannot use more than 10 units of x_1. The firm must pay a fixed cost of $80 if it produces any positive amount but doesn't have to pay this cost if it produces no output. What is the smallest integer price that would make a firm willing to produce a positive amount?
   a. $44
   b. $41
   c. $29
   d. $13
   e. $21

Difficulty: 3
Correct Answer: e

5. A competitive firm uses two variable factors to produce its output, with a production function $q = \min\{x_1, x_2\}$. The price of factor 1 is $4 and the price of factor 2 is $1. Due to a lack of warehouse space, the company cannot use more than 15 units of x_1. The firm must pay a fixed cost of $90 if it produces any positive amount but doesn't have to pay this cost if it produces no output. What is the smallest integer price that would make a firm willing to produce a positive amount?
   a. $15
   b. $21
   c. $5
   d. $24
   e. $11

Difficulty: 3
Correct Answer: e

6. A competitive firm uses two variable factors to produce its output, with a production function $q = \min\{x_1, x_2\}$. The price of factor 1 is $4 and the price of factor 2 is $5. Due to a lack of warehouse space, the company cannot use more than 17 units of x_1. The firm must pay a fixed cost of $136 if it produces any positive amount but doesn't have to pay this cost if it produces no output. What is the smallest integer price that would make a firm willing to produce a positive amount?
   a. $36
   b. $33
   c. $21
   d. $9
   e. $17

Difficulty: 1
Correct Answer: a

7. A competitive firm has a single factory with the cost function $c(y) = 4y^2 + 89$ and produces 28 units in order to maximize profits. Although the price of output does not change, the firm decides to build a second factory with the cost function $c(y) = 8y^2 + 39$. To maximize its profits, how many units should it produce in the second factory?
   a. 14
   b. 21
   c. 9
   d. 13
   e. None of the above.

Difficulty: 2
Correct Answer: b

8. A competitive firm is choosing an output level to maximize its profits in the short run. Which of the following is *not* necessarily true? (Assume that marginal cost is not constant and is well defined at all levels of output.)
   a. Marginal cost is at least as large as average variable cost.
   b. Total revenues are at least as large as total costs.
   c. Price is at least as large as average variable cost.
   d. Price equals marginal cost.
   e. The marginal cost curve is rising.

Difficulty: 2
Correct Answer: d

9. A competitive, capitalistic firm produces gift-wrapped pieces of the Berlin wall, using the standard Marxian inputs, K and L. The production function is $y = (K + L)^{1/2}$, where y is the number of pieces produced. Neglect the use of the wall itself. The price of capital, K, is r, and the price of labor, L, is w.
   a. Regardless of w and r, cost minimization requires that $K = L$.
   b. The technology has increasing returns to scale.
   c. If $r > w$, then $L = 0$.
   d. If $r > w$, then $K = 0$.
   e. None of the above.

Difficulty: 2
Correct Answer: a

10. A competitive firm has a long-run total cost function $c(y) = 3y^2 + 675$ for $y > 0$ and $c(0) = 0$. Its long-run supply function is described as
    a. $y = p/6$ if $p > 90$, $y = 0$ if $p < 90$.
    b. $y = p/3$ if $p > 88$, $y = 0$ if $p < 88$.
    c. $y = p/3$ if $p > 93$, $y = 0$ if $p < 99$.
    d. $y = p/6$ if $p > 93$, $y = 0$ if $p < 93$.
    e. $y = p/3$ if $p > 95$, $y = 0$ if $p < 85$.

Difficulty: 2
Correct Answer: c

11. A competitive firm has a long-run total cost function $c(y) = 2y^2 + 288$ for $y > 0$ and $c(0) = 0$. Its long-run supply function is described as
    a. $y = p/2$ if $p > 46$, $y = 0$ if $p < 46$.
    b. $y = p/2$ if $p > 51$, $y = 0$ if $p < 54$.
    c. $y = p/4$ if $p > 48$, $y = 0$ if $p < 48$.
    d. $y = p/4$ if $p > 51$, $y = 0$ if $p < 51$.
    e. $y = p/2$ if $p > 53$, $y = 0$ if $p < 43$.

Difficulty: 2
Correct Answer: b

12. A competitive firm has a long-run total cost function $c(y) = 5y^2 + 1{,}125$ for $y > 0$ and $c(0) = 0$. Its long-run supply function is described as
    a. $y = p/5$ if $p > 148$, $y = 0$ if $p < 148$.
    b. $y = p/10$ if $p > 150$, $y = 0$ if $p < 150$.
    c. $y = p/10$ if $p > 153$, $y = 0$ if $p < 153$.
    d. $y = p/5$ if $p > 153$, $y = 0$ if $p < 165$.
    e. $y = p/5$ if $p > 155$, $y = 0$ if $p < 145$.

Difficulty: 2
Correct Answer: a

13. A competitive firm uses two inputs and has a production function $f(x_1, x_2) = 39x^{.25}{}_1x^{.25}{}_2$. The firm can buy as much of either factor as it likes at factor prices $w_1 = w_2 = \$1$. The cost of producing y units of output for this firm is
    a. $2(y/39)^2$.
    b. $39(x_1 + x_2)y$.
    c. $(x_1 + x_2)/39$.
    d. $y/78$.
    e. $y^2/78$.

Difficulty: 2
Correct Answer: d

14. A competitive firm uses two inputs and has a production function $f(x_1, x_2) = 23x^{.25}{}_1x^{.25}{}_2$. The firm can buy as much of either factor as it likes at factor prices $w_1 = w_2 = \$1$. The cost of producing y units of output for this firm is
    a. $23(x_1 + x_2)y$.
    b. $y/46$.
    c. $(x_1 + x_2)/23$.
    d. $2(y/23)^2$.
    e. $y^2/46$.

Difficulty: 2
Correct Answer: b

15. A competitive firm uses two inputs and has a production function $f(x_1, x_2) = 8x^{.25}{}_1x^{.25}{}_2$. The firm can buy as much of either factor as it likes at factor prices $w_1 = w_2 = \$1$. The cost of producing y units of output for this firm is
   a. $8(x_1 + x_2)y$.
   b. $2(y/8)^2$.
   c. $(x_1 + x_2)/8$.
   d. $y/16$.
   e. $y^2/16$.

Difficulty:
Correct Answer: a

16. A firm's production function is $f(x_1, x_2) = (\min\{x_1, 5x_2\})^{1/2}$. If the price of factor 1 is $w_1 = \$5$ per unit and the price of factor 2 is $w_2 = \$25$ per unit, then its supply function is given by the equation $S(p) =$
   a. $p/20$.
   b. $\max\{w_1, 5w_2\}p$.
   c. $\min\{w_1, 5w_2\}p$.
   d. $10p$.
   e. $\min\{5p, 125p\}p$.

Difficulty:
Correct Answer: d

17. A firm's production function is $f(x_1, x_2) = (\min\{x_1, 3x_2\})^{1/2}$. If the price of factor 1 is $w_1 = \$6$ per unit and the price of factor 2 is $w_2 = \$6$ per unit, then its supply function is given by the equation $S(p) =$
   a. $\max\{w_1, 3w_2\}p$.
   b. $\min\{w_1, 3w_2\}p$.
   c. $8p$.
   d. $p/16$.
   e. $\min\{6p, 18p\}p$.

Difficulty:
Correct Answer: b

18. A firm's production function is $f(x_1, x_2) = (\min\{x_1, 4x_2\})^{1/2}$. If the price of factor 1 is $w_1 = \$5$ per unit and the price of factor 2 is $w_2 = \$8$ per unit, then its supply function is given by the equation $S(p) =$
   a. $7p$.
   b. $p/14$.
   c. $\min\{w_1, 4w_2\}p$.
   d. $\max\{w_1, 4w_2\}p$.
   e. $\min\{5p, 32p\}p$.

Difficulty:
Correct Answer: b

19. Suppose that Dent Carr's long-run total cost of repairing s cars per week is $c(s) = 3s^2 + 75$. If the price he receives for repairing a car is \$18, then in the long run, how many cars will he fix per week if he maximizes profits?
   a. 3
   b. 0
   c. 6
   d. 4.50
   e. 9

Difficulty:
Correct Answer: b

20. Suppose that Dent Carr's long-run total cost of repairing s cars per week is $c(s) = 3s^2 + 108$. If the price he receives for repairing a car is \$18, then in the long run, how many cars will he fix per week if he maximizes profits?
   a. 4.50
   b. 0
   c. 6
   d. 3
   e. 9

Difficulty:
Correct Answer: b

21. Suppose that Dent Carr's long-run total cost of repairing s cars per week is $c(s) = 3s^2 + 12$. If the price he receives for repairing a car is \$24, then in the long run, how many cars will he fix per week if he maximizes profits?
   a. 6
   b. 4
   c. 0
   d. 8
   e. 12

Difficulty:
Correct Answer: a

22. Irma's production function is $f(x_1, x_2) = (\min\{x_1, 5x_2\})^{1/2}$. If the price of factor 1 is $w_1 = \$5$ and the price of factor 2 is $w_2 = \$20$, then her supply function is given by the equation
   a. $S(p) = p/18$.
   b. $S(p) = p(\max\{w_1, 5w_2\})^2$.
   c. $S(p) = p(\min\{w_1, 5w_2\})^2$.
   d. $S(p) = 9p$.
   e. $S(p) = \min\{5p, 100p\}$.

Difficulty:
Correct Answer: b

23. Irma's production function is $f(x_1, x_2) = (\min\{x_1, 2x_2\})^{1/2}$. If the price of factor 1 is $w_1 = \$3$ and the price of factor 2 is $w_2 = \$4$, then her supply function is given by the equation
   a. $S(p) = p(\min\{w_1, 2w_2\})^2$.
   b. $S(p) = p/10$.
   c. $S(p) = p(\max\{w_1, 2w_2\})^2$.
   d. $S(p) = 5p$.
   e. $S(p) = \min\{3p, 8p\}$.

Difficulty:
Correct Answer: a

24. Irma's production function is $f(x_1, x_2) = (\min\{x_1, 3x_2\})^{1/2}$. If the price of factor 1 is $w_1 = \$3$ and the price of factor 2 is $w_2 = \$9$, then her supply function is given by the equation
   a. $S(p) = p/12$.
   b. $S(p) = p(\max\{w_1, 3w_2\})^2$.
   c. $S(p) = p(\min\{w_1, 3w_2\})^2$.
   d. $S(p) = 6p$.
   e. $S(p) = \min\{3p, 27p\}$.

Difficulty:
Correct Answer: d

25. A firm has the long-run cost function $C(q) = 3q^2 + 27$. In the long run, it will supply a positive amount of output, so long as the price is greater than
   a. \$36.
   b. \$44.
   c. \$9.
   d. \$18.
   e. \$23.

Difficulty:
Correct Answer: a

26. A firm has the long-run cost function $C(q) = 7q^2 + 175$. In the long run, it will supply a positive amount of output, so long as the price is greater than
   a. \$70.
   b. \$148.
   c. \$35.
   d. \$140.
   e. \$75.

Difficulty:
Correct Answer: d

27. A firm has the long-run cost function $C(q) = 6q^2 + 486$. In the long run, it will supply a positive amount of output, so long as the price is greater than
   a. \$216.
   b. \$54.
   c. \$224.
   d. \$108.
   e. \$113.

Difficulty:
Correct Answer: d

28. A competitive firm produces its output according to the production function $y = \min\{x^3, 1000\}$. Let p be the price of output, and let the price of input x be \$1. The profit-maximizing output for this firm is
   a. 1,000 if $p > 1$ and 0 otherwise.
   b. 10 for all p.
   c. 1,000 for all p.
   d. 0 if $p < 1/100$ and 1,000 otherwise.
   e. None of the above.

Difficulty:
Correct Answer: d

29. A competitive firm produces its output according to the production function $y = \min\{x^2, 100\}$. Let w be the price of the factor x, and let the price of output be \$1. The demand for x, when the price of x is w, is
   a. 10 when $w < 1$ and 100 otherwise.
   b. 100 for all w.
   c. 10 for all w.
   d. 0 if $w > 10$ and 10 otherwise.
   e. None of the above.

Difficulty:
Correct Answer: c

30. A competitive firm produces its output according to the production function $y = \min\{x^{1/2}, 10\}$. Let w be the price of the factor x, and let the price of output be \$1. The demand for factor x, when the factor price is w, is
   a. $x = \min\{w^{1/2}, 10\}$
   b. $x = \max\{w^{1/2}/2, 100\}$.
   c. $x = \min\{1/4w^2, 100\}$.
   d. $x = 10 + x^2/2$.
   e. None of the above.

PROBLEM

Difficulty: 3

1. The Lost Mountains of northern Iowa are inhabited by the rare Marshallian deer. Patches of grass are far apart in this rugged land. If a deer finds a fresh patch of grass and spends h hours grazing it, it gets the square root of h units of grass. The deer compete for grass. When there are n deer, it takes a deer n^2 minutes to find a fresh patch. A deer can survive if it gets 1 unit of grass every 200 minutes.
   a. Find the average cost in time of a unit of grass if a deer gets y units of grass from each patch.
   b. How much time will an efficient deer spend in each patch when there are n deer? (Hint: Minimize average cost.)
   c. Since there is free entry into the deer business, the equilibrium population is the maximum number of efficient deer who can survive. How many is this?

Answer:
   a. $y + (n^2)/y$.
   b. n minutes.
   c. 100.

CHAPTER 23 Industry Supply

TRUE-FALSE

Difficulty: 1
Correct Answer: True

1. The short-run industry supply curve can be found by horizontally summing the short-run supply curves of all the individual firms in the industry.

Difficulty: 2
Correct Answer: True

2. It is possible to have an industry in which all firms make zero economic profits in long-run equilibrium.

Difficulty: 1
Correct Answer: True

3. The possibility of more firms entering an industry in the long run tends to make long-run industry supply more price elastic than short-run industry supply.

Difficulty: 2
Correct Answer: True

4. In a competitive market, if both demand and supply curves are linear, then a per-unit tax of \$10 will generate exactly the same deadweight loss as a per-unit subsidy of \$10.

Difficulty: 2
Correct Answer: True

5. If there are constant returns to scale in a competitive industry, then the long-run industry supply curve for that industry is horizontal.

Difficulty: 2
Correct Answer: True

6. If some firm in an industry has the production function $F(x, y) = x^{3/4}y^{3/4}$, where x and y are the only two inputs in producing the good, then that industry cannot be competitive in the long run.

Difficulty: 1
Correct Answer: False

7. The market for a good is in equilibrium when the government unexpectedly imposes a quantity tax of \$2 per unit. In the short run, the price will rise by \$2 per unit so that firms can regain their lost revenue and continue to produce.

MULTIPLE CHOICE

Difficulty: 2
Correct Answer: c

1. In East Icicle, Minnesota, on the northern edge of the corn belt, the growing season is short and the soil is poor. Corn yields are meager unless a great deal of expensive fertilizer is used. In Corncrib, Illinois, the land is fertile and flat and the growing season is 20 days longer. For any given expenditure per acre, corn yields are far greater than in East Icicle. Farmers in both places are profit maximizers who grow corn.
   a. Marginal costs are higher in East Icicle than in Corncrib.
   b. More fertilizer is used per acre in East Icicle than in Corncrib.
   c. Marginal costs are the same in both places.
   d. More fertilizer is used per acre in Corncrib than in East Icicle.
   e. More than one of the above is true.

Difficulty: 3
Correct Answer: e

2. A competitive industry has 10,000 identical firms. For each firm in the industry, the long-run cost of producing y units of output is $c(y) = \$100 + y^2$ if $y > 0$ and $c(0) = 0$. The government imposes a lump sum tax of \$300 on each firm in the industry. Firms can avoid this tax only by going out of business. There is free entry and exit into this industry. In the long run, the number of firms
   a. stays constant and the price of output rises by \$30.

b. doubles and the price of output doubles.
c. is halved and the price of output is doubled.
d. stays constant and the price of output rises by less than $30.
e. None of the above.

Difficulty: 2
Correct Answer: b

3. The bicycle industry is made up of 100 firms with the long-run cost curve $c(y) = 2 + (y^2/2)$ and 60 firms with the long-run cost curve $c(y) = y^2/10$. No new firms can enter the industry. What is the long-run industry supply curve at prices greater than $2?
   a. $y = 420p$.
   b. $y = 400p$.
   c. $y = 200p$.
   d. $y = 300p$.
   e. $y = 435p$.

Difficulty: 2
Correct Answer: a

4. The bicycle industry is made up of 100 firms with the long-run cost curve $c(y) = 2 + (y^2/2)$ and 60 firms with the long-run cost curve $c(y) = y^2/10$. No new firms can enter the industry. What is the long-run industry supply curve at prices greater than $2?
   a. $y = 400p$.
   b. $y = 420p$.
   c. $y = 200p$.
   d. $y = 300p$.
   e. $y = 435p$.

Difficulty: 2
Correct Answer: d

5. The bicycle industry is made up of 100 firms with the long-run cost curve $c(y) = 2 + (y^2/2)$ and 120 firms with the long-run cost curve $c(y) = y^2/4$. No new firms can enter the industry. What is the long-run industry supply curve at prices greater than $2?
   a. $y = 170p$.
   b. $y = 360p$.
   c. $y = 240p$.
   d. $y = 340p$.
   e. $y = 375p$.

Difficulty: 2
Correct Answer: b

6. Two firms constitute the entire doghouse industry. One has a long-run cost curve of $3 + 4y^2/3$ and the other has a long-run cost curve of $10 + y^2/10$. If no new firms enter the industry, at which of the following prices will exactly one firm operate?
   a. $1
   b. $3
   c. $5
   d. $7
   e. None of the above.

Difficulty: 1
Correct Answer: b

7. On a small island, papayas can only be sold in the market in the center of the island. Although papayas only cost $1 to raise, they can be sold in the market for $3. But it costs $.10 per kilometer to transport each papaya to market. If an acre of land grows 200 papayas, how much rent does an acre of land 4 kilometers from the market command?
   a. $302
   b. $320
   c. $240
   d. $262
   e. None of the above.

Difficulty: 3
Correct Answer: a

8. On a tropical island there are 100 potential boat builders, numbered 1 through 100. Each can build up to 20 boats a year, but anyone who goes into the boat-building business has to pay a fixed cost of $19. Marginal costs differ from person to person. Where y denotes the number of boats built per year, boat builder 1 has a total cost function $c(y) = 19 + y$. Boat builder 2 has a total cost function $c(y) = 19 + 2y$, and more generally, for each i, from 1 to 100, boat builder i has a cost function $c(y) = 19 + iy$. If the price of boats is 25, how many boats will be built per year?
   a. 480
   b. 120
   c. 60
   d. 720
   e. Any number between 500 and 520 is possible.

Difficulty: 3
Correct Answer: a

9. On a tropical island there are 100 potential boat builders, numbered 1 through 100. Each can build up to 8 boats a year, but anyone who goes into the boat-building business has to pay a fixed cost of $7. Marginal costs differ from person to person. Where y denotes the number of boats built per year, boat builder 1 has a total cost function $c(y) = 7 + y$. Boat builder 2 has a total cost function $c(y) = 7 + 2y$, and more generally, for each i, from 1 to 100, boat builder i has a cost function $c(y) = 7 + iy$. If the price of boats is 15, how many boats will be built per year?
   a. 112
   b. 64
   c. 32
   d. 168
   e. Any number between 120 and 128 is possible.

Difficulty: 3
Correct Answer: a

10. On a tropical island there are 100 potential boat builders, numbered 1 through 100. Each can build up to 16 boats a year, but anyone who goes into the boat-building business has to pay a fixed cost of \$15. Marginal costs differ from person to person. Where y denotes the number of boats built per year, boat builder 1 has a total cost function $c(y) = 15 + y$. Boat builder 2 has a total cost function $c(y) = 15 + 2y$, and more generally, for each i, from 1 to 100, boat builder i has a cost function $c(y) = 15 + iy$. If the price of boats is 40, how many boats will be built per year?
    a. 624
    b. 200
    c. 936
    d. 400
    e. Any number between 640 and 656 is possible.

Difficulty: 3
Correct Answer: b

11. Consider a competitive industry with several firms all of which have the same cost function, $c(y) = y^2 + 4$ for $y > 0$ and $c(0) = 0$. The demand curve for this industry is $D(p) = 50 - p$, where p is the price. The long-run equilibrium number of firms in this industry is
    a. 4.
    b. 23.
    c. 25.
    d. 46.
    e. 2.

Difficulty: 1
Correct Answer: c

12. Brand X is one of many firms in a competitive industry where each firm has a constant marginal cost of 2 dollars per unit of output. If marginal cost for Brand X rises to 4 dollars per unit and marginal costs of all other firms in the industry stay constant, by how much does the price in the industry increase?
    a. 2 dollars
    b. 1 dollar
    c. 0 dollar
    d. $2/n$, where n is the number of firms in the industry
    e. None of the above.

Difficulty: 3
Correct Answer: a

13. A firm uses a single input to produce its output, which is sold in a competitive market. It gets quantity discounts on purchases of its input. If it buys x units of the input, the price it must pay per unit of input is $289/x + 3$. If it buys no inputs, it doesn't have to pay anything. The firm's production function is $f(x) = 45x - x^2$. If the price of the firm's output is 1, the profit-maximizing amount of input to buy is
    a. 21.
    b. 0.
    c. 42.
    d. 31.50.
    e. None of the above.

Difficulty: 3
Correct Answer: d

14. A firm uses a single input to produce its output, which is sold in a competitive market. It gets quantity discounts on purchases of its input. If it buys x units of the input, the price it must pay per unit of input is $25/x + 4$. If it buys no inputs, it doesn't have to pay anything. The firm's production function is $f(x) = 60x - x^2$. If the price of the firm's output is 1, the profit-maximizing amount of input to buy is
    a. 56.
    b. 0.
    c. 42.
    d. 28.
    e. None of the above.

Difficulty: 3
Correct Answer: a

15. A firm uses a single input to produce its output, which is sold in a competitive market. It gets quantity discounts on purchases of its input. If it buys x units of the input, the price it must pay per unit of input is $400/x + 4$. If it buys no inputs, it doesn't have to pay anything. The firm's production function is $f(x) = 40x - x^2$. If the price of the firm's output is 1, the profit-maximizing amount of input to buy is
    a. 0.
    b. 36.
    c. 18.
    d. 27.
    e. None of the above.

Difficulty: 2
Correct Answer: a

16. Chirimollas grow only on the island of Socorro, off the coast of Mexico. They need very little soil, so virtually an unlimited supply can be grown at a cost of \$4 per unit. When they are exported to the United States, half of the chirimollas that are shipped rot on the boat and are dumped in the ocean. Shipping costs are \$1 for every unit that is put on board a ship. The demand function for chirimollas in the United States is given by the equation $q = 10{,}000 - 20p^2$. If chirimollas are competitively supplied, the number of units that are sold in the United States will be
    a. 8,000.

b. 9,500.
c. 9,680.
d. 9,190.
e. 9,000.

Difficulty: 2
Correct Answer: c

17. An industry has 1,000 firms, each with the production function $f(x_1, x_2) = x^{1/2}{}_1 x^{1/2}{}_2$. The price of factor 1 is \$1 and the price of factor 2 is \$1. In the long run, both factors are variable, but in the short run, each firm is stuck with using 100 units of factor 2. The long-run industry supply curve is
a. upward sloping with zero supply if price is less than \$10.
b. downward sloping for outputs less than 10.
c. horizontal with zero supply for prices less than \$2 and infinite supply for prices greater than \$2.
d. horizontal with zero supply for prices less than \$10 and infinite supply for prices greater than \$10.
e. upward sloping with zero supply if price is less than \$20.

Difficulty: 3
Correct Answer: c

18. Suppose that all firms in a given industry have the same supply curve given by $S_i(p) = 2p$ when p is greater than or equal to \$2 and $S_i(p) = 0$ when p is less than \$2. Suppose that market demand is given by $D(p) = 12 - p$. If firms continue to enter the industry so long as they can do so profitably, the equilibrium price must be closest to
a. \$5.
b. \$4.
c. \$2.40.
d. \$2.
e. \$1.75.

Difficulty: 2
Correct Answer: b

19. In the absence of government interference, there is a constant marginal cost of \$6 per ounce for growing marijuana and delivering it to buyers. Suppose that government authorities seize shipments whenever they find them and resell the marijuana that they seize on the open market. The probability that any shipment of marijuana is seized is .10. If a shipment is seized, there is no other punishment besides loss of the marijuana that is seized. The effect of the government action is to
a. leave prices unchanged.
b. raise the equilibrium price by \$.67.
c. lower the equilibrium price by \$.33.
d. raise the equilibrium price by \$1.33.
e. raise the equilibrium price by \$.60.

Difficulty: 2
Correct Answer: b

20. In the absence of government interference, there is a constant marginal cost of \$6 per ounce for growing marijuana and delivering it to buyers. Suppose that government authorities seize shipments whenever they find them and resell the marijuana that they seize on the open market. The probability that any shipment of marijuana is seized is .50. If a shipment is seized, there is no other punishment besides loss of the marijuana that is seized. The effect of the government action is to
a. leave prices unchanged.
b. raise the equilibrium price by \$6.
c. lower the equilibrium price by \$3.
d. raise the equilibrium price by \$12.
e. raise the equilibrium price by \$3.

Difficulty: 2
Correct Answer: b

21. In the absence of government interference, there is a constant marginal cost of \$4 per ounce for growing marijuana and delivering it to buyers. Suppose that government authorities seize shipments whenever they find them and resell the marijuana that they seize on the open market. The probability that any shipment of marijuana is seized is .50. If a shipment is seized, there is no other punishment besides loss of the marijuana that is seized. The effect of the government action is to
a. raise the equilibrium price by \$8.
b. raise the equilibrium price by \$4.
c. lower the equilibrium price by \$2.
d. leave prices unchanged.
e. raise the equilibrium price by \$2.

Difficulty:
Correct Answer: a

22. In the problem discussed in your workbook, the cost of capturing a cockatoo and transporting him to the United States is about \$40 per bird. Cockatoos are drugged and smuggled in suitcases to the United States. Half of the smuggled cockatoos die in transit. Each smuggled cockatoo has a 10% probability of being discovered, in which case the smuggler is fined. If the fine imposed for each smuggled cockatoo is increased to \$1,100, then the equilibrium price of cockatoos in the United States will be
a. \$333.33.
b. \$150.
c. \$95.
d. \$73.
e. \$244.44.

Difficulty:
Correct Answer: d

23. In the problem discussed in your workbook, the cost of capturing a cockatoo and transporting him to the United States is about \$40 per bird. Cockatoos are drugged and smuggled in suitcases to the United States. Half of the smuggled cockatoos die in transit. Each smuggled cockatoo has a 10% probability of being discovered, in which case the smuggler is fined. If the fine imposed for each smuggled cockatoo is increased to \$1,200, then the equilibrium price of cockatoos in the United States will be
    a. \$100.
    b. \$160.
    c. \$76.
    d. \$355.56.
    e. \$266.67.

Difficulty:
Correct Answer: b

24. In the problem discussed in your workbook, the cost of capturing a cockatoo and transporting him to the United States is about \$40 per bird. Cockatoos are drugged and smuggled in suitcases to the United States. Half of the smuggled cockatoos die in transit. Each smuggled cockatoo has a 10% probability of being discovered, in which case the smuggler is fined. If the fine imposed for each smuggled cockatoo is increased to \$700, then the equilibrium price of cockatoos in the United States will be
    a. \$110.
    b. \$244.44.
    c. \$75.
    d. \$61.
    e. \$155.56.

Difficulty:
Correct Answer: a

25. In the absence of government interference, there is a constant marginal cost of \$5 per ounce for growing marijuana and delivering it to buyers. If the probability that any shipment of marijuana is seized is .10 and the fine if a shipper is caught is \$25 per ounce, then the equilibrium price of marijuana per ounce is
    a. \$8.33.
    b. \$7.50.
    c. \$30.
    d. \$4.50.
    e. \$5.50.

Difficulty:
Correct Answer: c

26. In the absence of government interference, there is a constant marginal cost of \$5 per ounce for growing marijuana and delivering it to buyers. If the probability that any shipment of marijuana is seized is .10 and the fine if a shipper is caught is \$45 per ounce, then the equilibrium price of marijuana per ounce is
    a. \$50.
    b. \$9.50.
    c. \$10.56.
    d. \$4.50.
    e. \$5.50.

Difficulty:
Correct Answer: a

27. In the absence of government interference, there is a constant marginal cost of \$5 per ounce for growing marijuana and delivering it to buyers. If the probability that any shipment of marijuana is seized is .30 and the fine if a shipper is caught is \$35 per ounce, then the equilibrium price of marijuana per ounce is
    a. \$22.14.
    b. \$40.
    c. \$3.50.
    d. \$15.50.
    e. \$6.50.

Difficulty:
Correct Answer: d

28. In a certain industry, the supply curve of any firm is $S_i(p) = p/2$. If a firm produces 5 units of output, what are its total variable costs?
    a. \$50
    b. \$23
    c. \$37.50
    d. \$25
    e. There is not enough information given to determine total variable costs.

Difficulty:
Correct Answer: d

29. In a certain industry, the supply curve of any firm is $S_i(p) = p/2$. If a firm produces 6 units of output, what are its total variable costs?
    a. \$34
    b. \$72
    c. \$54
    d. \$36
    e. There is not enough information given to determine total variable costs.

Difficulty:
Correct Answer: b

30. In a certain industry, the supply curve of any firm is $S_i(p) = p/2$. If a firm produces 5 units of output, what are its total variable costs?
    a. \$37.50
    b. \$25

c. \$23
d. \$50
e. There is not enough information given to determine total variable costs.

Difficulty:
Correct Answer: a

31. An industry has 100 firms. These firms have identical production functions. In the short run, each firm has fixed costs of \$200. There are two variable factors in the short run and output is given by $y = (\min\{x_1, 4x_2\})^{1/2}$. The cost of factor 1 is \$2 per unit and the cost of factor 2 is \$4 per unit. In the short run, the industry supply curve is given by
a. $Q = 100p/6$.
b. $Q = 100p/4$.
c. $Q = 300p^{1/2}$.
d. the part of the line $Q = 50(\min\{2, 16\})$ for which $pQ > 200/Q$.
e. None of the above.

Difficulty:
Correct Answer: d

32. An industry has 100 firms. These firms have identical production functions. In the short run, each firm has fixed costs of \$200. There are two variable factors in the short run and output is given by $y = (\min\{x_1, 3x_2\})^{1/2}$. The cost of factor 1 is \$5 per unit and the cost of factor 2 is \$4 per unit. In the short run, the industry supply curve is given by
a. $Q = 100p/10$.
b. the part of the line $Q = 50(\min\{5, 12\})$ for which $pQ > 200/Q$.
c. $Q = 575p^{1/2}$.
d. $Q = 100p/12.67$.
e. None of the above.

Difficulty:
Correct Answer: a

33. An industry has 100 firms. These firms have identical production functions. In the short run, each firm has fixed costs of \$200. There are two variable factors in the short run and output is given by $y = (\min\{x1, 4x_2\})^{1/2}$. The cost of factor 1 is \$5 per unit and the cost of factor 2 is \$5 per unit. In the short run, the industry supply curve is given by
a. $Q = 100p/12.50$.
b. $Q = 100p/10$.
c. $Q = 580p^{1/2}$.
d. the part of the line $Q = 50(\min\{5, 20\})$ for which $pQ > 200/Q$.
e. None of the above.

Difficulty:
Correct Answer: b

34. The cheese business in Lake Fon-du-lac, Wisconsin, is a competitive industry. All cheese manufacturers have the cost function $C = Q^2 + 4$, while demand for cheese in the town is given by $Q_d = 120 - P$. The long-run equilibrium number of firms in this industry is
a. 29.
b. 58.
c. 56.
d. 120.
e. 59.

Difficulty:
Correct Answer: b

35. The cheese business in Lake Fon-du-lac, Wisconsin, is a competitive industry. All cheese manufacturers have the cost function $C = Q^2 + 16$, while demand for cheese in the town is given by $Q_d = 120 - P$. The long-run equilibrium number of firms in this industry is
a. 14.
b. 28.
c. 22.
d. 120.
e. 29.

Difficulty:
Correct Answer: b

36. The cheese business in Lake Fon-du-lac, Wisconsin, is a competitive industry. All cheese manufacturers have the cost function $C = Q^2 + 9$, while demand for cheese in the town is given by $Q_d = 120 - P$. The long-run equilibrium number of firms in this industry is
a. 120.
b. 38.
c. 19.
d. 34.
e. 39.

Difficulty:
Correct Answer: c

37. In Baggs, Wyoming, cattle can be produced according to the following process: $C = G/20 + P/30$, where C is the number of cattle, G are bushels of grain, and P are acres of pasture. If grain costs \$5 per bushel and pasture costs \$4 per acre, how many cattle can Rancher Roy produce with a budget of \$3,000?
a. 600
b. 60
c. 30
d. 25
e. 150

Difficulty:
Correct Answer: c

38. In Baggs, Wyoming, cattle can be produced according to the following process: $C = G/10 + P/40$, where C is the number of cattle, G are bushels of grain, and P are acres of pasture. If grain costs \$4 per bushel and pasture costs \$4 per acre, how many cattle can Rancher Roy produce with a budget of \$4,000?
    a. 80
    b. 25
    c. 100
    d. 1,000
    e. 400

Difficulty:
Correct Answer: d

39. In Baggs, Wyoming, cattle can be produced according to the following process: $C = G/20 + P/40$, where C is the number of cattle, G are bushels of grain, and P are acres of pasture. If grain costs \$4 per bushel and pasture costs \$3 per acre, how many cattle can Rancher Roy produce with a budget of \$6,000?
    a. 50
    b. 100
    c. 1,500
    d. 75
    e. 300

PROBLEMS

Difficulty: 2

1. The cost per bushel of growing corn on a given acre of land depends partly on how intensely the land is farmed and partly on the quality of the soil, the amount of rainfall, and the length of the growing season. Suppose that the last three factors are summarized by a single index f for fertility. Suppose that the long-run total cost of producing y hundred bushels of corn on an acre of land of fertility f is $c(y, f)$, where $c(y, f) = (1 + y^2)/f$ for $y > 0$ and $c(0, f) = 0$.
    a. Write down a formula for the long-run average cost function per hundred bushels of corn from an acre of land of quality f.
    b. At what level of output is long-run average cost minimized on an acre of land of quality f?
    c. What is the lowest price per hundred bushels at which an acre of land of quality f will be used to produce corn?

Answer:
    a. $LRAC = (y + 1/y)/f$.
    b. 100 bushels.
    c. $2/f$.

Difficulty:

2. The price elasticity of gasoline in the United States has been estimated to be 0.15. If this is so, should profit-maximizing gasoline stations raise their prices? (Explain why or why not.)

Answer: Individual station's price elasticities of demand are quite elastic because of competition between stations.

Difficulty:

3. The price elasticity of demand for gasoline in the United States is equal to 0.15. How should the price elasticity of demand for the individual firm compare to 0.15 (higher, lower, same, can't tell)? Explain why.

Answer: Higher, because one station's gasoline is a near perfect substitute for that of its competitors.

CHAPTER 24 Monopoly

TRUE-FALSE

Difficulty: 1
Correct Answer: True

1. Since a monopoly charges a price higher than marginal cost, it will produce an inefficient amount of output.

Difficulty: 2
Correct Answer: False

2. If the interest rate is 10%, a monopolist will choose a markup of price over marginal cost of at least 10%.

Difficulty: 1
Correct Answer: False

3. A natural monopoly occurs when a firm gains ownership of the entire stock of some natural resource and thus is able to exclude other producers.

Difficulty: 1
Correct Answer: False

4. Since a monopoly makes excess profits beyond the normal rate of return on investment, an investor is likely to get a higher rate of return in the stock market by investing in monopolistic rather than in competitive industries.

Difficulty: 1
Correct Answer: True

5. If he produces anything at all, a profit-maximizing monopolist with some fixed costs and no variable costs will set price and output so as to maximize revenue.

Difficulty: 1
Correct Answer: True

6. For a monopolist who faces a downward-sloping demand curve, marginal revenue is less than price whenever quantity sold is positive.

Difficulty: 2
Correct Answer: True

7. A monopolist with constant marginal costs faces a demand curve with a constant elasticity of demand and does not practice price discrimination. If the government imposes a tax of \$1 per unit of goods sold by the monopolist, the monopolist will increase his price by more than \$1 per unit.

Difficulty: 1
Correct Answer: True

8. A monopolist will always equate marginal revenue and marginal cost when maximizing profit.

MULTIPLE CHOICE

Difficulty: 2
Correct Answer: c

1. A monopolist faces the inverse demand function described by $p = 50 - 4q$, where q is output. The monopolist has no fixed cost and his marginal cost is \$5 at all levels of output. Which of the following expresses the monopolist's profits as a function of his output?
   a. $50 - 4q - 5$
   b. $50 - 8q$
   c. $45q - 4q^2$
   d. $50q - 4q^2 - 5$
   e. None of the above.

Difficulty: 2
Correct Answer: c

2. A monopolist faces the inverse demand function described by $p = 23 - 5q$, where q is output. The monopolist has no fixed cost and his marginal cost is \$6 at all levels of output. Which of the following expresses the monopolist's profits as a function of his output?
   a. $23 - 5q - 6$
   b. $17q - 5q^2$
   c. $23 - 10q$
   d. $23q - 5q^2 - 6$
   e. None of the above.

Difficulty: 1
Correct Answer: e

3. A monopolist faces the inverse demand curve $p = 64 - 2q$. At what level of output is his total revenue maximized?
   a. 24
   b. 26
   c. 8
   d. 32
   e. 16

Difficulty: 1
Correct Answer: e

4. A monopolist faces the inverse demand curve $p = 120 - 6q$. At what level of output is his total revenue maximized?
   a. 20
   b. 5
   c. 20
   d. 15
   e. 10

Difficulty: 2
Correct Answer: b

5. The demand for a monopolist's output is 7,000 divided by the square of the price in dollars that it charges per unit. The firm has constant marginal costs equal to 1 dollar per unit. To maximize its profits, it should charge a price of
   a. 1 dollar.
   b. 2 dollars.
   c. 3 dollars.
   d. 1.5 dollars.
   e. 2.5 dollars.

Difficulty: 2
Correct Answer: a

6. A profit-maximizing monopolist faces the demand curve $q = 100 - 3p$. It produces at a constant marginal cost of \$20 per unit. A quantity tax of \$10 per unit is imposed on the monopolist's product. The price of the monopolist's product
   a. rises by \$5.
   b. rises by \$10.
   c. rises by \$20.
   d. rises by \$12.
   e. stays constant.

Difficulty: 2
Correct Answer: c

7. The demand for a monopolist's output is 10,000 divided by the square of the price it charges. The monopolist produces at a constant marginal cost of \$5. If the government imposes a sales tax of \$10 per unit on the monopolist's output, the monopolist's price will rise by
   a. \$5.
   b. \$10.
   c. \$20.
   d. \$12.
   e. None of the above.

Difficulty: 2
Correct Answer: c

8. The demand for a monopolist's output is $6{,}000/(p + 2)^2$, where p is the price it charges. At a price of \$3, the elasticity of demand for the monopolist's output is
   a. -1.
   b. -2.20.
   c. -1.20.
   d. -1.70.
   e. -0.70.

Difficulty: 2
Correct Answer: d

9. The demand for a monopolist's output is $3{,}000/(p + 2)^2$, where p is the price it charges. At a price of \$3, the elasticity of demand for the monopolist's output is
   a. -1.
   b. -2.60.
   c. -2.10.
   d. -1.60.
   e. -1.10.

Difficulty: 3
Correct Answer: d

10. The demand for a monopolist's output is $6{,}000/(p + 7)^2$, where p is its price. It has constant marginal costs equal to \$5 per unit. What price will it charge to maximize its profits?
    a. \$33
    b. \$12
    c. \$26
    d. \$17
    e. \$5

Difficulty: 3
Correct Answer: d

11. The demand for a monopolist's output is $6{,}000/(p + 3)^2$, where p is its price. It has constant marginal costs equal to \$6 per unit. What price will it charge to maximize its profits?
    a. \$9
    b. \$18
    c. \$21
    d. \$15
    e. \$6

Difficulty: 2
Correct Answer: d

12. A monopolist faces a constant marginal cost of \$1 per unit. If at the price he is charging, the price elasticity of demand for the monopolist's output is -0.5, then
    a. the price he is charging must be \$2.
    b. the price he is charging must exceed \$2.
    c. the price he is charging must be less than \$2.
    d. the monopolist cannot be maximizing profits.
    e. the monopolist must use price discrimination.

Difficulty: 1
Correct Answer: e

13. A profit-maximizing monopolist sets
    a. price equal to average cost.
    b. price equal to marginal cost.
    c. price equal to marginal cost plus a prorated share of overhead.
    d. price equal to marginal revenue.
    e. marginal revenue equal to marginal cost.

Difficulty: 2
Correct Answer: c

14. A monopolist has decreasing average costs as output increases. If the monopolist sets price equal to average cost, it will
    a. produce too much output from the standpoint of efficiency.
    b. lose money.
    c. produce too little output from the standpoint of efficiency.
    d. maximize its profits.
    e. face excess demand.

Difficulty: 1
Correct Answer: d

15. A profit-maximizing monopolist faces a downward-sloping demand curve that has a constant elasticity of -3. The firm finds it optimal to charge a price of \$12 for its output. What is its marginal cost at this level of output?
    a. \$5
    b. \$25
    c. \$24
    d. \$8
    e. \$12

Difficulty: 1
Correct Answer: b

16. A profit-maximizing monopolist faces a downward-sloping demand curve that has a constant elasticity of -4. The firm finds it optimal to charge a price of \$24 for its output. What is its marginal cost at this level of output?
    a. \$55
    b. \$18
    c. \$48
    d. \$10
    e. \$24

Difficulty: 2
Correct Answer: d

17. A monopolist has constant marginal costs of \$1 per unit. The demand for her output is $1{,}000/p$ if p is less than or equal to 50. The demand is 0 if $p > 50$. What is her profit maximizing level of output?
    a. 5
    b. 10
    c. 15
    d. 20
    e. 25

Difficulty: 2
Correct Answer: b

18. The demand curve for the output of a certain industry is linear; $q = A - Bp$. There are constant marginal costs of C. For all values of A, B, and C such that $A > 0$, $B > 0$, and $0 < C < A/B$,
    a. if the industry is monopolized, prices will be exactly twice as high as they would be if the industry were competitive.
    b. if the industry is competitive, output will be exactly twice as great as it would be if the industry were monopolized.
    c. if the industry is monopolized, prices will be more than twice as high as if the industry is competitive.
    d. if the industry is monopolized, output will be more than half as large as it would be if the industry were competitive.
    e. None of the above.

Difficulty: 3
Correct Answer: b

19. A monopolist receives a subsidy from the government for every unit of output that is consumed. He has constant marginal costs and the subsidy that he gets per unit of output is greater than his marginal cost of production. But to get the subsidy on a unit of output, somebody has to consume it.
    a. He will pay consumers to consume his product.
    b. If he sells at a positive price, demand must be inelastic at that price.
    c. He will sell at a price where demand is elastic.
    d. He will give the good away.
    e. None of the above.

Difficulty: 2
Correct Answer: c

20. A monopolist faces the demand curve $q = 90 - p/2$, where q is the number of units sold and p is the price in dollars. She has quasi-fixed costs, C, and constant marginal costs of \$20 per unit of output. Therefore her total costs are $C + 20q$ if $q > 0$ and 0 if $q = 0$. What is the largest value of C for which she would be willing to produce positive output?
   a. \$20
   b. \$2,560
   c. \$3,200
   d. \$4,800
   e. \$3,840

Difficulty: 2
Correct Answer: a

21. A monopolist faces the demand curve $q = 90 - p/2$, where q is the number of units sold and p is the price in dollars. He has quasi-fixed costs, C, and constant marginal costs of \$20 per unit of output. Therefore his total costs are $C + 20q$ if $q > 0$ and 0 if $q = 0$. What is the largest value of C for which he would be willing to produce positive output?
   a. \$3,200
   b. \$2,560
   c. \$4,800
   d. \$20
   e. \$3,840

Difficulty: 2
Correct Answer: c

22. A natural monopolist has the total cost function $c(q) = 350 + 20q$, where q is its output. The inverse demand function for the monopolist's product is $p = 100 - 2q$. Government regulations require this firm to produce a positive amount and to set price equal to average costs. To comply with these requirements
   a. is impossible for this firm.
   b. the firm must produce 40 units.
   c. the firm could produce either 5 units or 35 units.
   d. the firm must charge a price of \$70.
   e. the firm must produce 20 units.

Difficulty: 2
Correct Answer: d

23. A monopolist has the total cost function $c(q) = 800 + 8q$. The inverse demand function is $80 - 6q$, where prices and costs are measured in dollars. If the firm is required by law to meet demand at a price equal to its marginal costs,
   a. the firm's profits will be zero.
   b. the firm will lose \$400.
   c. the firm will make positive profit but not as much profit as it would make if it were allowed to choose its own price.
   d. the firm will lose \$800.
   e. the firm will lose \$480.

Difficulty: 2
Correct Answer: d

24. A monopolist has the total cost function $c(q) = 750 + 5q$. The inverse demand function is $140 - 7q$, where prices and costs are measured in dollars. If the firm is required by law to meet demand at a price equal to its marginal costs,
   a. the firm will make positive profit but not as much profit as it would make if it were allowed to choose its own price.
   b. the firm's profits will be zero.
   c. the firm will lose \$375.
   d. the firm will lose \$750.
   e. the firm will lose \$450.

Difficulty: 2
Correct Answer: b

25. A monopolist enjoys a monopoly over the right to sell automobiles on a certain island. He imports automobiles from abroad at a cost of \$10,000 each and sells them at the price that maximizes profits. One day, the island's government annexes a neighboring island and extends the monopolist's monopoly rights to this island. People on the annexed island have the same tastes and incomes and there are just as many people as on the first.
   a. The monopolist doubles his price and his sales stay constant.
   b. The monopolist keeps his price constant and his sales double.
   c. The monopolist raises his price but does not necessarily double it.
   d. The monopolist's profits more than double.
   e. None of the above.

Difficulty: 3
Correct Answer: d

26. An airline has exclusive landing rights at the local airport. The airline flies one flight per day to New York with a plane that has a seating capacity of 100. The cost of flying the plane per day is \$4,000 + $10q$, where q is the number of passengers. The number of flights to New York demanded is $q = 165 - .5p$. If the airline maximizes its monopoly profits, the difference between the marginal cost of flying an extra passenger and the amount the marginal passenger is willing to pay to fly to New York is
   a. \$10.
   b. \$100.
   c. \$140.
   d. \$160.
   e. None of the above.

Difficulty: 2
Correct Answer: d

27. A monopoly has the demand curve $q = 10{,}000 - 100p$. Its total cost function is $c(q) = 1{,}000 + 10q$. The government plans to tax the monopoly's profits at a rate of 50%. If it does so, the monopoly will
    a. increase its price by 50%.
    b. increase its price by more than 50%.
    c. recover some but not all of the tax it pays by increasing its price.
    d. not change its price or the quantity it sells.
    e. None of the above.

Difficulty: 2
Correct Answer: e

28. A monopolist faces a downward-sloping demand curve and has fixed costs so large that when she maximizes profits with a positive amount of output, she earns exactly zero profits. At this positive, profit-maximizing output,
    a. there are decreasing returns to scale.
    b. demand is price inelastic.
    c. marginal revenue is greater than marginal cost.
    d. price equals marginal cost.
    e. average total cost is greater than marginal cost.

Difficulty: 2
Correct Answer: d

29. A computer software firm has developed a new and better spreadsheet program. The program is protected by copyrights, so the firm can act as a monopolist for this product. The demand function for the spreadsheet is $q = 50{,}000 - 100p$. Any single consumer will want only one copy. The marginal cost of producing and distributing another copy and its documentation is just \$10 per copy. If the company sells this software at the profit-maximizing monopoly price, the number of consumers who would not buy the software at the monopoly price but would be willing to pay at least the marginal cost is
    a. 50,000.
    b. 12,000.
    c. 14,000.
    d. 25,000.
    e. None of the above.

Difficulty: 3
Correct Answer: d

30. The town council of Frostbite, Ontario, is trying to decide whether to build an outdoor skating rink which would cost \$1 million and last for only one season. Operating costs would be zero. Yearly passes would be sold to anyone who wanted to use the rink. If p is the price of the pass in dollars, the number demanded would be $q = 1200 - .6p$. The council has asked you to advise them on building the rink. You should tell them that
    a. revenues won't cover construction costs at any ticket price. There is no way to increase total consumer surplus by building the rink.
    b. if the rink is built and price is set to maximize profits, the town makes a profit and consumers will be better off.
    c. if the rink is built and price set to maximize profits, the town makes a profit but consumers are worse off than without a rink.
    d. there is no price at which ticket revenues still cover costs but total consumer surplus from the rink exceeds costs.
    e. None of the above.

Difficulty: 2
Correct Answer: c

31. A monopolist produces at a point where the price elasticity of demand is -0.7 and the marginal cost is \$2. If you were hired to advise this monopolist on how to increase his profits, you would find that the way to increase his profits is to
    a. increase his output.
    b. lower the price.
    c. decrease his output.
    d. produce the output level where marginal cost equals price.
    e. increase his advertising efforts.

Difficulty: 2
Correct Answer: c

32. The Hard Times Concrete Company is a monopolist in the concrete market. It uses two inputs, cement and gravel, which it buys in competitive markets. The company's production function is $q = c^{1/2}g^{1/2}$, where q is its output, c is the amount of cement it uses, and g is the amount of gravel it uses. If the price of cement goes up, the firm's demand for cement
    a. goes down and its demand for gravel goes up.
    b. and its demand for gravel go down.
    c. goes down and its demand for gravel may go up, down, or remain the same, depending on the demand function for concrete.
    d. may go up, down, or not change, depending on whether the cement's elasticity of demand is less than, equal to, or greater than -1.
    e. could go up or down but must move in the opposite direction from its demand for gravel.

Difficulty: 1
Correct Answer: b

33. In a market with the inverse demand curve $P = 10 - Q$, Brand X is a monopolist with no fixed costs and with a marginal cost of \$2. If marginal cost rises to \$4, by how much will the price of Brand X rise?
   a. \$2.
   b. \$1.
   c. \$3.
   d. \$0; the firm is already charging the monopoly price.
   e. None of the above.

Difficulty: 2
Correct Answer: c

34. Charlie can work as many hours as he wishes at a local fast-food restaurant for a wage of \$4 per hour. Charlie also does standup comedy. Since Charlie lives in a quiet, rather solemn midwestern town, he is the town's only comedian and has a local monopoly for standup comedy. The demand for comedy is $Q = 40 - P$, where Q is the number of hours of comedy performed per week and P is the price charged per hour of comedy. When Charlie maximizes his utility, he spends at least 1 hour per week working at the restaurant and he gets at least 1 hour of leisure time. His utility depends only on income and leisure. How many hours per week does he perform standup comedy?
   a. 36
   b. 40
   c. 18
   d. 20
   e. We can't tell without knowing his utility function.

Difficulty: 2
Correct Answer: d

35. A certain monopolist has a positive marginal cost of production. Despite this fact, the monopolist decides to produce a quantity of output that maximizes total revenues. Assume that the marginal revenue curve for this monopolist always has a negative slope. Then the monopolist
   a. is minimizing its profits.
   b. produces the same output that it would if it maximized profits.
   c. produces less output than it would if it maximized profits.
   d. produces more output than it would if it were maximizing profits.
   e. produces an output where marginal revenue is strictly less than 1.

Difficulty: 2
Correct Answer: d

36. The demand curve facing a monopolist is $D(p) = 100/p$ if p is 20 or smaller and $D(p) = 0$ if $p > 20$. The monopolist has a constant marginal cost of \$1 per unit produced. What is the profit-maximizing quantity of output for this monopolist?
   a. 4
   b. 3
   c. 2
   d. 5
   e. It cannot be determined from the information given.

Difficulty: 2
Correct Answer: b

37. An industry has two firms, a leader and a follower. The demand curve for the industry's output is given by $p = 456 - 6q$, where q is total industry output. Each firm has zero marginal cost. The leader chooses his quantity first, knowing that the follower will observe the leader's choice and choose his quantity to maximize profits, given the quantity produced by the leader. The leader will choose an output of
   a. 25.33.
   b. 38.
   c. 19.
   d. 76.
   e. None of the above.

Difficulty: 2
Correct Answer: a

38. An industry has two firms, a leader and a follower. The demand curve for the industry's output is given by $p = 208 - 4q$, where q is total industry output. Each firm has zero marginal cost. The leader chooses his quantity first, knowing that the follower will observe the leader's choice and choose his quantity to maximize profits, given the quantity produced by the leader. The leader will choose an output of
   a. 26.
   b. 17.33.
   c. 13.
   d. 52.
   e. None of the above.

Difficulty: 1
Correct Answer: a

39. A monopolist faces a constant marginal cost of \$1 per unit and has no fixed costs. If the price elasticity of demand for this product is constant and equal to -3, then
   a. to maximize profits, he should charge a price of \$1.50.
   b. to maximize profits, he should charge a price of \$3.
   c. to maximize profits, he should charge a price of \$1.33.
   d. he is not maximizing profits.
   e. None of the above.

Difficulty: 1
Correct Answer: c

40. A monopolist faces a constant marginal cost of $1 per unit and has no fixed costs. If the price elasticity of demand for this product is constant and equal to −4, then
   a. to maximize profits, he should charge a price of $4.
   b. he is not maximizing profits.
   c. to maximize profits, he should charge a price of $1.33.
   d. to maximize profits, he should charge a price of $1.25.
   e. None of the above.

Difficulty: 2
Correct Answer: c

41. A profit-maximizing monopolist has the cost schedule $c(y) = 20y$. The demand for her product is given by $y = 600/p4$, where p is her price. Suppose that the government tries to get her to increase her output by giving her a subsidy of $15 for every unit that she sells. Giving her the subsidy would make her
   a. decrease her price by $7.50.
   b. decrease her price by $15.
   c. decrease her price by $20.
   d. decrease her price by $35.
   e. leave her price unchanged.

Difficulty: 2
Correct Answer: b

42. A profit-maximizing monopolist has the cost schedule $c(y) = 40y$. The demand for her product is given by $y = 600/p^4$, where p is her price. Suppose that the government tries to get her to increase her output by giving her a subsidy of $21 for every unit that she sells. Giving her the subsidy would make her
   a. decrease her price by $49.
   b. decrease her price by $28.
   c. decrease her price by $10.50.
   d. decrease her price by $21.
   e. leave her price unchanged.

Difficulty: 2
Correct Answer: b

43. A profit-maximizing monopolist faces a demand function given by $q = 1000 - 20p$, where p is the price of her output in dollars. She has a constant marginal cost of 20 dollars per unit of output. In an effort to induce her to increase her output, the government agrees to pay her a subsidy of $10 for every unit that she produces. She will
   a. increase her price and lower her output.
   b. decrease her price by $5 per unit.
   c. decrease her price by $10 per unit.
   d. decrease her price by more than $10 per unit but by less than $16 per unit.
   e. decrease her price by more than $16 per unit.

Difficulty: 2
Correct Answer: a

44. A firm has discovered a new kind of nonfattening, non-habit-forming dessert called zwiffle. It doesn't taste very good, but some people like it and it can be produced from old newspapers at zero marginal cost. Before any zwiffle could be produced, the firm would have to spend a fixed cost of $\$F$. Demand for zwiffle is given by the equation $q = 12 - p$. The firm has a patent on zwiffle, so it can have a monopoly in this market.
   a. The firm will produce zwiffle only if F is less than or equal to 36.
   b. The firm will not produce zwiffle if $F > 12$.
   c. The firm will produce 12 units of zwiffle.
   d. The firm will produce 9 units of zwiffle.
   e. None of the above.

Difficulty: 2
Correct Answer: b

45. A firm has discovered a new kind of nonfattening, non-habit-forming dessert called zwiffle. It doesn't taste very good, but some people like it and it can be produced from old newspapers at zero marginal cost. Before any zwiffle could be produced, the firm would have to spend a fixed cost of $\$F$. Demand for zwiffle is given by the equation $q = 20 - p$. The firm has a patent on zwiffle, so it can have a monopoly in this market.
   a. The firm will not produce zwiffle if $F > 20$.
   b. The firm will produce zwiffle only if F is less than or equal to 100.
   c. The firm will produce 15 units of zwiffle.
   d. The firm will produce 20 units of zwiffle.
   e. None of the above.

Difficulty: 3
Correct Answer: b

46. A firm has invented a new beverage called Slops. It doesn't taste very good, but it gives people a craving for Lawrence Welk's music and Professor Johnson's jokes. Some people are willing to pay money for this effect, so the demand for Slops is given by the equation $q = 14 - p$. Slops can be made at zero marginal cost from old-fashioned macroeconomics books dissolved in bathwater. But before any Slops can be produced, the firm must undertake a fixed cost of $54. Since the inventor has a patent on Slops, it can be a monopolist in this new industry.
   a. The firm will produce 7 units of Slops.
   b. A Pareto improvement could be achieved by having the government pay the firm a subsidy of $59 and insisting that the firm offer Slops at zero price.
   c. From the point of view of social efficiency, it is best that no Slops be produced.
   d. The firm will produce 14 units of Slops.
   e. None of the above.

Difficulty: 3
Correct Answer: d

47. A firm has invented a new beverage called Slops. It doesn't taste very good, but it gives people a craving for Lawrence Welk's music and Professor Johnson's jokes. Some people are willing to pay money for this effect, so the demand for Slops is given by the equation $q = 10 - p$. Slops can be made at zero marginal cost from old-fashioned macroeconomics books dissolved in bathwater. But before any Slops can be produced, the firm must undertake a fixed cost of $30. Since the inventor has a patent on Slops, it can be a monopolist in this new industry.
    a. The firm will produce 5 units of Slops.
    b. The firm will produce 10 units of Slops.
    c. From the point of view of social efficiency, it is best that no Slops be produced.
    d. A Pareto improvement could be achieved by having the government pay the firm a subsidy of $35 and insisting that the firm offer Slops at zero price.
    e. None of the above.

Difficulty: 2
Correct Answer: c

48. The demand for Professor Bongmore's new book is given by the function $Q = 2{,}000 - 100p$. If the cost of having the book typeset is $7,000, if the marginal cost of printing an extra copy is $4, and if he has no other costs, then he would maximize his profits by
    a. having it typeset and selling 800 copies.
    b. having it typeset and selling 1,000 copies.
    c. not having it typeset and not selling any copies.
    d. having it typeset and selling 1,600 copies.
    e. having it typeset and selling 400 copies.

Difficulty: 2
Correct Answer: d

49. The demand for Professor Bongmore's new book is given by the function $Q = 5{,}000 - 100p$. If the cost of having the book typeset is $9,000, if the marginal cost of printing an extra copy is $4, and if he has no other costs, then he would maximize his profits by
    a. not having it typeset and not selling any copies.
    b. having it typeset and selling 2,500 copies.
    c. having it typeset and selling 4,600 copies.
    d. having it typeset and selling 2,300 copies.
    e. having it typeset and selling 1,150 copies.

Difficulty:
Correct Answer: a

50. Peter Morgan sells pigeon pies from his pushcart in Central Park. Due to the abundant supplies of raw materials, his costs are zero. The demand schedule for his pigeon pies is $p(y) = 150 - y/3$. What level of output will maximize Peter's profits?
    a. 225
    b. 45
    c. 450
    d. 675
    e. None of the above

Difficulty:
Correct Answer: e

51. Peter Morgan sells pigeon pies from his pushcart in Central Park. Due to the abundant supplies of raw materials, his costs are zero. The demand schedule for his pigeon pies is $p(y) = 80 - y/4$. What level of output will maximize Peter's profits?
    a. 164
    b. 480
    c. 32
    d. 320
    e. None of the above

Difficulty:
Correct Answer: c

52. A profit-maximizing monopoly faces an inverse demand function described by the equation $p(y) = 40 - y$ and its total costs are $c(y) = 7y$, where prices and costs are measured in dollars. In the past it was not taxed, but now it must pay a tax of 6 dollars per unit of output. After the tax, the monopoly will
    a. increase its price by 6 dollars.
    b. increase its price by 9 dollars.
    c. increase its price by 3 dollars.
    d. leave its price constant.
    e. None of the above.

Difficulty:
Correct Answer: c

53. A profit-maximizing monopoly faces an inverse demand function described by the equation $p(y) = 30 - y$ and its total costs are $c(y) = 5y$, where prices and costs are measured in dollars. In the past it was not taxed, but now it must pay a tax of 2 dollars per unit of output. After the tax, the monopoly will
    a. increase its price by 3 dollars.
    b. increase its price by 2 dollars.
    c. increase its price by 1 dollars.
    d. leave its price constant.
    e. None of the above.

Difficulty:
Correct Answer: c

54. A monopolist faces the demand function $Q = 7{,}000/(p + 3)^{-2}$. If she charges a price of p, her marginal revenue will be
    a. $p/2 + 3$.
    b. $2p + 1.50$.
    c. $p/2 - 3/2$.
    d. $-2(p + 3)^{-3}$.
    e. $(p + B)^{-2}$.

Difficulty:
Correct Answer: d

55. A monopolist faces the demand function $Q = 4{,}000/(p + 6)^{-2}$. If she charges a price of p, her marginal revenue will be
    a. $p/2 + 6$.
    b. $-2(p + 6)^{-3}$.
    c. $2/p + 3$.
    d. $p/2 - 6/2$.
    e. $(p + B)^{-2}$.

Difficulty:
Correct Answer: a

56. The demand for copies of the software package Macrosoft Doors is given by $Q = 10{,}000P^{-2}$. The cost to produce Doors is $C = 100{,}000 + 5Q$. If Macrosoft practices cost plus pricing, what would be the profit-maximizing markup?
    a. 100%
    b. 33.33%
    c. 14.29%
    d. 6.67%
    e. 3.23%

Difficulty:
Correct Answer: b

57. The demand for copies of the software package Macrosoft Doors is given by $Q = 10{,}000P^{-2}$. The cost to produce Doors is $C = 100{,}000 + 5Q$. If Macrosoft practices cost plus pricing, what would be the profit-maximizing markup?
    a. 6.67%
    b. 100%
    c. 14.29%
    d. 33.33%
    e. 3.23%

Difficulty:
Correct Answer: c

58. A major software developer has estimated the demand for its new personal finance software package to be $Q = 1{,}000{,}000P^{-1.40}$ while the total cost of the package is $C = 100{,}000 + 20Q$. If this firm wishes to maximize profit, what percentage markup should it place on this product?
    a. 220%
    b. 290%
    c. 250%
    d. 190%
    e. 300%

Difficulty:
Correct Answer: b

59. A major software developer has estimated the demand for its new personal finance software package to be $Q = 1{,}000{,}000P^{-2}$ while the total cost of the package is $C = 100{,}000 + 25Q$. If this firm wishes to maximize profit, what percentage markup should it place on this product?
    a. 90%
    b. 100%
    c. 20%
    d. 40%
    e. 250%

Difficulty:
Correct Answer: d

60. The Fabulous 50s Decor Company is the only producer of pink flamingo lawn statues. While business is not as good as it used to be, in recent times the annual demand has been $Q = 400 - 6P$. Flamingo lawn statues are handcrafted by artisans using the process $Q = \min\{L, P/6\}$ where L is hours of labor and P is pounds of pink plastic. $P_L = 15$ and $P_P = 3$. What would be the profit-maximizing output and price?
    a. $Q = 179$ and $P = 36.83$.
    b. $Q = 192.25$ and $P = 34.63$.
    c. $Q = 199.42$ and $P = 33.43$.
    d. $Q = 101$ and $P = 49.83$.
    e. $Q = 202$ and $P = 33$.

Difficulty:
Correct Answer: a

61. The Fabulous 50s Decor Company is the only producer of pink flamingo lawn statues. While business is not as good as it used to be, in recent times the annual demand has been $Q = 700 - 5P$. Flamingo lawn statues are handcrafted by artisans using the process $Q = \min\{L, P/7\}$ where L is hours of labor and P is pounds of pink plastic. $P_L = 20$ and $P_P = 2$. What would be the profit-maximizing output and price?
    a. $Q = 265$ and $P = 87$.
    b. $Q = 330$ and $P = 74$.
    c. $Q = 339.86$ and $P = 72.03$.
    d. $Q = 349.43$ and $P = 70.11$.
    e. $Q = 530$ and $P = 34$.

Difficulty:
Correct Answer: d

62. An obscure inventor in Strasburg, North Dakota, has a monopoly on a new beverage called Bubbles, which produces an unexplained craving for Lawrence Welk music. Bubbles is produced by the following process: $Q = \min\{R/2, W\}$, where R is pulverized Lawrence Welk records and W is gallons of North Dakota well

water. $P_R = P_W = \$1$. Demand for Bubbles is $Q = 576P^{-2}A^{0.5}$. If the advertising budget for Bubbles is \$81, the profit-maximizing quantity of Bubbles is
a. 0.
b. 36.
c. 432.
d. 144.
e. 140.

Difficulty:
Correct Answer: d

63. An obscure inventor in Strasburg, North Dakota, has a monopoly on a new beverage called Bubbles, which produces an unexplained craving for Lawrence Welk music. Bubbles is produced by the following process: $Q = \min\{R/3, W\}$, where R is pulverized Lawrence Welk records and W is gallons of North Dakota well water. $P_R = P_W = \$1$. Demand for Bubbles is $Q = 1{,}024P^{-2}A^{0.5}$. If the advertising budget for Bubbles is \$100, the profit-maximizing quantity of Bubbles is
a. 640.
b. 40.
c. 0.
d. 160.
e. 156.

Difficulty:
Correct Answer: a

64. The Cleveland Visitors Bureau is the exclusive national marketer of weekend getaway vacations in Cleveland, Ohio. At current market prices, the price elasticity of demand is -1. To maximize profits, the bureau should
a. raise prices.
b. lower prices.
c. not change prices.
d. run new TV commercials.
e. More information is needed to make an accurate judgment.

Difficulty:
Correct Answer: d

65. The Cleveland Visitors Bureau is the exclusive national marketer of weekend getaway vacations in Cleveland, Ohio. At current market prices, the price elasticity of demand is $-.50$. To maximize profits, the bureau should
a. not change prices.
b. run new TV commercials.
c. lower prices.
d. raise prices.
e. More information is needed to make an accurate judgement.

Difficulty:
Correct Answer: d

66. In some parts of the world, Red Lizzard Wine is alleged to increase one's longevity. It is produced by the process $Q = \min\{(1/3)L, R\}$, where L is the number of spotted red lizards and R is gallons of rice wine. $P_L = P_R = \$1$. Demand for Red Lizzard Wine in the United States is $Q = 576P^{-2}A^{1/2}$. If the advertising budget is \$121, the quantity of wine which should be imported into the United States is
a. 0 gallons.
b. 33 gallons.
c. 396 gallons.
d. 99 gallons.
e. 95 gallons.

Difficulty:
Correct Answer: b

67. In some parts of the world, Red Lizzard Wine is alleged to increase one's longevity. It is produced by the process $Q = \min\{(1/4)L, R\}$, where L is the number of spotted red lizards and R is gallons of rice wine. $P_L = P_R = \$1$. Demand for Red Lizzard Wine in the United States is $Q = 900P^{-2}A^{1/2}$. If the advertising budget is \$144, the quantity of wine which should be imported into the United States is
a. 540 gallons.
b. 108 gallons.
c. 0 gallons.
d. 36 gallons.
e. 104 gallons.

PROBLEM

Difficulty: 3

1. A baseball team's attendance depends on the number of games it wins per season and on the price of its tickets. The demand function it faces is $Q = N(20 - p)$, where Q is the number of tickets (in hundred thousands) sold per year, p is the price per ticket, and N is the fraction of its games that the team wins. The team can increase the number of games it wins by hiring better players. If the team spends C million dollars on players, it will win $.7 - 1/C$ of its games. Over the relevant range, the marginal cost of selling an extra ticket is zero.
   a. Write an expression for the firm's profits as a function of ticket price and expenditure on players.
   b. Find the ticket price that maximizes revenue.
   c. Find the profit-maximizing expenditure on players and the profit-maximizing fraction of games to win.

Answer:
a. $(.7 - 1/C)(20 - p)p - C$.
b. $p = 10$.
c. $C = 10$. The team will win 60% of its games.

CHAPTER 25 Monopoly Behavior

TRUE-FALSE

Difficulty: 2
Correct Answer: True

1. Third-degree price discrimination occurs when a monopolist sells output to different people at different prices but every unit that an individual buys costs the same amount.

Difficulty: 1
Correct Answer: False

2. A monopolist who is able to practice third-degree price discrimination will make greater profits than a monopolist who is able to practice first-degree price discrimination.

Difficulty: 2
Correct Answer: False

3. A discriminating monopolist is able to charge different prices in two different markets. If when the same price is charged in both markets, the quantity demanded in market 1 is always greater than the quantity demanded in market 2, then in order to maximize profits, the monopolist should charge a higher price in market 1 than in market 2.

Difficulty: 2
Correct Answer: True

4. In a monopolistically competitive industry with zero profits, each firm will produce less than the amount that minimizes average costs.

Difficulty: 3
Correct Answer: True

5. It is possible that a profit-maximizing monopolist who is able to practice first-degree (perfect) price discrimination would sell a quantity x such that the demand curve for his product is inelastic when the quantity sold is x.

Difficulty: 1
Correct Answer: True

6. In order to maximize his profits, a monopolist who practices third-degree price discrimination with two or more markets should charge higher prices in markets with more inelastic demand functions.

Difficulty: 1
Correct Answer: False

7. A profit-maximizing monopolist is able to practice third-degree price discrimination. If he charges p_1 in market 1 and p_2 in market 2, where $p_1 > p_2$, the quantity sold in market 1 must be smaller than the quantity sold in market 2.

Difficulty: 2
Correct Answer: False

8. A profit-maximizing monopolist practices third-degree price discrimination. If he charges p_1 in market 1 and p_2 in market 2, where $p_1 > p_2$, then if the law forced him to charge the same price in both markets, more would be demanded in market 1 than in market 2.

Difficulty: 2
Correct Answer: True

9. A price-discriminating monopolist charges p_1 in market 1 and p_2 in market 2. If $p_1 > p_2$, the absolute value of the price elasticity in market 1 at price p_1 must be smaller than the absolute value of the price elasticity in market 2 at price p_2.

Difficulty: 1
Correct Answer: False

10. A monopolist who is able to practice third-degree price discrimination charges a higher price in the market that is more elastic.

MULTIPLE CHOICE

Difficulty: 2
Correct Answer: c

1. A monopolist is able to practice third-degree price discrimination between two markets. The demand function in the first market is $q = 500 - 2p$ and the demand function in the second market is $q = 1{,}500 - 6p$. To maximize his profits, he should
   a. charge a higher price in the second market than in the first.
   b. charge a higher price in the first market than in the second.
   c. charge the same price in both markets.
   d. sell only in one of the two markets.
   e. None of the above.

Difficulty: 2
Correct Answer: b

2. A monopolist finds that a person's demand for its product depends on the person's age. The inverse demand function of someone of age y can be written $p = A(y) - q$, where $A(y)$ is an increasing function of y. The product cannot be resold from one buyer to another and the monopolist knows the ages of its consumers. If the monopolist maximizes its profits,
   a. older people will pay higher prices and purchase less of this product.
   b. older people will pay higher prices and purchase more of this product.
   c. older people will pay lower prices and purchase more of this product.
   d. everyone will pay the same price but older people will consume more.
   e. None of the above

Difficulty: 3
Correct Answer: a

3. A monopolist has discovered that the inverse demand function of a person with income M for the monopolist's product is $p = .002M - q$. The monopolist is able to observe the incomes of its consumers and to practice price discrimination according to income (second-degree price discrimination). The monopolist has a total cost function, $c(q) = 100q$. The price it will charge a consumer depends on the consumer's income, M, according to the formula
   a. $p = .001M + 50$.
   b. $p = .002M - 100$.
   c. $p = M^2$.
   d. $p = .01M^2 + 100$.
   e. None of the above.

Difficulty: 2
Correct Answer: a

4. Wobble's Weebles is the only producer of weebles. It makes weebles at constant marginal cost c(where $c > 0$) and sells them at a price of p_1 per weeble in market 1 and at a price of p_2 per weeble in market 2. The demand curve for weebles in market 1 has a constant price elasticity of demand equal to -2. The demand curve for weebles in market 2 has a constant price elasticity equal to $-3/2$. The ratio of the profit-maximizing price in market 1 to the profit-maximizing price in market 2 is
   a. 2/3.
   b. 1/3.
   c. 3/2.
   d. 3.
   e. dependent on the value of c.

Difficulty: 2
Correct Answer: b

5. A monopolist sells in two markets. The demand curve for her product is given by $p_1 = 122 - 2x_1$ in the first market and $p_2 = 306 - 5x_2$ in the second market, where x_i is the quantity sold in market i and p_i is the price charged in market i. She has a constant marginal cost of production, $c = 6$, and no fixed costs. She can charge different prices in the two markets. What is the profit-maximizing combination of quantities for this monopolist?
   a. $x_1 = 58$ and $x_2 = 32$.
   b. $x_1 = 29$ and $x_2 = 30$.
   c. $x_1 = 59$ and $x_2 = 29$.
   d. $x_1 = 39$ and $x_2 = 28$.
   e. $x_1 = 49$ and $x_2 = 40$.

Difficulty: 2
Correct Answer: c

6. A monopolist sells in two markets. The demand curve for her product is given by $p_1 = 141 - 3x_1$ in the first market and $p_2 = 115 - 2x_2$ in the second market, where x_i is the quantity sold in market i and p_i is the price charged in market i. She has a constant marginal cost of production, $c = 3$, and no fixed costs. She can charge different prices in the two markets. What is the profit-maximizing combination of quantities for this monopolist?
   a. $x_1 = 46$ and $x_2 = 30$.
   b. $x_1 = 51$ and $x_2 = 23$.
   c. $x_1 = 23$ and $x_2 = 28$.
   d. $x_1 = 33$ and $x_2 = 26$.
   e. $x_1 = 43$ and $x_2 = 38$.

Difficulty: 2
Correct Answer: a

7. A monopolist sells in two markets. The demand curve for her product is given by $p_1 = 165 - 3x_1$ in the first market and $p_2 = 233 - 4x_2$ in the second market, where x_i is the quantity sold in market i and p_i is the price charged in market i. She has a constant marginal cost of production, $c = 9$, and no fixed costs. She can charge different prices in the two markets. What is the profit-maximizing combination of quantities for this monopolist?
   a. $x_1 = 26$ and $x_2 = 28$.
   b. $x_1 = 54$ and $x_2 = 26$.
   c. $x_1 = 36$ and $x_2 = 26$.
   d. $x_1 = 52$ and $x_2 = 30$.
   e. $x_1 = 46$ and $x_2 = 38$.

Difficulty: 2
Correct Answer: b

8. A price-discriminating monopolist sells in two separate markets such that goods sold in one market are never resold in the other. It charges $p_1 = \$5$ in one market and $p_2 = \$10$ in the other market. At these prices, the price elasticity in the first market is -1.40 and the price elasticity in the second market is -0.10. Which of the following actions is sure to raise the monopolist's profits?
   a. Lower p_2.
   b. Raise p_2.
   c. Raise p_1 and lower p_2.
   d. Raise both p_1 and p_2.
   e. Raise p_2 and lower p_1.

Difficulty: 2
Correct Answer: b

9. A price-discriminating monopolist sells in two separate markets such that goods sold in one market are never resold in the other. It charges $p_1 = \$2$ in one market and $p_2 = \$8$ in the other market. At these prices, the price elasticity in the first market is -2.20 and the price elasticity in the second market is -0.10. Which of the following actions is sure to raise the monopolist's profits?
   a. Lower p_2.
   b. Raise p_2.
   c. Raise both p_1 and p_2.
   d. Raise p_1 and lower p_2.
   e. Raise p_2 and lower p_1.

Difficulty: 2
Correct Answer: a

10. A price-discriminating monopolist sells in two separate markets such that goods sold in one market are never resold in the other. It charges $p_1 = \$4$ in one market and $p_2 = \$8$ in the other market. At these prices, the price elasticity in the first market is -1.90 and the price elasticity in the second market is -0.30. Which of the following actions is sure to raise the monopolist's profits?
   a. Raise p_2.
   b. Raise p_1 and lower p_2.
   c. Lower p_2.
   d. Raise both p_1 and p_2.
   e. Raise p_2 and lower p_1.

Difficulty:
Correct Answer: a

11. A monopolist has a constant marginal cost of \$2 per unit and no fixed costs. He faces separate markets in the United States and England. He can set one price p_1 for the U.S. market and another price p_2 for the English market. If demand in the United States is given by $Q_1 = 6{,}000 - 600p_1$ and demand in England is given by $Q_2 = 2{,}400 - 400p_2$, then the price in the United States will
   a. be larger than the price in England by \$2.
   b. be smaller than the price in England by \$2.
   c. equal the price in England.
   d. be larger than the price in England by \$4.
   e. be smaller than the price in England by \$4.

Difficulty:
Correct Answer: d

12. A monopolist has a constant marginal cost of \$2 per unit and no fixed costs. He faces separate markets in the United States and England. He can set one price p_1 for the U.S. market and another price p_2 for the English market. If demand in the United States is given by $Q_1 = 7{,}000 - 700p_1$ and demand in England is given by $Q_2 = 3{,}200 - 400p_2$, then the price in the United States will
   a. be smaller than the price in England by \$1.
   b. be larger than the price in England by \$3.
   c. equal the price in England.
   d. be larger than the price in England by \$1.
   e. be smaller than the price in England by \$3.

Difficulty:
Correct Answer: d

13. A monopolist has a constant marginal cost of \$2 per unit and no fixed costs. He faces separate markets in the United States and England. He can set one price p_1 for the U.S. market and another price p_2 for the English market. If demand in the United States is given by $Q_1 = 7{,}000 - 700p_1$ and demand in England is given by $Q_2 = 1{,}200 - 200p_2$, then the price in the United States will
   a. equal the price in England.
   b. be smaller than the price in England by \$2.
   c. be larger than the price in England by \$4.
   d. be larger than the price in England by \$2.
   e. be smaller than the price in England by \$4.

Difficulty:
Correct Answer: c

14. Roach Motors has a monopoly on used cars in Enigma, Ohio. By installing secret microphones in the showroom, the friendly salespersons at Roach are able to learn each customer's willingness to pay and can therefore practice first-degree price discrimination, extracting from each customer his entire consumer's surplus. The inverse demand function for cars in Enigma is $P = 2{,}000 - 10Q$. Roach Motors purchases its stock of used cars at an auction in Cleveland for \$500 each. Roach motors will
   a. sell 75 cars for a total profit of \$56,250.
   b. sell 150 cars at a price of \$300 a car.
   c. sell 150 cars for a total profit of \$112,500.
   d. sell 180 cars and make a total profit of \$180,000.
   e. shut down since revenue will not cover variable costs.

Difficulty:
Correct Answer: a

15. Roach Motors has a monopoly on used cars in Enigma, Ohio. By installing secret microphones in the showroom, the friendly salespersons at Roach are able to learn each customer's willingness to pay and can therefore practice first-degree price discrimination, extracting from each customer his entire consumer's surplus. The inverse demand function for cars in Enigma is $P = 2{,}000 - 10Q$. Roach Motors purchases its stock of used cars at an auction in Cleveland for \$500 each. Roach motors will
   a. sell 150 cars for a total profit of \$112,500.
   b. sell 75 cars for a total profit of \$56,250.
   c. sell 150 cars at a price of \$300 a car.
   d. sell 180 cars and make a total profit of \$180,000.
   e. shut down since revenue will not cover variable costs.

Difficulty:
Correct Answer: c

16. Roach Motors has a monopoly on used cars in Enigma, Ohio. By installing secret microphones in the showroom, the friendly salespersons at Roach are able to learn each customer's willingness to pay and can therefore practice first-degree price discrimination, extracting from each customer his entire consumer's surplus. The inverse demand function for cars in Enigma is $P = 2{,}000 - 10Q$. Roach Motors purchases its stock of used cars at an auction in Cleveland for \$600 each. Roach motors will
   a. sell 140 cars at a price of \$300 a car.
   b. sell 70 cars for a total profit of \$49,000.
   c. sell 140 cars for a total profit of \$98,000.
   d. sell 168 cars and make a total profit of \$156,800.
   e. shut down since revenue will not cover variable costs.

Difficulty:
Correct Answer: e

17. Bayerische Motoren Werk (BMW) charges a considerably higher price for its automobiles in the North American market than it does in its home market of Europe. Assuming that the goal of BMW's pricing policy is profit maximization, which of the following would be a plausible explanation for BMW's pricing policy?
   a. The income elasticity of demand in North America must be greater than 1, making BMWs a luxury good in North America, and between 0 and 1 in Europe, making BMWs a normal good there.
   b. The income elasticity of demand in North America must be between 0 and 1, making BMWs a normal good in North America, and less than 0 in Europe, making BMWs an inferior good there.
   c. The price elasticity of demand in North America must be greater than 1, making the demand for BMWs price elastic in North America, and between 0 and 1 in Europe, making the demand for BMWs price inelastic there.
   d. The income elasticity of demand in both North America and Europe is greater than 1, since BMWs are a luxury good, but per capita income in North America is much higher than in Europe.
   e. The price elasticity of demand is greater than 1 in both North America and Europe, making BMWs price elastic, but it must be higher in Europe.

Difficulty:
Correct Answer: a

18. A careful analysis of demand for Bubbles in Strasburg, North Dakota, reveals a strange segmentation in the market. (Recall Bubbles is the beverage which produces an unexplained craving for Lawrence Welk's music. It is produced by the process $Q = \min\{R/3, W\}$, where R is the number of pulverized Lawrence Welk records and W is gallons of North Dakota well water. $P_R = \$1$, $P_W = \$5$.) If demand for Bubbles by senior citizens is described by $Q_0 = 500P^{-3/2}$ while demand by those under 65 years old is $Q_y = 50P^{-5}$, how should Bubbles be priced to maximize profits?
   a. \$24 for senior citizens and \$10 for those younger
   b. \$12 for senior citizens and \$40 for those younger
   c. \$8 for senior citizens and \$26.67 for those younger
   d. \$11.56 for all citizens of Strasburg
   e. \$45 for senior citizens and \$18.75 for those younger

Difficulty:
Correct Answer: c

19. A careful analysis of demand for Bubbles in Strasburg, North Dakota, reveals a strange segmentation in the market. (Recall Bubbles is the beverage which produces an unexplained craving for Lawrence Welk's music. It is produced by the process $Q = \min\{R/4, W\}$,

where R is the number of pulverized Lawrence Welk records and W is gallons of North Dakota well water. P_R = \$1, P_W = \$4.) If demand for Bubbles by senior citizens is described by $Q_0 = 500P^{-3/2}$ while demand by those under 65 years old is $Q_y = 50P^{-4}$, how should Bubbles be priced to maximize profits?

a. \$12 for senior citizens and \$32 for those younger
b. \$12.57 for all citizens of Strasburg
c. \$24 for senior citizens and \$10.67 for those younger
d. \$8 for senior citizens and \$21.33 for those younger
e. \$48 for senior citizens and \$21.33 for those younger

Difficulty:
Correct Answer: c

20. A careful analysis of demand for Bubbles in Strasburg, North Dakota, reveals a strange segmentation in the market. (Recall Bubbles is the beverage which produces an unexplained craving for Lawrence Welk's music. It is produced by the process $Q = \min\{R/5, W\}$, where R is the number of pulverized Lawrence Welk records and W is gallons of North Dakota well water. P_R = \$1, P_W = \$4.) If demand for Bubbles by senior citizens is described by $Q_0 = 500P^{-3/2}$ while demand by those under 65 years old is $Q_y = 50P^{-5}$, how should Bubbles be priced to maximize profits?

a. \$13 for all citizens of Strasburg
b. \$9 for senior citizens and \$30 for those younger
c. \$27 for senior citizens and \$11.25 for those younger
d. \$13.50 for senior citizens and \$45 for those younger
e. \$60 for senior citizens and \$25 for those younger

Difficulty:
Correct Answer: a

21. Miron Floren, of Lawrence Welk Show fame, now tours the country performing at accordion concerts. A careful analysis of demand for tickets to Mr. Floren's concerts reveals a strange segmentation in the market. Demand for tickets by senior citizens is described by $Q_O = 500P^{-3/2}$ while demand by those under 65 years old is $Q_y = 50P^{-4}$. If the marginal cost of a ticket is \$3, how should tickets to Mr. Floren's concerts be priced to maximize profits?

a. \$9 for senior citizens and \$4 for those younger
b. \$12 for senior citizens and \$4.50 for those younger
c. \$3 for senior citizens and \$8 for those younger
d. \$4.71 for all tickets
e. \$6 for senior citizens and \$12 for those younger

Difficulty:
Correct Answer: b

22. Miron Floren, of Lawrence Welk Show fame, now tours the country performing at accordion concerts. A careful analysis of demand for tickets to Mr. Floren's concerts reveals a strange segmentation in the market. Demand for tickets by senior citizens is described by $Q_O = 500P^{-3/2}$ while demand by those under 65 years old is $Q_y = 50P^{-4}$. If the marginal cost of a ticket is \$4, how should tickets to Mr. Floren's concerts be priced to maximize profits?

a. \$16 for senior citizens and \$6 for those younger
b. \$12 for senior citizens and \$5.33 for those younger
c. \$6.29 for all tickets
d. \$4 for senior citizens and \$10.67 for those younger
e. \$8 for senior citizens and \$16 for those younger

Difficulty:
Correct Answer: c

23. Miron Floren, of Lawrence Welk Show fame, now tours the country performing at accordion concerts. A careful analysis of demand for tickets to Mr. Floren's concerts reveals a strange segmentation in the market. Demand for tickets by senior citizens is described by $Q_O = 500P^{-3/2}$ while demand by those under 65 years old is $Q_y = 50P^{-5}$. If the marginal cost of a ticket is \$3, how should tickets to Mr. Floren's concerts be priced to maximize profits?

a. \$15 for senior citizens and \$4.50 for those younger
b. \$4.33 for all tickets
c. \$9 for senior citizens and \$3.75 for those younger
d. \$3 for senior citizens and \$10 for those younger
e. \$6 for senior citizens and \$12 for those younger

PROBLEM

Difficulty:

1. Disneyland has two possibilities for pricing rides at its theme parks: (1) Set $MR = MC$ for each ride and charge the maximum price consumers will bear. (2) Charge an admission fee to the theme park but allow unlimited rides for free. Using graphs, show which pricing scheme is more profitable for Disneyland.

Answer: (2) is more profitable.

CHAPTER 26 Factor Markets

TRUE-FALSE

Difficulty: 1
Correct Answer: False

1. A monopsony occurs when two previously competing firms reach an agreement to collude on price.

Difficulty: 1
Correct Answer: False

2. A monopsonist's market power enables him to hire labor at a marginal cost that is lower than the wage rate.

Difficulty: 1
Correct Answer: True

3. For a monopsonist, the supply curve of a factor of production is less steep than the marginal cost curve.

Difficulty: 2
Correct Answer: False

4. A coal producer has a monopoly on coal. A different monopoly controls the railroad that takes the coal to market. Each monopolist chooses prices to maximize its profits. If the coal monopolist buys the railroad, then it will increase its profits by raising the market price of coal.

Difficulty: 2
Correct Answer: False

5. For a monopsonist, the more elastic the supply of labor, the greater the difference between the marginal cost of labor and the wage rate.

Difficulty: 2
Correct Answer: False

6. If a monopolist faces a competitive labor market, it will hire labor up to the point where the price of output times the marginal product of labor equals the wage rate.

Difficulty: 1
Correct Answer: True

7. A monopolist who faces a horizontal labor supply curve will demand less labor than he would if he acted competitively.

Difficulty: 1
Correct Answer: False

8. If an upstream monopolist sells to a downstream monopolist, the price to consumers will be higher than the competitive price but not so high as it would be if the downstream monopolist took control of the upstream monopolist's business and ran both the upstream and downstream markets to maximize total profits.

Difficulty:
Correct Answer: True

9. If a labor market is dominated by a monopolist, it is possible that the imposition of a minimum wage law could *increase* the amount of employment in that market.

MULTIPLE CHOICE

Difficulty: 1
Correct Answer: d

1. A monopolist produces a good using only one factor, labor. There are constant returns to scale in production, and the demand for the monopolist's product is described by a downward-sloping straight line with slope -1. The monopolist faces a horizontal labor supply curve. If the monopolist chooses output to maximize profits, then the marginal
   a. cost of labor to the monopolist exceeds the wage.
   b. product of labor times the price of output equals the wage.
   c. product of labor times the price of output is less than the wage.

d. product of labor times the price of output exceeds the wage.
e. revenue product of labor is less than the wage.

Difficulty: 1
Correct Answer: b

2. If a monopsonist pays the wage rate w, then the amount of labor that he can hire is $L(w) = Aw$, where A is a positive constant. The marginal cost of labor to the monopsonist is
   a. equal to the wage rate.
   b. twice the wage rate.
   c. half the wage rate.
   d. greater than the wage rate but less than twice as great.
   e. less than the wage rate but more than half as great.

Difficulty: 1
Correct Answer: c

3. A profit-maximizing monopsonist hires both men and women to do a certain task. The two sexes are equally good at this task and are regarded as perfect substitutes. Labor supply curves for both sexes are upward sloping. In order to hire M men, the firm would have to pay men a wage of AM, where A is a positive constant. In order to hire F women, the monopsonist would have to pay a wage of BF^c, where B and c are positive constants. Which, if any, of these conditions necessarily implies that the monopsonist pays a lower wage to women than to men?
   a. $A > B$.
   b. $A < c$.
   c. $c < 1$.
   d. $Bc < A$.
   e. $C > 2$.

Difficulty: 3
Correct Answer: e

4. The frangle industry is a monopoly, with a demand curve $100 - p$, where p is the price of frangles. It takes one unit of labor and no other inputs to produce a frangle. The Frangle-Makers Guild is a strong union. The guild sets a wage and prevents anyone from working for less than that wage. The frangle monopoly must pay that wage but can hire as much labor as it chooses to. If the guild chooses a wage so as to maximize the total earnings (wage times number of units of labor hired) of frangle makers, then
   a. the price of frangles will be \$50.
   b. the price of frangles will be \$25.
   c. the price of frangles will equal the wage rate.
   d. the wage rate will be \$25.
   e. the wage will be \$50.

Difficulty: 2
Correct Answer: c

5. The bauble industry is competitive with free entry. There is a fixed-coefficient technology. One unit of labor and one unit of plastic are required for each bauble. Workers in the bauble industry must all belong to the Bauble-Makers Union. The union sets the wage that will be paid to all bauble makers. The price of plastic is 10 dollars per unit and the demand function for baubles is $1{,}000 - 10p$. Long-run equilibrium requires that the price of baubles equals the cost of production. The wage per unit of labor that maximizes total revenue of workers is
   a. 100 dollars.
   b. 10 dollars.
   c. 45 dollars.
   d. 20 dollars.
   e. infinity.

Difficulty: 2
Correct Answer: a

6. Suppose that the demand curve for mineral water is given by $p = 40 - 12q$, where p is the price per bottle paid by consumers and q is the number of bottles purchased by consumers. Mineral water is supplied to consumers by a monopolistic distributor who buys from a monopolistic producer, who is able to produce mineral water at zero cost. The producer charges the distributor a price of c per bottle. Given his marginal cost of c per unit, the distributor chooses an output to maximize his own profits. Knowing that this is what the distributor will do, the producer sets his price c so as to maximize his revenue. The price paid by consumers under this arrangement is
   a. \$30.
   b. \$3.33.
   c. \$20.
   d. \$10.
   e. \$1.67.

Difficulty: 2
Correct Answer: c

7. Suppose that the demand curve for mineral water is given by $p = 50 - 16q$, where p is the price per bottle paid by consumers and q is the number of bottles purchased by consumers. Mineral water is supplied to consumers by a monopolistic distributor who buys from a monopolistic producer, who is able to produce mineral water at zero cost. The producer charges the distributor a price of c per bottle. Given his marginal cost of c per unit, the distributor chooses an output to maximize his own profits. Knowing that this is what the distributor will do, the producer sets his price c so

as to maximize his revenue. The price paid by consumers under this arrangement is

a. \$3.13.
b. \$12.50.
c. \$37.50.
d. \$25.
e. \$1.56.

Difficulty: 2
Correct Answer: d

8. Suppose that the demand curve for mineral water is given by $p = 70 - 12q$, where p is the price per bottle paid by consumers and q is the number of bottles purchased by consumers. Mineral water is supplied to consumers by a monopolistic distributor who buys from a monopolistic producer, who is able to produce mineral water at zero cost. The producer charges the distributor a price of c per bottle. Given his marginal cost of c per unit, the distributor chooses an output to maximize his own profits. Knowing that this is what the distributor will do, the producer sets his price c so as to maximize his revenue. The price paid by consumers under this arrangement is

a. \$17.50.
b. \$35.
c. \$5.83.
d. \$52.50.
e. \$2.92

Difficulty: 2
Correct Answer: d

9. The labor supply curve faced by a large firm in a small city is given by $w = 60 + 0.05L$, where L is the number of units of labor per week hired by the large firm and w is the weekly wage rate that it pays. If the firm is currently hiring 1,000 units of labor per week, then the marginal cost of a unit of labor to the firm

a. equals the wage rate.
b. is twice the wage rate.
c. equals the wage rate plus \$100.
d. equals the wage rate plus \$50.
e. equals the wage rate plus \$150.

Difficulty: 2
Correct Answer: b

10. The labor supply curve faced by a large firm in a small city is given by $w = 160 + 0.02L$, where L is the number of units of labor per week hired by the large firm and w is the weekly wage rate that it pays. If the firm is currently hiring 1,000 units of labor per week, then the marginal cost of a unit of labor to the firm

a. equals the wage rate plus \$40.
b. equals the wage rate plus \$20.
c. equals the wage rate.
d. is twice the wage rate.
e. equals the wage rate plus \$60.

Difficulty: 2
Correct Answer: d

11. The labor supply curve faced by a large firm in a small city is given by $w = 60 + 0.08L$, where L is the number of units of labor per week hired by the large firm and w is the weekly wage rate that it pays. If the firm is currently hiring 1,000 units of labor per week, then the marginal cost of a unit of labor to the firm

a. is twice the wage rate.
b. equals the wage rate.
c. equals the wage rate plus \$160.
d. equals the wage rate plus \$80.
e. equals the wage rate plus \$240.

Difficulty:
Correct Answer: a

12. Rabelaisian Restaurants has a monopoly in the town of Upper Glutton. Its production function is $Q = 40L$, where L is the amount of labor it uses and Q is the number of meals produced. In order to hire L units of labor, Rabelaisian Restaurants must pay a wage of $40 + .1L$ per unit of labor. The demand curve for meals at Rabelaisian Restaurants is given by $P = 5.25 - Q/1{,}000$. The profit-maximizing output for Rabelaisian Restaurants is

a. 2,000 meals.
b. 4,000 meals.
c. 500 meals.
d. 0 meals.
e. 250 meals.

Difficulty:
Correct Answer: a

13. Rabelaisian Restaurants has a monopoly in the town of Upper Glutton. Its production function is $Q = 40L$, where L is the amount of labor it uses and Q is the number of meals produced. In order to hire L units of labor, Rabelaisian Restaurants must pay a wage of $120 + .1L$ per unit of labor. The demand curve for meals at Rabelaisian Restaurants is given by $P = 24.25 - Q/1{,}000$. The profit-maximizing output for Rabelaisian Restaurants is

a. 10,000 meals.
b. 1,000 meals.
c. 2,500 meals.
d. 20,000 meals.
e. 1,250 meals.

Difficulty:
Correct Answer: d

14. Rabelaisian Restaurants has a monopoly in the town of Upper Glutton. Its production function is $Q = 10L$, where L is the amount of labor it uses and Q is the number of meals produced. In order to hire L units of labor, Rabelaisian Restaurants must pay a wage of $10 + .1L$ per unit of labor. The demand curve for meals at Rabelaisian Restaurants is given by $P = 41 - Q/1{,}000$. The profit-maximizing output for Rabelaisian Restaurants is
    a. 2,000 meals.
    b. 20,000 meals.
    c. 2,500 meals.
    d. 10,000 meals.
    e. 1,250 meals.

PROBLEM

Difficulty: 3

1. This comes from an actual newspaper story. "The average price of a home in *W* County rose more than 12% last year but the number of sales fell nearly 15%. 'It's the old law of supply and demand,' said a spokesman for the Board of Realtors. 'The number of sales is down because there's a higher demand for properties but there isn't a corresponding number to sell.' "
    a. What does the "old law of supply and demand" predict would happen to price and quantity if the demand curve shifts outward and the supply curve does not change?
    b. Draw a diagram to illustrate the case of a shift in demand and/or supply curves that is consistent with the observed change in prices and quantities.

Answer:
a. The price would rise and the quantity would rise. Even if the supply were very inelastic, the number of sales would not fall if the supply curve did not shift.
b. One simple case would be a leftward shift in the supply curve and no change in the demand curve.

CHAPTER 27 Oligopoly

TRUE-FALSE

Difficulty: 1
Correct Answer: False

1. In Cournot equilibrium each firm chooses the quantity that maximizes its own profits assuming that the firm's rival will continue to sell at the same price as before.

Difficulty: 1
Correct Answer: False

2. In Bertrand competition between two firms, each firm believes that if it changes its output, the rival firm will change its output by the same amount.

Difficulty: 1
Correct Answer: True

3. Suppose that the demand curve for an industry's output is a downward-sloping straight line and there is constant marginal cost. Then the larger the number of identical firms producing in Cournot equilibrium, the lower will be the price.

Difficulty: 1
Correct Answer: True

4. A Stackelberg leader chooses his actions on the assumption that his rival will adjust to the leader's actions in such a way as to maximize the rival's profits.

Difficulty: 1
Correct Answer: False

5. Conjectural variation refers to the fact that in a single market there is variation among firms in their estimates of the demand function in future periods.

Difficulty: 1
Correct Answer: True

6. A duopoly in which two identical firms are engaged in Bertrand competition will not distort prices from their competitive levels.

Difficulty: 2
Correct Answer: True

7. A Stackelberg leader will necessarily make at least as much profit as he would if he acted as a Cournot oligopolist.

Difficulty: 2
Correct Answer: False

8. In the Cournot model, each firm chooses its actions on the assumption that its rivals will react by changing their quantities in such a way as to maximize their own profits.

Difficulty:
Correct Answer: True

9. In the Bertrand model of duopoly, each firm sets its price, believing that the other's price will not change. When both firms have identical production functions and produce with constant returns to scale, the Bertrand equilibrium price is equal to marginal cost.

MULTIPLE CHOICE

Difficulty: 3
Correct Answer: d

1. An industry has two firms each of which produces output at a constant unit cost of \$10 per unit. The demand function for the industry is $q = 1{,}000{,}000/p$. The Cournot equilibrium price for this industry is
   a. \$5.
   b. \$10.
   c. \$15.
   d. \$20.
   e. \$25.

Difficulty: 2
Correct Answer: c

2. An industry has two firms. The inverse demand function for this industry is $p = 263 - 6q$. Both firms produce at a constant unit cost of \$29 per unit. What is the Cournot equilibrium price for this industry?

a. \$29
b. \$31
c. \$107
d. \$53.50
e. None of the above.

Difficulty: 2
Correct Answer: c

3. An industry has two firms. The inverse demand function for this industry is $p = 74 - 4q$. Both firms produce at a constant unit cost of \$26 per unit. What is the Cournot equilibrium price for this industry?
a. \$21
b. \$29
c. \$42
d. \$26
e. None of the above.

Difficulty: 3
Correct Answer: c

4. One unit of zinc and one unit of copper are needed to produce a unit of brass. The world's supply of zinc and the world's supply of copper are owned by two different monopolists. For simplicity assume that it costs nothing to mine zinc and copper, that no other inputs are needed to produce brass, and that the brass industry operates competitively. Then the price of a unit of brass equals the cost of the inputs used to make it. The demand function for brass is $q = 900 - 2p$, where p is the price of brass. The zinc and copper monopolists each set a price, believing that the other monopolist will not change its price. What is the equilibrium price of brass?
a. \$100
b. \$200
c. \$300
d. \$50
e. \$25

Difficulty: 2
Correct Answer: c

5. A duopoly faces the inverse demand curve $p = 160 - 2q$. Both firms in the industry have constant costs of \$10 per unit of output. In a Cournot equilibrium how much output will each duopolist sell?
a. 75
b. 54
c. 25
d. 35
e. 48

Difficulty: 2
Correct Answer: b

6. Suppose that the price elasticity of demand for airline flights between two cities is constant and equal to -1.5. If 4 airlines with equal costs are in Cournot equilibrium for this industry, then the ratio of price to marginal cost in the industry is
a. 8/7.
b. 9/8.
c. 7/6.
d. 3/2.
e. None of the above.

Difficulty: 2
Correct Answer: a

7. A city has two major league baseball teams, *A* and *B*. The number of tickets sold by either team depends on the price of the team's own tickets and the price of the other team's tickets. If team *A* charges P_a for its tickets and team *B* charges P_b for its tickets, then ticket sales, measured in hundreds of thousands per season, are $10 - 2P_a + P_b$ for team *A* and $20 + P_a - 2P_b$ for team *B*. The marginal cost of an extra spectator is zero for both teams. Each team believes the other's price is independent of its own choice of price, and each team sets its own price so as to maximize its revenue. What price do they charge per ticket?
a. Team *A* charges 4 and team *B* charges 6.
b. Team *A* charges 6 and team *B* charges 5.
c. Team *A* charges 5 and team *B* charges 8.
d. Team *A* charges 4 and team *B* charges 12.
e. None of the above.

Difficulty: 2
Correct Answer: a

8. A city has two major league baseball teams, *A* and *B*. The number of tickets sold by either team depends on the price of the team's own tickets and the price of the other team's tickets. If team *A* charges P_a for its tickets and team *B* charges P_b for its tickets, then ticket sales, measured in hundreds of thousands per season, are $10 - 2P_a + P_b$ for team *A* and $5 + P_a - 2P_b$ for team *B*. The marginal cost of an extra spectator is zero for both teams. Each team believes the other's price is independent of its own choice of price, and each team sets its own price so as to maximize its revenue. What price do they charge per ticket?
a. Team *A* charges 3 and team *B* charges 2.
b. Team *A* charges 3 and team *B* charges 4.
c. Team *A* charges 4 and team *B* charges 4.
d. Team *A* charges 5 and team *B* charges 1.
e. None of the above.

Difficulty: 3
Correct Answer: d

9. A city has two newspapers. Demand for either paper depends on its own price and the price of its rival. Demand functions for papers *A* and *B* respectively, measured in tens of thousands of subscriptions, are 21

$- 2P_a + P_b$ and $21 + P_a - 2P_b$. The marginal cost of printing and distributing an extra paper just equals the extra advertising revenue from another reader, so each paper treats marginal costs as zero. Each paper maximizes its revenue assuming that the other's price is independent of its own price. If the papers enter a joint operating agreement where they set prices to maximize total revenue, by how much will newspaper prices rise?

a. \$3
b. \$2
c. \$0
d. \$3.50
e. \$2.50

Difficulty: 1
Correct Answer: c

10. There are two major producers of corncob pipes in the world, both located in Herman, Missouri. Suppose that the inverse demand function for corncob pipes is described by $p = 160 - 3q$, where q is total industry output, and marginal costs are zero. What is the Cournot reaction function of firm 1 to the output, q_2, of firm 2?

a. $160 - 3q^2{}_2$
b. $160 - 3q_2$
c. $26.67 - .5q_2$
d. $53.33 - 3q_2$
e. $163 - 6q_2$

Difficulty: 1
Correct Answer: c

11. There are two major producers of corncob pipes in the world, both located in Herman, Missouri. Suppose that the inverse demand function for corncob pipes is described by $p = 160 - 4q$, where q is total industry output, and marginal costs are zero. What is the Cournot reaction function of firm 1 to the output, q_2, of firm 2?

a. $40 - 4q_2$
b. $160 - 4q^2{}_2$
c. $20 - .5q_2$
d. $160 - 4q_2$
e. $164 - 8q_2$

Difficulty: 2
Correct Answer: d

12. An industry has two firms producing at a constant unit cost of \$10 per unit. The inverse demand curve for the industry is $p = 110 - .5q$. Suppose that firm 1 is a Stackelberg leader in choosing its quantity (i.e., firm 1 chooses its quantity first, knowing that firm 2 will observe firm 1's quantity when it chooses its own output.) How much output will firm 2, the follower, produce?

a. 40 units.
b. 15 units.
c. 20 units.
d. 50 units.
e. 30 units.

Difficulty: 3
Correct Answer: c

13. The cartel of copper exporting countries is called COPEC. As part of an international marketing agreement, the United States has agreed to buy all the copper that COPEC wants to sell the United States at a constant price of \$100 per ton. COPEC also sells copper in Europe at a price of \$150 per ton. COPEC acts just like a monopolist. If COPEC finds it profitable to sell in the United States at \$100 per ton and simultaneously to sell in Europe for \$150 a ton, what is the price elasticity of demand of COPEC's copper in the European market? (Hint: What is COPEC's marginal revenue in the U.S. market?)

a. -1
b. -2
c. -3
d. $-1/3$
e. $-2/3$

Difficulty: 2
Correct Answer: e

14. Two firms decide to form a cartel and collude in a way that maximizes industry profits. Each firm has zero production costs and each firm is given a positive output quota by the cartel. Which of the following statements is *not* true?

a. Each firm would want to produce more than its quota if it knew that the other would continue to produce at its quota.
b. The price elasticity of demand will be -1 at the output level chosen.
c. Output would be lower than if the firms behaved as Cournot firms.
d. Output would be lower than if the firms behaved as competitors.
e. All of the other statements are false.

Difficulty: 2
Correct Answer: d

15. The inverse demand function for fuzzy dice is $p = 20 - q$. There are constant returns to scale in this industry with unit costs of \$8. Which of the following sets of statements is completely true?

a. Monopoly output is 6. Cournot duopoly total output is 8. A Stackelberg leader's output is 8.
b. Monopoly output is 8. Cournot duopoly total output is 8. A Stackelberg leader's output is 8.
c. Monopoly output is 6. Cournot duopoly total output is 6. A Stackelberg follower's output is 3.

d. Monopoly output is 6. Cournot duopoly total output is 8. A Stackelberg follower's output is 3.
e. Monopoly output is 6. Cournot duopoly total output is 8. A Stackelberg follower's output is 4.

Difficulty: 2
Correct Answer: c

16. An industry has two firms. Firm 1's cost function is $c(y) = 2y + 500$ and firm 2's cost function is $c(y) = 2y + 400$. The demand curve for the output of this industry is a downward-sloping straight line. In a Cournot equilibrium, where both firms produce positive amounts of output,
   a. the firm with lower fixed costs produces more.
   b. the firm with higher fixed costs produces more.
   c. both firms produce the same amount of output.
   d. there is less output than there would be if the firms colluded to maximize joint profits.
   e. firm 1 always operates in the region where the demand curve is inelastic.

Difficulty: 3
Correct Answer: a

17. The price elasticity of demand for melocotones is constant and equal to -2. The melocotone market is controlled by two Cournot duopolists who have different cost functions. One of the duopolists has a constant marginal cost of \$975 per ton and produces 70% of the total number of melocotones sold. The equilibrium price of a ton of melocotones must be
   a. \$1,500.
   b. \$750.
   c. \$975.
   d. \$3,000.
   e. \$2,250.

Difficulty: 3
Correct Answer: c

18. The price elasticity of demand for melocotones is constant and equal to -2. The melocotone market is controlled by two Cournot duopolists who have different cost functions. One of the duopolists has a constant marginal cost of \$675 per ton and produces 50% of the total number of melocotones sold. The equilibrium price of a ton of melocotones must be
   a. \$1,800.
   b. \$450.
   c. \$900.
   d. \$675.
   e. \$1,350.

Difficulty: 3
Correct Answer: a

19. The demand for y is given by $y = 256/p^2$. Only two firms produce y. They have identical costs $c(y) = y^2$. If they agree to collude and maximize their joint profits, how much output will each firm produce?
   a. 2
   b. 5
   c. 10
   d. 12
   e. 16

Difficulty: 3
Correct Answer: e

20. A certain type of mushroom used to be produced on 50 farms, each of which had a cost function $c(y) = y_2 + 1$, where $y > 0$ and $c(0) = 0$. The firms operated as competitors. The demand curve for this kind of mushroom is given by $D(p) = 52 - p$. Marauding deviant Ninja turtles invaded many of the mushroom farms leaving absolute devastation and loathsome slime in their wake. (The turtles had no effect on the cost functions of farms that were not invaded.)
   a. If all of the farms but one were invaded and that farm became a monopolist, total output of mushrooms would fall to half of the preinvasion output.
   b. If all of the farms but one were invaded and that farm became a monopolist, total output of mushrooms would fall to 1/50th of the preinvasion output.
   c. If all of the farms but two were invaded and the two undamaged farms became Cournot duopolists, total output of mushrooms would be 2/3 of the preinvasion output.
   d. If half of the farms were invaded and the industry remained competitive, industry output would fall to half of the preinvasion output.
   e. If half of the farms were invaded and the industry remained competitive, industry output would fall but would be greater than half of the preinvasion output.

Difficulty: 2
Correct Answer: c

21. A duopoly faces the demand curve $D(p) = 30 - .5p$. Both firms in the industry have a total cost function given by $C(q) = 4q$. Suppose that firm 1 is a Stackelberg leader in choosing its quantity first. Firm 1's profit function can be written as
   a. $q_1 = 14 - .5q_2$.
   b. $q_2 = 14 - .5q_1$.
   c. $28_{q1} - q^2{}_1$.
   d. $56_{q1} - q^2{}_1$.
   e. $60_q - q^2$.

Difficulty:
Correct Answer: a

22. A duopoly faces the inverse demand curve $p = 160 - 2q$. Firm 1's total cost function is given by $C_1(q_1) = 8q_1$

and firm 2's total cost function is given by $C_2(q_2) = 10q_2$. In a Cournot equilibrium,

a. the firm with the lower marginal cost produces more.
b. both firms will produce the same amount.
c. the firm with the higher marginal cost produces more to cover the higher costs.
d. the reaction function for both firms is the same since both firms have a constant marginal cost.
e. More than one of the above is correct.

Difficulty:
Correct Answer: b

23. Consider a market with one large firm and many small firms. The supply function of all of the small firms together is $S(p) = 200 + p$, the market demand curve is $D(p) = 400 - p$, and the cost function for the large firm is $C(y) = 20y$. The residual demand curve for the large firm, where D_L is the large firm's demand and y_L is the large firm's output, is
a. $D_L(p) = 400 - 21y_L$.
b. $D_L(p) = 200 - 2p$.
c. $D_L(p) = 600 - 2p$.
d. $D_L(y_L) = 200 - 2p - 20y_L$.
e. $D_L(y_L) = 200 + p + 20y_L$.

Difficulty:
Correct Answer: a

24. The duopolists Carl and Simon face a demand function for pumpkins of $Q = 8{,}200 - 400P$, where Q is the total number of pumpkins that reach the market and P is the price of pumpkins. Suppose further that each farmer has a constant marginal cost of \$.50 for each pumpkin produced. If Carl believes that Simon is going to produce Q_s pumpkins this year, then the reaction function tells us how many pumpkins Carl should produce in order to maximize his profits. Carl's reaction function is
a. $R_C(Q_s) = 4{,}000 - Q_s/2$.
b. $R_C(Q_s) = 8{,}200 - 400Q_s$.
c. $R_C(Q_s) = 8{,}200 - 800Q_s$.
d. $R_C(Q_s) = 2{,}000 - Q_s/2$.
e. $R_C(Q_s) = 6{,}000 - Q_s$.

Difficulty:
Correct Answer: c

25. The duopolists Carl and Simon face a demand function for pumpkins of $Q = 2{,}200 - 400P$, where Q is the total number of pumpkins that reach the market and P is the price of pumpkins. Suppose further that each farmer has a constant marginal cost of \$1.50 for each pumpkin produced. If Carl believes that Simon is going to produce Q_s pumpkins this year, then the reaction function tells us how many pumpkins Carl should produce in order to maximize his profits. Carl's reaction function is
a. $R_C(Q_s) = 400 - Q_s/2$.
b. $R_C(Q_s) = 2{,}200 - 800Q_s$.
c. $R_C(Q_s) = 800 - Q_s/2$.
d. $R_C(Q_s) = 2{,}200 - 400Q_s$.
e. $R_C(Q_s) = 1{,}200 - Q_s$.

Difficulty: 2
Correct Answer: d

26. Suppose that the inverse demand for bean sprouts is given by $P(Y) = 370 - 4Y$ and the total cost of producing Y units for any firm is $TC(Y) = 10Y$. If the industry consists of two Cournot duopolists, then in equilibrium each firm's production is
a. 45 units.
b. 22.50 units.
c. 15 units.
d. 30 units.
e. 23.13 units.

Difficulty: 2
Correct Answer: b

27. Suppose that the inverse demand for bean sprouts is given by $P(Y) = 750 - 2Y$ and the total cost of producing Y units for any firm is $TC(Y) = 30Y$. If the industry consists of two Cournot duopolists, then in equilibrium each firm's production is
a. 60 units.
b. 120 units.
c. 180 units.
d. 90 units.
e. 93.75 units.

Difficulty:
Correct Answer: a

28. Suppose that Grinch and Grubb go into the wine business in a small country where wine is difficult to grow. The demand for wine is given by $p = \$300 - .2Q$, where p is the price and Q is the total quantity sold. The industry consists of just the two Cournot duopolists, Grinch and Grubb. Imports are prohibited. Grinch has constant marginal costs of \$45 and Grubb has marginal costs of \$30. How much is Grinch's output in equilibrium?
a. 400
b. 800
c. 200
d. 600
e. 1,200

Difficulty:
Correct Answer: c

29. Suppose that Grinch and Grubb go into the wine business in a small country where wine is difficult to grow. The demand for wine is given by $p = \$480 -$

$.2Q$, where p is the price and Q is the total quantity sold. The industry consists of just the two Cournot duopolists, Grinch and Grubb. Imports are prohibited. Grinch has constant marginal costs of \$30 and Grubb has marginal costs of \$60. How much is Grinch's output in equilibrium?
a. 1,600
b. 1,200
c. 800
d. 400
e. 2,400

Difficulty:
Correct Answer: a

30. Suppose that two airlines are Cournot duopolists serving the Peoria-Dubuque route, and the demand curve for tickets per day is $Q = 230 - 2p$ (so $p = 115 - Q/2$). Total costs of running a flight on this route are $450 + 40q$, where q is the number of passengers on the flight. Each flight has a capacity of 80 passengers. In Cournot equilibrium, each duopolist will run one flight per day and will make a daily profit of
a. \$800.
b. \$225.
c. \$230.
d. \$1,600.
e. \$3,250.

Difficulty:
Correct Answer: a

31. Suppose that two airlines are Cournot duopolists serving the Peoria-Dubuque route, and the demand curve for tickets per day is $Q = 220 - 2p$ (so $p = 110 - Q/2$). Total costs of running a flight on this route are $1{,}400 + 20q$, where q is the number of passengers on the flight. Each flight has a capacity of 80 passengers. In Cournot equilibrium, each duopolist will run one flight per day and will make a daily profit of
a. \$400.
b. \$800.
c. \$220.
d. \$700.
e. \$3,000.

Difficulty:
Correct Answer: c

32. Suppose that the market demand curve for bean sprouts is given by $P = 880 - 4Q$, where P is the price and Q is the total industry output. Suppose that the industry has two firms, a Stackelberg leader and a follower. Each firm has a constant marginal cost of \$80 per unit of output. In equilibrium, total output by the two firms will be
a. 100.
b. 50.
c. 150.
d. 200.
e. 25.

Difficulty:
Correct Answer: c

33. Suppose that the market demand curve for bean sprouts is given by $P = 820 - 2Q$, where P is the price and Q is the total industry output. Suppose that the industry has two firms, a Stackelberg leader and a follower. Each firm has a constant marginal cost of \$20 per unit of output. In equilibrium, total output by the two firms will be
a. 200.
b. 100.
c. 300.
d. 400.
e. 50.

Difficulty:
Correct Answer: a

34. There are two firms in the blastopheme industry. The demand curve for blastophemes is given by $p = 3{,}600 - 4q$. Each firm has one manufacturing plant and each firm i has a cost function $C(q_i) = q^2_{\mathrm{i}}$, where q_{i} is the output of firm i. The two firms form a cartel and arrange to split total industry profits equally. Under this cartel arrangement, they will maximize joint profits if
a. and only if each firm produces 200 units in its plant.
b. they produce a total of 400 units, no matter which firm produces them.
c. and only if they each produce a total of 450 units.
d. they produce a total of 300 units, no matter which firm produces them.
e. they shut down one of the two plants, having the other operate as a monopoly and splitting the profits.

Difficulty:
Correct Answer: d

35. There are two firms in the blastopheme industry. The demand curve for blastophemes is given by $p = 4{,}200 - 3q$. Each firm has one manufacturing plant and each firm i has a cost function $C(q_i) = q^2_{\mathrm{i}}$, where q_i is the output of firm i. The two firms form a cartel and arrange to split total industry profits equally. Under this cartel arrangement, they will maximize joint profits if
a. they produce a total of 600 units, no matter which firm produces them.
b. they produce a total of 466.67 units, no matter which firm produces them.
c. and only if they each produce a total of 700 units.

d. and only if each firm produces of 300 units in its plant.
e. they shut down one of the two plants, having the other operate as a monopoly and splitting the profits.

Difficulty:
Correct Answer: d

36. A Stackelberg leader and follower choose their outputs to maximize their own profits. Local property taxes which constitute a lump sum tax for each of them are reduced by \$500 per year for the leader and by \$200 a year for the follower. In consequence, the firms
 a. both increase their output, with the leader increasing its output by more.
 b. both increase their output, with the follower increasing its output by more.
 c. increase their output by equal amounts for each firm.
 d. leave their outputs unchanged.
 e. There is not enough information in the question to determine what the firms will do.

Difficulty:
Correct Answer: b

37. An industry has two colluding firms that act so as to maximize total profit in the industry and then split the profits equally. Firm 1 has cost function $c(y) = 8y$. Firm 2 has cost function $c(y) = y^2$. Each firm produces an integer number of units. Market demand is given by $Y(p) = 56 - p$.
 a. Firm 1 should produce 10 units and firm 2 should produce 10 units.
 b. Firm 1 should produce 20 units and firm 2 should produce 4 units.
 c. Each firm should produce 12 units.
 d. Firm 1 should produce 24 units and firm 2 should produce 2 units.
 e. None of the above.

Difficulty:
Correct Answer: d

38. An industry has two colluding firms that act so as to maximize total profit in the industry and then split the profits equally. Firm 1 has cost function $c(y) = 8y$. Firm 2 has cost function $c(y) = y^2$. Each firm produces an integer number of units. Market demand is given by $Y(p) = 72 - p$.
 a. Each firm should produce 16 units.
 b. Firm 1 should produce 32 units and firm 2 should produce 2 units.
 c. Firm 1 should produce 14 units and firm 2 should produce 14 units.
 d. Firm 1 should produce 28 units and firm 2 should produce 4 units.
 e. None of the above.

Difficulty:
Correct Answer: c

39. An industry has two firms—a Stackelberg leader and a follower. The price of the industry output is given by $P = 36 - Q$, where Q is the total output of the two firms. The follower has a marginal cost of \$0. The leader has a marginal cost of \$9. How much should the leader produce in order to maximize profits?
 a. 12
 b. 18
 c. 9
 d. 7
 e. None of the above.

Difficulty:
Correct Answer: a

40. An industry has two firms—a Stackelberg leader and a follower. The price of the industry output is given by $P = 84 - Q$, where Q is the total output of the two firms. The follower has a marginal cost of \$0. The leader has a marginal cost of \$21. How much should the leader produce in order to maximize profits?
 a. 21
 b. 24
 c. 42
 d. 19
 e. None of the above.

Difficulty:
Correct Answer: a

41. Roach Motors is the dominant used-car dealer in a small midwestern city. After paying \$50,000 for overhead, Roach Motors' cost per car is \$500. There are 5 other small used-car lots in this town, but since they are not large enough to purchase cars through the same discount sources as Roach, each firm faces the cost function $C = 5{,}000 + 700Q + 5Q^2$. The demand for used cars is $Q = 200 - P1/10$. Assuming Roach is aware of its competitors' costs, what price should Roach set for a used car?
 a. \$708.33
 b. \$575
 c. \$616.67
 d. \$604.17
 e. \$925

Difficulty:
Correct Answer: c

42. Roach Motors is the dominant used-car dealer in a small midwestern city. After paying \$50,000 for overhead, Roach Motors' cost per car is \$500. There

are 5 other small used-car lots in this town, but since they are not large enough to purchase cars through the same discount sources as Roach, each firm faces the cost function $C = 5{,}000 + 700Q + 5Q^2$. The demand for used cars is $Q = 500 - P1/10$. Assuming Roach is aware of its competitors' costs, what price should Roach set for a used car?

a. \$1,325
b. \$616.67
c. \$958.33
d. \$729.17
e. \$1,675

Difficulty:
Correct Answer: b

43. Roach Motors is the dominant used-car dealer in a small midwestern city. After paying \$50,000 for overhead, Roach Motors' cost per car is \$500. There are 4 other small used-car lots in this town, but since they are not large enough to purchase cars through the same discount sources as Roach, each firm faces the cost function $C = 5{,}000 + 700Q + 5Q^2$. The demand for used cars is $Q = 300 - P1/10$. Assuming Roach sets the market price so as to maximize its profit, how many cars will each of the follower firms supply?

a. 19
b. 13
c. 9
d. 16
e. 8

Difficulty:
Correct Answer: a

44. Roach Motors is the dominant used-car dealer in a small midwestern city. After paying \$50,000 for overhead, Roach Motors' cost per car is \$500. There are 4 other small used-car lots in this town, but since they are not large enough to purchase cars through the same discount sources as Roach, each firm faces the cost function $C = 5{,}000 + 600Q + 5Q^2$. The demand for used cars is $Q = 600 - P3/10$. Assuming Roach sets the market price so as to maximize its profit, how many cars will each of the follower firms supply?

a. 25
b. 33
c. 28
d. 29
e. 27

Difficulty:
Correct Answer: d

45. North Bend currently has one McDonald's fast-food franchise. Demand for hamburgers in North Bend is given by $Q = 400 - 10P$. Any McDonald's franchise has costs of $C = 60 + 3Q$ for producing Q hamburgers. If a second McDonald's franchise were to move into North Bend (and both behaved as duopolists), the profit of the original McDonald's would fall from

a. \$3,362.50 to \$2,922.22.
b. \$3,977.50 to \$1,891.11.
c. \$3,422.50 to \$2,922.22.
d. \$3,362.50 to \$1,461.11.
e. \$3,422.50 to \$2,982.22.

Difficulty:
Correct Answer: d

46. North Bend currently has one McDonald's fast-food franchise. Demand for hamburgers in North Bend is given by $Q = 300 - 10P$. Any McDonald's franchise has costs of $C = 70 + 2Q$ for producing Q hamburgers. If a second McDonald's franchise were to move into North Bend (and both behaved as duopolists), the profit of the original McDonald's would fall from

a. \$1,890 to \$1,602.22.
b. \$1,960 to \$1,602.22.
c. \$2,240 to \$1,057.78.
d. \$1,890 to \$801.11.
e. \$1,960 to \$1,672.22.

Difficulty:
Correct Answer: b

47. Ann and Bruce each own a pizza store in Frostbite Falls, Minnesota. Demand for pizza is given by $Q = 200 - 10P$. Having the only two pizza stores in Frostbite Falls, they attempt to profitably split the market without violating the Sherman Antitrust Act. Each has the cost function $C = 50 + 5Q$. If Ann and Bruce behave as duopolists, each earns a profit of

a. \$0.
b. \$200.
c. \$500.
d. \$500.
e. \$562.50.

Difficulty:
Correct Answer: d

48. Ann and Bruce each own a pizza store in Frostbite Falls, Minnesota. Demand for pizza is given by $Q = 400 - 40P$. Having the only two pizza stores in Frostbite Falls, they attempt to profitably split the market without violating the Sherman Antitrust Act. Each has the cost function $C = 50 + 2Q$. If Ann and Bruce behave as duopolists, each earns a profit of

a. \$568.89.
b. \$497.78.
c. \$0.
d. \$234.44.
e. \$640.

CHAPTER 28 | Game Theory

TRUE-FALSE

Difficulty: 2
Correct Answer: True

1. A situation where everyone is playing a dominant strategy must be a Nash equilibrium.

Difficulty: 2
Correct Answer: False

2. In a Nash equilibrium, everyone must be playing a dominant strategy.

Difficulty: 2
Correct Answer: False

3. In the prisoner's dilemma game, if each prisoner believed that the other prisoner would deny the crime, then both would deny the crime.

Difficulty: 1
Correct Answer: False

4. A general has the two possible pure strategies, sending all of his troops by land or sending all of his troops by sea. An example of a mixed strategy is where he sends 1/4 of his troops by land and 3/4 of his troops by sea.

Difficulty: 1
Correct Answer: False

5. While game theory predicts noncooperative behavior for a single play of the prisoner's dilemma, it would predict cooperative tit-for-tat behavior if the same people play prisoner's dilemma together for, say, 20 rounds.

Difficulty: 1
Correct Answer: False

6. A two-person game in which each person has access to only two possible strategies will have at most one Nash equilibrium.

Difficulty: 1
Correct Answer: True

7. A dominant strategy equilibrium is a set of choices such that each player's choices are optimal regardless of what the other players choose.

Difficulty: 1
Correct Answer: True

8. In Nash equilibrium, each player is making an optimal choice for herself, given the choices of the other players.

Difficulty: 1
Correct Answer: False

9. If a game does not have an equilibrium in pure strategies, then it will not have an equilibrium in mixed strategies either.

Difficulty: 2
Correct Answer: False

10. A game has two players and each has two strategies. The strategies are Be Nice and Be Mean. If both players play Be Nice, both get a payoff of 5. If both players play Be Mean, both get a payoff of -3. If one player plays Be Nice and the other plays Be Mean, the player who played Be Nice gets 0 and the player who played Be Mean gets 10. Playing Be Mean is a dominant strategy for both players.

MULTIPLE CHOICE

Difficulty: 2
Correct Answer: c

1. A game has two players. Each player has two possible strategies. One strategy is Cooperate, the other is Defect. Each player writes on a piece of paper either a *C* for cooperate or a *D* for defect. If both players write *C*, they each get a payoff of \$100. If both players write *D*, they each get a payoff of 0. If one player writes *C* and the other player writes *D*, the cooperating player gets a payoff of *S* and the defecting player gets a payoff

of T. To defect will be a dominant strategy for both players if

a. $S + T > 100$.
b. $T > 2S$.
c. $S < 0$ and $T > 100$.
d. $S < T$ and $T > 100$.
e. S and T are any positive numbers.

Difficulty: 1
Correct Answer: c

2. In the game matrix below, the first payoff in each pair goes to player A who chooses the row, and the second payoff goes to player B, who chooses the column. Let a, b, c, and d be positive constants.

		Player B	
		Left	Right
Player A	Top	a, 1	b, 1
	Bottom	1, c	1, d

If player A chooses Bottom and player B chooses Right in a Nash equilibrium, then we know that

a. $b > 1$ and $d < 1$.
b. $c < 1$ and $b < 1$.
c. $b < 1$ and $c <$ d.
d. $b < c$ and $d < 1$.
e. $a < 1$ and $b < d$.

Difficulty: 2
Correct Answer: a

3. In the town of Torrelodones, each of the $N > 2$ inhabitants has \$100. They are told that they can all voluntarily contribute to a fund that will be evenly divided among all residents. If \$$F$ are contributed to the fund, the local K-Mart will match the private contributions so that the total amount to be divided is \$$2F$. That is, each resident will get back a payment of \$$2F/N$ when the fund is divided. If the people in town care only about their own net incomes, in Nash equilibrium, how much will each person contribute to the fund?

a. \$0
b. \$10
c. \$20
d. \$50
e. \$100

Difficulty: 3
Correct Answer: c

4. Frank and Nancy met at a sorority sock hop. They agreed to meet for a date at a local bar the next week. Regrettably, they were so fraught with passion that they forgot to agree on which bar would be the site of their rendezvous. Luckily, the town has only two bars, Rizotti's and the Oasis. Having discussed their tastes in bars at the sock hop, both are aware that Frank prefers Rizotti's to the Oasis and Nancy prefer the Oasis to Rizotti's. In fact, the payoffs are as follows. If both go to the Oasis, Nancy's utility is 3 and Frank's utility is 2. If both go to Rizotti's, Frank's utility is 3 and Nancy's utility is 2. If they don't both go to the same bar, both have a utility of 0.

a. This game has no Nash equilibrium in pure strategies.
b. This game has a dominant strategy equilibrium.
c. There are two Nash equilibrium in pure strategies and a Nash equilibrium in mixed strategies where the probability that Frank and Nancy go to the same bar is 12/25.
d. This game has two Nash equilibria in pure strategies and a Nash equilibrium in mixed strategies where each person has a probability of 1/2 of going to each bar.
e. This game has exactly one Nash equilibrium.

Difficulty: 2
Correct Answer: c

5. George and Sam have taken their fathers' cars out on a lonely road and are engaged in a game of Chicken. George has his father's Mercedes and Sam has his father's rattly little Yugoslavian-built subcompact car. Each of the players can choose either to Swerve or to Not Swerve. If both choose Swerve, both get a payoff of zero. If one chooses Swerve and the other chooses Not Swerve, the one who chooses Not Swerve gets a payoff of 10 and the one who chooses Swerve gets zero. If both choose Not Swerve, the damage to George's car is fairly minor and he gets a payoff of -5, while for Sam the results are disastrous and he gets a payoff of -100.

a. This game has a dominant strategy equilibrium in which George does not swerve and Sam swerves.
b. This game has two pure strategy Nash equilibria and no mixed strategy equilibrium.
c. This game has three different Nash equilibria, two of which are pure strategy equilibrium and one of which is a mixed strategy equilibrium in which George is more likely to swerve than Sam is.
d. The one and only Nash equilibrium in this game is where George does not swerve and Sam swerves.
e. This game has two pure strategy equilibria and a mixed strategy equilibrium in which Sam randomizes his strategy and George chooses Not Swerve with certainty.

Difficulty:
Correct Answer: c

6. Big Pig and Little Pig have two possible strategies, Press the Button, and Wait at the Trough. If both pigs choose Wait at the Trough, both get 3. If both pigs choose Press the Button, then Big Pig gets 8 and Little Pig gets 2. If Little Pig presses the button and Big Pig waits at the trough, then Big Pig gets 10 and Little Pig gets 0. Finally, if Big Pig presses the button and Little Pig waits at the trough, then Big Pig gets 2 and Little Pig gets 1. In Nash equilibrium,
   a. Little Pig will get a payoff of 1 and Big Pig will get a payoff of 2.
   b. Little Pig will get a payoff of 2 and Big Pig will get a payoff of 8.
   c. both pigs will wait at the trough.
   d. Little pig will get a payoff of zero.
   e. the pigs must be using mixed strategies.

Difficulty:
Correct Answer: e

7. Big Pig and Little Pig have two possible strategies, Press the Button, and Wait at the Trough. If both pigs choose Wait at the Trough, both get 2. If both pigs choose Press the Button, then Big Pig gets 5 and Little Pig gets 5. If Little Pig presses the button and Big Pig waits at the trough, then Big Pig gets 10 and Little Pig gets 0. Finally, if Big Pig presses the button and Little Pig waits at the trough, then Big Pig gets 6 and Little Pig gets 2. In Nash equilibrium,
   a. Little pig will get a payoff of zero.
   b. Little Pig will get a payoff of 5 and Big Pig will get a payoff of 5.
   c. both pigs will wait at the trough.
   d. Little Pig will get a payoff of 2 and Big Pig will get a payoff of 6.
   e. the pigs must be using mixed strategies.

Difficulty:
Correct Answer: e

8. Big Pig and Little Pig have two possible strategies, Press the Button, and Wait at the Trough. If both pigs choose Wait at the Trough, both get 2. If both pigs choose Press the Button, then both pigs get 5. If Little Pig presses the button and Big Pig waits at the trough, then Big Pig gets 10 and Little Pig gets 0. Finally, if Big Pig presses the button and Little Pig waits at the trough, then Big Pig gets 3 and Little Pig gets 2. In Nash equilibrium,
   a. both pigs will wait at the trough.
   b. Little Pig will get a payoff of 2 and Big Pig will get a payoff of 3.
   c. Little pig will get a payoff of zero.
   d. Little Pig will get a payoff of 5 and Big Pig will get a payoff of 5.
   e. the pigs must be using mixed strategies.

Difficulty:
Correct Answer: a

9. Two players are engaged in a game of Chicken. There are two possible strategies, Swerve and Drive Straight. A player who chooses to Swerve is called Chicken and gets a payoff of zero, regardless of what the other player does. A player who chooses to Drive Straight gets a payoff of 32 if the other player swerves and a payoff of -48 if the other player also chooses to Drive Straight. This game has two pure strategy equilibria and
   a. a mixed strategy equilibrium in which each player swerves with probability .60 and drives straight with probability .40.
   b. two mixed strategies in which players alternate between swerving and driving straight.
   c. a mixed strategy equilibrium in which one player swerves with probability .60 and the other swerves with probability .40.
   d. a mixed strategy in which each player swerves with probability .30 and drives straight with probability .70.
   e. no mixed strategies.

Difficulty:
Correct Answer: a

10. Two players are engaged in a game of Chicken. There are two possible strategies, Swerve and Drive Straight. A player who chooses to Swerve is called Chicken and gets a payoff of zero, regardless of what the other player does. A player who chooses to Drive Straight gets a payoff of 432 if the other player swerves and a payoff of -48 if the other player also chooses to Drive Straight. This game has two pure strategy equilibria and
   a. a mixed strategy equilibrium in which each player swerves with probability .10 and drives straight with probability .90.
   b. a mixed strategy in which each player swerves with probability .05 and drives straight with probability .95.
   c. a mixed strategy equilibrium in which one player swerves with probability .10 and the other swerves with probability .90.
   d. two mixed strategies in which players alternate between swerving and driving straight.
   e. no mixed strategies.

Difficulty:
Correct Answer: a

11. Two players are engaged in a game of Chicken. There are two possible strategies, Swerve and Drive Straight. A player who chooses to Swerve is called Chicken and gets a payoff of zero, regardless of what the other player does. A player who chooses to Drive Straight gets a payoff of 36 if the other player swerves and a payoff of -36 if the other player also chooses to Drive Straight. This game has two pure strategy equilibria and
    a. a mixed strategy equilibrium in which each player swerves with probability .50 and drives straight with probability .50.
    b. a mixed strategy equilibrium in which one player swerves with probability .50 and the other swerves with probability .50.
    c. a mixed strategy in which each player swerves with probability .25 and drives straight with probability .75.
    d. two mixed strategies in which players alternate between swerving and driving straight.
    e. no mixed strategies.

Difficulty:
Correct Answer: b

12. A famous Big Ten football coach had only two strategies, Run the ball to the left side of the line and Run the ball to the right side. The defense can concentrate forces on the left side or the right side. If the opponent concentrates on the wrong side, his offense is sure to gain at least 5 yards. If the defense defended the left side and the offense ran left, the offense gained only 1 yard. If the opponent defended the right side when the offense ran right, the offense would still gain at least 5 yards with probability .30. It is the last play of the game and the famous coach's team is on offense. If it makes 5 yards or more, it wins; if not, it loses. Both sides choose Nash equilibrium strategies. In equilibrium the offense
    a. is sure to run to the right side.
    b. will run to the right side with probability .59.
    c. will run to the right side with probability .74.
    d. will run to the two sides with equal probability.
    e. will run to the right side with probability .70.

Difficulty:
Correct Answer: d

13. A famous Big Ten football coach had only two strategies, Run the ball to the left side of the line and Run the ball to the right side. The defense can concentrate forces on the left side or the right side. If the opponent concentrates on the wrong side, his offense is sure to gain at least 5 yards. If the defense defended the left side and the offense ran left, the offense gained only 1 yard. If the opponent defended the right side when the offense ran right, the offense would still gain at least 5 yards with probability .70. It is the last play of the game and the famous coach's team is on offense. If it makes 5 yards or more, it wins; if not, it loses. Both sides choose Nash equilibrium strategies. In equilibrium the offense
    a. will run to the two sides with equal probability.
    b. will run to the right side with probability .87.
    c. is sure to run to the right side.
    d. will run to the right side with probability .77.
    e. will run to the right side with probability .70.

Difficulty:
Correct Answer: a

14. A famous Big Ten football coach had only two strategies, Run the ball to the left side of the line and Run the ball to the right side. The defense can concentrate forces on the left side or the right side. If the opponent concentrates on the wrong side, his offense is sure to gain at least 5 yards. If the defense defended the left side and the offense ran left, the offense gained only 1 yard. If the opponent defended the right side when the offense ran right, the offense would still gain at least 5 yards with probability .50. It is the last play of the game and the famous coach's team is on offense. If it makes 5 yards or more, it wins; if not, it loses. Both sides choose Nash equilibrium strategies. In equilibrium the offense
    a. will run to the right side with probability .67.
    b. will run to the right side with probability .80.
    c. will run to the two sides with equal probability.
    d. is sure to run to the right side.
    e. will run to the right side with probability .50.

Difficulty:
Correct Answer: a

15. Suppose that in a Hawk-Dove game similar to the one discussed in your workbook, the payoff to each player is -6 if both play Hawk. If both play Dove, the payoff to each player is 3, and if one plays Hawk and the other plays Dove, the one that plays Hawk gets a payoff of 8 and the one that plays Dove gets 0. In equilibrium, we would expect hawks and doves to do equally well. This happens when the proportion of the total population that plays Hawk is
    a. .45.
    b. .23.
    c. .11.
    d. .73.
    e. 1.

Difficulty:
Correct Answer: a

16. Suppose that in a Hawk-Dove game similar to the one discussed in your workbook, the payoff to each player is -9 if both play Hawk. If both play Dove, the payoff to each player is 4, and if one plays Hawk and the other plays Dove, the one that plays Hawk gets a payoff of 5 and the one that plays Dove gets 0. In equilibrium, we would expect hawks and doves to do equally well. This happens when the proportion of the total population that plays Hawk is
    a. .10.
    b. .55.
    c. .05.
    d. .03.
    e. 1.

Difficulty:
Correct Answer: a

17. Suppose that in a Hawk-Dove game similar to the one discussed in your workbook, the payoff to each player is -6 if both play Hawk. If both play Dove, the payoff to each player is 4, and if one plays Hawk and the other plays Dove, the one that plays Hawk gets a payoff of 6 and the one that plays Dove gets 0. In equilibrium, we would expect hawks and doves to do equally well. This happens when the proportion of the total population that plays Hawk is
    a. .25.
    b. .63.
    c. .06.
    d. .13.
    e. 1.

Difficulty:
Correct Answer: d

18. If the number of persons who attend the club meeting this week is X, then the number of people who will attend next week is $63 + 0.30X$. What is a long-run equilibrium attendance for this club?
    a. 63
    b. 210
    c. 126
    d. 90
    e. 27

Difficulty:
Correct Answer: d

19. If the number of persons who attend the club meeting this week is X, then the number of people who will attend next week is $80 + 0.20X$. What is a long-run equilibrium attendance for this club?
    a. 80
    b. 400
    c. 160
    d. 100
    e. 20

Difficulty:
Correct Answer: b

20. If the number of persons who attend the club meeting this week is X, then the number of people who will attend next week is $90 + 0.40X$. What is a long-run equilibrium attendance for this club?
    a. 225
    b. 150
    c. 180
    d. 90
    e. 60

Difficulty:
Correct Answer: e

21. Professor Binmore has a monopoly in the market for undergraduate game theory textbooks. The time-discounted value of Professor Binmore's future earnings is $2,000. Professor Ditt is considering writing a book to compete with Professor Binmore's book. With two books amicably splitting the market, the time-discounted value of each professor's future earnings would be $200. If there is full information (each professor knows the profits of the other), under what conditions could Professor Binmore deter the entry of Professor Ditt into his market?
    a. Professor Binmore threatens to cut his price so that Professor Ditt would loose $200. In so doing, Professor Binmore would loose $20 over time.
    b. Professor Binmore threatens to cut his price so that Professor Ditt would loose $20. In so doing, Professor Binmore would just break even over time.
    c. Professor Binmore threatens to cut his price and attack the credibility of Professor Ditt's book so that Professor Ditt would loose $2. In so doing, Professor Binmore would still make $190 over time.
    d. Professor Binmore threatens to cut his price and attack the credibility of Professor Ditt's book so that Professor Ditt would only make $2. In so doing, Professor Binmore would still make $100 over time.
    e. None of the above.

Difficulty:
Correct Answer: a

22. Professor Binmore has a monopoly in the market for undergraduate game theory textbooks. The time-discounted value of Professor Binmore's future earnings is $2,000. Professor Ditt is considering writing a book to compete with Professor Binmore's book. With two books amicably splitting the market, the time-discounted value of each professor's future earnings would be $200.

If there is full information (each professor knows the profits of the other), under what conditions could Professor Binmore deter the entry of Professor Ditt into his market?

a. Professor Binmore threatens to cut his price and attack the credibility of Professor Ditt's book so that Professor Ditt would loose $8. In so doing, Professor Binmore would still make $210 over time.
b. Professor Binmore threatens to cut his price and attack the credibility of Professor Ditt's book so that Professor Ditt would only make $8. In so doing, Professor Binmore would still make $100 over time.
c. Professor Binmore threatens to cut his price so that Professor Ditt would loose $800. In so doing, Professor Binmore would loose $80 over time.
d. Professor Binmore threatens to cut his price so that Professor Ditt would loose $80. In so doing, Professor Binmore would just break even over time.
e. None of the above.

Difficulty:
Correct Answer: a

23. Professor Binmore has a monopoly in the market for undergraduate game theory textbooks. The time-discounted value of Professor Binmore's future earnings is $4,000. Professor Ditt is considering writing a book to compete with Professor Binmore's book. With two books amicably splitting the market, the time-discounted value of each professor's future earnings would be $400. If there is full information (each professor knows the profits of the other), under what conditions could Professor Binmore deter the entry of Professor Ditt into his market?
    a. Professor Binmore threatens to cut his price and attack the credibility of Professor Ditt's book so that Professor Ditt would loose $8. In so doing, Professor Binmore would still make $410 over time.
    b. Professor Binmore threatens to cut his price so that Professor Ditt would loose $800. In so doing, Professor Binmore would loose $80 over time.
    c. Professor Binmore threatens to cut his price so that Professor Ditt would loose $80. In so doing, Professor Binmore would just break even over time.
    d. Professor Binmore threatens to cut his price and attack the credibility of Professor Ditt's book so that Professor Ditt would only make $8. In so doing, Professor Binmore would still make $200 over time.
    e. None of the above.

PROBLEM

Difficulty: 2

1. The coach of the offensive football team has two options on the next play. He can run the ball or he can pass. His rival can defend either against the run or against the pass. Suppose that the offense passes. Then if the defense defends against the pass, the offense will make zero yards, and if the defense defends against the run, the offense will make 25 yards. Suppose that the offense runs. If the defense defends against the pass, the offense will make 10 yards, and if the defense defends against a run, the offense will gain 2 yards.
    a. Write down a payoff matrix for this game.
    b. Is there a Nash equilibrium in pure strategies for this game? If so, what is it? If not, demonstrate that there is none.

Answer: (b) This game does not have a Nash equilibrium in pure strategies. The best response to a pass (run) is a defense against the pass (run). But the best response to a defense against the pass (run) is to run (pass).

CHAPTER 29 Game Applications

TRUE-FALSE

Difficulty:
Correct Answer: False

1. Alec and Kim used to be much better friends than they are now. The problem is what to do about Christmas gifts? If they wait until Christmas morning and move simultaneously, their payoff matrix is

		Kim: Gift	Kim: No
Alec	Gift	1, 1	6, 2
	No	6, 5	4, 4

Under the circumstances, Alec should publicly announce at Thanksgiving that he is not buying a Christmas gift for Kim.

Difficulty:
Correct Answer: False

2. Alec and Kim used to be much better friends than they are now. The problem is what to do about Christmas gifts? If they wait until Christmas morning and move simultaneously, their payoff matrix is

		Kim: Gift	Kim: No
Alec	Gift	6, 6	6, 1
	No	2, 4	1, 1

Under the circumstances, Alec should publicly announce at Thanksgiving that he is not buying a Christmas gift for Kim.

Difficulty:
Correct Answer: False

3. Alec and Kim used to be much better friends than they are now. The problem is what to do about Christmas gifts? If they wait until Christmas morning and move simultaneously, their payoff matrix is

		Kim: Gift	Kim: No
Alec	Gift	3, 3	3, 1
	No	2, 2	6, 6

Under the circumstances, Alec should publicly announce at Thanksgiving that he is not buying a Christmas gift for Kim.

Difficulty:
Correct Answer: True

4. In the classic 1960s macabre comedy *Dr. Strangelove*, the Soviet Union constructed a Doomsday Machine which would end all life on earth if ever the Soviet Union were attacked. When playing against a rational opponent, the existence of such a machine would be of great benefit to the Soviets.

Difficulty:
Correct Answer: False

5. In the classic 1960s macabre comedy *Dr. Strangelove*, the Soviet Union constructed a Doomsday Machine which would end all life on earth if ever the Soviet Union were attacked. In the movie, the existence of the Doomsday Machine was kept secret. This would enhance the effectiveness of such a machine.

Difficulty:
Correct Answer: False

6. Alec and Kim used to be much better friends than they are now. The problem is what to do about Christmas

gifts? If they wait until Christmas morning and move simultaneously, their payoff matrix is

		Kim	
		Gift	No
Alec	Gift	3, 3	5, 3
	No	6, 4	2, 2

If Kim is worried that Alec is going to announce publicly what he is going to do at Thanksgiving, Kim would definitely be made better off by announcing her action publicly at Halloween.

Difficulty:
Correct Answer: False

7. Alec and Kim used to be much better friends than they are now. The problem is what to do about Christmas gifts? If they wait until Christmas morning and move simultaneously, their payoff matrix is

		Kim	
		Gift	No
Alec	Gift	1, 1	1, 1
	No	2, 6	2, 2

If Kim is worried that Alec is going to announce publicly what he is going to do at Thanksgiving, Kim would definitely be made better off by announcing her action publicly at Halloween.

Difficulty:
Correct Answer: False

8. Alec and Kim used to be much better friends than they are now. The problem is what to do about Christmas gifts? If they wait until Christmas morning and move simultaneously, their payoff matrix is

		Kim	
		Gift	No
Alec	Gift	1, 1	3, 5
	No	4, 3	5, 5

If Kim is worried that Alec is going to announce publicly what he is going to do at Thanksgiving, Kim would definitely be made better off by announcing her action publicly at Halloween.

Difficulty:
Correct Answer: False

9. An equilibrium in a sequential game is always a Nash equilibrium in a simultaneous game with equivalent payoffs.

MULTIPLE CHOICE

Difficulty:
Correct Answer: e

1. Suppose Boeing and Airbus are both considering expanding their plant capacity as a strategic move but can't observe their opponent's move until their own move has been determined. The following are time-discounted values of all future profit streams in billions of dollars.

		Airbus	
		Expand	Don't
Boeing	Expand	0.10, 0.10	1.60, 0.80
	Don't	0.40, 1.70	1.20, 1.20

Which of the following strategies are Nash equilibria?
a. (Expand, Expand)
b. (Expand, Don't)
c. (Don't, Expand)
d. (Don't, Don't)
e. (b) and (c)
f. None are Nash equilibria.

Difficulty:
Correct Answer: e

2. Suppose Boeing and Airbus are both considering expanding their plant capacity as a strategic move but can't observe their opponent's move until their own move has been determined. The following are time-discounted values of all future profit streams in billions of dollars.

		Airbus	
		Expand	Don't
Boeing	Expand	0.40, 0.30	1.20, 0.60
	Don't	0.60, 1.50	1, 0.90

Which of the following strategies are Nash equilibria?
a. (Expand, Don't)
b. (Don't, Don't)
c. (Expand, Expand)
d. (Don't, Expand)
e. (b) and (c)
f. None are Nash equilibria.

Difficulty:
Correct Answer: e

3. Suppose Boeing and Airbus are both considering expanding their plant capacity as a strategic move but can't observe their opponent's move until their own move has been determined. The following are time-discounted values of all future profit streams in billions of dollars.

		Airbus	
		Expand	Don't
Boeing	Expand	0.30, 0.20	1, 0.40
	Don't	0.80, 1.80	1.10, 1.50

Which of the following strategies are Nash equilibria?
   a. (Expand, Don't)
   b. (Don't, Don't)
   c. (Don't, Expand)
   d. (Expand, Expand)
   e. (b) and (c)
   f. None are Nash equilibria.

Difficulty:
Correct Answer: c

4. In the little town of Gas Pump, South Dakota, there are two gas stations across the street from each other, the East station and the West station. A local ordinance requires that they are permitted to change the price of gasoline only once a week at precisely 8:00 a.m. on Monday and in 5 cent increments. For some time, the price of gasoline has been stable at $1.50 per gallon, but midweek, the price each station pays for gasoline changed to $1.50. Given the payoff matrix below, which of the following strategies is a pure strategy Nash equilibrium?

		West		
		1.45	1.50	1.55
	1.45	–25, –25	–50, 0	–50, 0
East	1.50	0, –50	0, 0	0, 0
	1.55	0, –50	0, 0	25, 25

   a. (raise, raise)
   b. (cut, cut) and (hold, hold)
   c. (hold, hold) and (raise, raise)
   d. (cut, cut), (hold, hold), and (raise, raise)
   e. No pure strategy Nash equilibrium exists.

Difficulty:
Correct Answer: a

5. In the little town of Gas Pump, South Dakota, there are two gas stations across the street from each other, the East station and the West station. A local ordinance requires that they are permitted to change the price of gasoline only once a week at precisely 8:00 a.m. on Monday and in 5 cent increments. For some time, the price of gasoline has been stable at $1.50 per gallon, but midweek, the price each station pays for gasoline changed to $1.49. Given the payoff matrix below, which of the following strategies is a pure strategy Nash equilibrium?

		West		
		1.45	1.50	1.55
	1.45	–20, –20	–40, 0	–40, 0
East	1.50	0, –40	5, 5	10, 0
	1.55	0, –40	0, 10	30, 30

   a. (hold, hold) and (raise, raise)
   b. (cut, cut) and (hold, hold)
   c. (cut, cut), (hold, hold), and (raise, raise)
   d. (raise, raise)
   e. No pure strategy Nash equilibrium exists.

Difficulty:
Correct Answer: b

6. In the little town of Gas Pump, South Dakota, there are two gas stations across the street from each other, the East station and the West station. A local ordinance requires that they are permitted to change the price of gasoline only once a week at precisely 8:00 a.m. on Monday and in 5 cent increments. For some time, the price of gasoline has been stable at $1.50 per gallon, but midweek, the price each station pays for gasoline changed to $1.44. Given the payoff matrix below, which of the following strategies is a pure strategy Nash equilibrium?

		West		
		1.45	1.50	1.55
	1.45	5, 5	10, 0	10, 0
East	1.50	0, 10	30, 30	60, 0
	1.55	0, 10	0, 60	55, 55

   a. (cut, cut), (hold, hold), and (raise, raise)
   b. (cut, cut) and (hold, hold)
   c. (hold, hold) and (raise, raise)
   d. (raise, raise)
   e. No pure strategy Nash equilibrium exists.

Difficulty:
Correct Answer: a

7. Alec and Kim used to be much better friends than they are now. The problem is what to do about Christmas gifts? If they wait until Christmas morning and move simultaneously, their payoff matrix is

		Kim	
		Gift	No
Alec	Gift	3, 3	4, 4
	No	4, 2	5, 5

If Alec commits at Thanksgiving time not to buy a gift for Kim, Kim will find it in her best interest

a. to buy a gift for Alec to spite him.
b. not to buy a gift for Alec.
c. to buy a gift for Alec with probability 2/7.
d. to buy a gift for Alec with probability 4/9.
e. to buy a gift for Alec with probability 4/6.

Difficulty:
Correct Answer: a

8. Alec and Kim used to be much better friends than they are now. The problem is what to do about Christmas gifts? If they wait until Christmas morning and move simultaneously, their payoff matrix is

		Kim	
		Gift	No
Alec	Gift	3, 3	1, 3
	No	4, 2	5, 5

If Alec commits at Thanksgiving time not to buy a gift for Kim, Kim will find it in her best interest

a. to buy a gift for Alec to spite him.
b. not to buy a gift for Alec.
c. to buy a gift for Alec with probability 2/7.
d. to buy a gift for Alec with probability 4/9.
e. to buy a gift for Alec with probability 4/6.

Difficulty:
Correct Answer: b

9. Alec and Kim used to be much better friends than they are now. The problem is what to do about Christmas gifts? If they wait until Christmas morning and move simultaneously, their payoff matrix is

		Kim	
		Gift	No
Alec	Gift	2, 2	3, 4
	No	4, 1	5, 5

If Alec commits at Thanksgiving time not to buy a gift for Kim, Kim will find it in her best interest

a. not to buy a gift for Alec.
b. to buy a gift for Alec to spite him.
c. to buy a gift for Alec with probability 1/6.
d. to buy a gift for Alec with probability 4/9.
e. to buy a gift for Alec with probability 4/5.

Difficulty:
Correct Answer: b

10. Consider the goalie's anxiety at the penalty kick. Let the kicker's payoffs below represent the kicker's probability of success and the goalie's payoffs the probability of failure.

		Goalie	
		Defend left	Defend right
Kicker	Kick left	90, –90	10, –10
	Kick right	50, –50	70, –70

The goalie should defend left with probability

a. .60.
b. .20.
c. .40.
d. .80.
e. 1.

Difficulty:
Correct Answer: c

11. Consider the goalie's anxiety at the penalty kick. Let the kicker's payoffs below represent the kicker's probability of success and the goalie's payoffs the probability of failure.

		Goalie	
		Defend left	Defend right
Kicker	Kick left	30, –30	60, –60
	Kick right	70, –70	20, –20

The goalie should defend left with probability

a. .50.
b. .38.
c. .63.
d. .50.
e. 1.

Difficulty:
Correct Answer: b

12. Consider the goalie's anxiety at the penalty kick. Let the kicker's payoffs below represent the kicker's probability of success and the goalie's payoffs the probability of failure.

		Goalie	
		Defend left	Defend right
Kicker	Kick left	50, –50	20, –20
	Kick right	40, –40	90, –90

The goalie should defend left with probability

a. .38.
b. .63.
c. .13.
d. .88.
e. 1.

Difficulty:
Correct Answer: b

13. In a small isolated town, there are two types of people, saints and crooks. In business dealings between any two residents of this town, the payoffs are below.

	Saint	Crook
Saint	5, 5	0, 9
Crook	9, 0	–2, –2

What percentage of this town's residents would be saints in an evolutionary stable strategy?
a. 100%
b. 33.33%
c. 83.33%
d. 28.51%
e. 0%

Difficulty:
Correct Answer: b

14. In a small isolated town, there are two types of people, saints and crooks. In business dealings between any two residents of this town, the payoffs are below.

	Saint	Crook
Saint	7, 7	0, 11
Crook	11, 0	–4, –4

What percentage of this town's residents would be saints in an evolutionary stable strategy?
a. 40.42%
b. 50%
c. 100%
d. 87.50%
e. 0%

Difficulty:
Correct Answer: a

15. In a small isolated town, there are two types of people, saints and crooks. In business dealings between any two residents of this town, the payoffs are below.

	Saint	Crook
Saint	7, 7	0, 10
Crook	10, 0	–5, –5

What percentage of this town's residents would be saints in an evolutionary stable strategy?
a. 62.50%
b. 100%
c. 87.50%
d. 15.30%
e. 0%

Difficulty:
Correct Answer: b

16. Suppose AMD is considering cloning Intel's latest CPU chip. If AMD enters Intel's market, Intel can play Mean, expand its output, drop prices, and try to make AMD's profit as small as possible or play Nice by cutting back its output and sharing the market. AMD and Intel both know that after all moves are complete, the time-discounted profits of future chip production in billions of dollars are

		Intel	
		Mean	Nice
AMD	In	5, 4	9, 17
	Out	0, 12	0, 21

Assuming AMD moves first, which of the following is the Nash equilibrium for sequential play?
a. (In, Mean)
b. (In, Nice)
c. (Out, Mean)
d. (Out, Nice)

Difficulty:
Correct Answer: b

17. Suppose AMD is considering cloning Intel's latest CPU chip. If AMD enters Intel's market, Intel can play Mean, expand its output, drop prices, and try to make AMD's profit as small as possible or play Nice by cutting back its output and sharing the market. AMD and Intel both know that after all moves are complete, the time-discounted profits of future chip production in billions of dollars are

		Intel	
		Mean	Nice
AMD	In	5, 3	7, 6
	Out	0, 12	0, 22

Assuming AMD moves first, which of the following is the Nash equilibrium for sequential play?
a. (Out, Mean)
b. (In, Nice)
c. (In, Mean)
d. (Out, Nice)

Difficulty:
Correct Answer: d

18. Suppose AMD is considering cloning Intel's latest CPU chip. If AMD enters Intel's market, Intel can play Mean, expand its output, drop prices, and try to make AMD's profit as small as possible or play Nice by cutting back its output and sharing the market. AMD and Intel both know that after all moves are complete, the time-discounted profits of future chip production in billions of dollars are

		Intel	
		Mean	Nice
AMD	In	5, 1	8, 12
	Out	0, 8	0, 22

Assuming AMD moves first, which of the following is the Nash equilibrium for sequential play?

a. (Out, Mean)
b. (In, Mean)
c. (Out, Nice)
d. (In, Nice)

Difficulty:
Correct Answer: b

19. Suppose AMD is considering cloning Intel's latest CPU chip. If AMD enters Intel's market, Intel can play Mean, expand its output, drop prices, and try to make AMD's profit as small as possible or play Nice by cutting back its output and sharing the market. AMD and Intel both know that after all moves are complete, the time-discounted profits of future chip production in billions of dollars are

		Intel	
		Mean	Nice
AMD	In	3, –1	7, 11
	Out	0, 12	0, 22

Assuming AMD moves first, which of the following is the Nash equilibrium for sequential play?

a. (In, Mean)
b. (In, Nice)
c. (Out, Mean)
d. (Out, Nice)

Difficulty:
Correct Answer: d

20. Suppose AMD is considering cloning Intel's latest CPU chip. If AMD enters Intel's market, Intel can play Mean, expand its output, drop prices, and try to make AMD's profit as small as possible or play Nice by cutting back its output and sharing the market. AMD and Intel both know that after all moves are complete, the time-discounted profits of future chip production in billions of dollars are

		Intel	
		Mean	Nice
AMD	In	3, –1	10, 6
	Out	0, 13	0, 22

Assuming AMD moves first, which of the following is the Nash equilibrium for sequential play?

a. (Out, Mean)
b. (In, Mean)
c. (Out, Nice)
d. (In, Nice)

Difficulty:
Correct Answer: b

21. Suppose AMD is considering cloning Intel's latest CPU chip. If AMD enters Intel's market, Intel can play Mean, expand its output, drop prices, and try to make AMD's profit as small as possible or play Nice by cutting back its output and sharing the market. AMD and Intel both know that after all moves are complete, the time-discounted profits of future chip production in billions of dollars are

		Intel	
		Mean	Nice
AMD	In	3, 5	5, 4
	Out	0, 9	0, 14

Assuming AMD moves first, which of the following is the Nash equilibrium for sequential play?

a. (In, Nice)
b. (In, Mean)
c. (Out, Nice)
d. (Out, Mean)

PROBLEMS

Difficulty:

1. In the movie *Dr. Strangelove*, crazed U.S. General Jack Ripper orders his B-52 bomber wing to launch a preemptive nuclear attack on the Soviet Union. General Ripper believes the payoffs for a U.S. first strike to be as follows:

		U.S.S.R.	
		Retaliate	Don't
U.S.	Attack	8, –10	10, –10
	Don't	–12, 10	1, 1

The U.S.S.R. has a little surprise of its own in the movie. It has constructed a Doomsday Machine, which will automatically destroy all life on earth if the U.S.S.R. is attacked. With the Doomsday Machine operational, the payoffs for a U.S. first strike are as follows:

		U.S.S.R.	
		Retaliate	Don't
U.S.	Attack	$-\infty, -\infty$	$-\infty, -\infty$
	Don't	–12, 10	1, 1

a. Prior to the building of the Doomsday Machine, would a Soviet threat to retaliate be credible? Explain.
b. How does the construction of the Doomsday Machine change this?
c. What purpose did keeping construction of the Doomsday Machine secret serve?
d. In the movie, the Soviet ambassador announced the existence of the Doomsday Machine only after the attack on the Soviet Union was in progress. Did this serve any useful strategic purpose? Why?

Answer:
a. Uncertain. Payoff for the Soviets is the same whether they attack or not.
b. By removing discretion, the Soviets are committed to retaliation.
c. Keeping the Doomsday Machine secret is not rational. It defeats the purpose of such a machine.
d. The existence of such a machine is meant to deter any attack on the Soviets. By keeping the machine secret, there is no deterrent effect.

Difficulty:

2. Recall from the movie *Dr. Strangelove*, General Turgison (played by George C. Scott) remarks, "Boy, I sure wish we had one of those Doomsday Machines." If both the United States and the Soviet Union possess a Doomsday Machine, the payoffs for a simultaneous attack are as follows:

		U.S.S.R.	
		Attack	Don't
U.S.	Attack	$-\infty, -\infty$	$-\infty, -\infty$
	Don't	$-\infty, -\infty$	1, 1

Would it be desirable from the U.S. perspective to have its own Doomsday Machine? Explain why or why not?

Answer: If the Soviets alone had a Doomsday Machine, it would allow them to attack the United States without fear of retaliation. If the United States too had such a machine, attack on the United States too would be infeasible.

Difficulty:

3. For the following scenarios, state whether the strategic effect of the firm's action will cause competitors to behave more or less aggressively, and why.
a. Sleep Country USA announces that it will beat any competitor's advertised price by 5%.
b. Termite Woods, a local, new home development, unexpectedly announces that it will decrease by 50% the number of homes it had planned to build in the coming year.
c. Used car dealership Roach Motors announces a 25% price cut on its entire stock.

Answer:
a. Less aggressive. If a competitor were to price more aggressively, then Sleep Country USA has committed to pricing below the competitor's new price. Both are better off to price less aggressively.
b. More aggressive. Competitors would make more money by expanding output to replace the cutbacks by Termite Woods.
c. More aggressive. Roach's competitors must match the price cuts to remain competitive.

Difficulty:

4. The February 24, 1997, issue of Forbes has an article about a private Belgian utility company which is aggressively expanding its overseas holdings. Loosely quoting from Forbes, "At least one of the Belgian utility's foreign moves was inspired by game theory. Last year, the Belgian utility paid $141 million for 49% of a Hungarian power station. The firm's CEO figured that if French utilities threatened to dump cheap power into the Belgian market, he could retaliate by dumping cheap Hungarian power into France."
a. What is this CEO trying to accomplish?
b. What is necessary for this plan to be successful?

Answer:
a. He is trying to put in place a credible threat to the firm's competitors.
b. The Belgian utility must be able to dump power into France and still make more money than it could by accommodating the French utilities.

CHAPTER 31 Exchange

TRUE-FALSE

Difficulty: 1
Correct Answer: False

1. Partial equilibrium analysis concerns only supply or only demand while general equilibrium analysis deals with supply and demand at the same time.

Difficulty: 1
Correct Answer: True

2. A pure exchange economy is an economy where goods are traded but there is no production.

Difficulty: 1
Correct Answer: False

3. In general equilibrium analysis, an allocation is a feasible allocation if every consumer is consuming a bundle that costs no more than his or her income.

Difficulty: 2
Correct Answer: True

4. From Walras's law it follows that in a market with two goods, if demand equals supply in one market, then demand must equal supply in the other market.

Difficulty: 1
Correct Answer: True

5. If the assumptions of the first theorem of welfare economics apply and if the economy is in a competitive equilibrium, then any reallocation that benefits someone must harm someone else.

Difficulty: 1
Correct Answer: True

6. If there are consumption externalities, then a competitive equilibrium is not necessarily Pareto optimal.

Difficulty: 1
Correct Answer: True

7. A competitive equilibrium allocation must be a feasible allocation.

Difficulty: 2
Correct Answer: True

8. The second welfare theorem of economics states that if preferences are convex, then any Pareto optimal allocation could be achieved as a competitive equilibrium after some reallocation of initial endowments.

Difficulty: 1
Correct Answer: True

9. In a competitive pure exchange economy, if the total value of excess demand for all types of food is zero, then the total value of excess demand for all nonfood commodities must be zero.

Difficulty: 1
Correct Answer: True

10. Every allocation on the contract curve is Pareto optimal.

Difficulty: 2
Correct Answer: True

11. In a pure exchange economy with two goods, if there is a competitive equilibrium with prices p_1 = \$12 and p_2 = \$27, then there must also be a competitive equilibrium with prices p_1 = \$24 and p_2 = \$54.

Difficulty: 2
Correct Answer: True

12. If demand varies continuously with price, then even if there are thousands of goods, there will be at least one set of prices such that demand equals supply in every market.

Difficulty: 3
Correct Answer: True

13. If allocation x is a competitive equilibrium at prices p and if everybody likes his bundle in allocation y better than his bundle in allocation x, then the total value of allocation y at prices p exceeds the total value of allocation x at prices p.

Difficulty: 2
Correct Answer: True

14. If the initial endowment is on the contract curve, then there must always be a competitive equilibrium in which no trade takes place.

Difficulty: 2
Correct Answer: False

15. Jack Spratt's utility function is $U(F, L) = L$. His wife's utility function is $U(F, L) = F$. If Jack's initial endowment is 10 units of F and 5 units of L and if Jack's wife's initial endowment is 6 units of F and 10 units of L, then in an Edgeworth box for Jack and his wife, an allocation of F and L will be Pareto optimal only if it is at a corner of the box.

Difficulty: 2
Correct Answer: False

16. Jack Spratt's utility function is $U(F, L) = L$. His wife's utility function is $U(F, L) = F$. If Jack's initial endowment is 40 units of F and 20 units of L and if Jack's wife's initial endowment is 24 units of F and 40 units of L, then in an Edgeworth box for Jack and his wife, an allocation of F and L will be Pareto optimal only if it is at a corner of the box.

Difficulty: 2
Correct Answer: False

17. Jack Spratt's utility function is $U(F, L) = L$. His wife's utility function is $U(F, L) = F$. If Jack's initial endowment is 100 units of F and 50 units of L and if Jack's wife's initial endowment is 60 units of F and 100 units of L, then in an Edgeworth box for Jack and his wife, an allocation of F and L will be Pareto optimal only if it is at a corner of the box.

Difficulty: 3
Correct Answer: True

18. If two people have identical Cobb-Douglas utility functions, then in every Pareto optimal allocation, they must consume all goods in the same proportions as each other.

Difficulty: 2
Correct Answer: True

19. If two people have identical homothetic preferences and if their indifference curves have a diminishing marginal rate of substitution, then in an Edgeworth box, the locus of Pareto optimal allocations between them is a diagonal straight line.

Difficulty: 1
Correct Answer: False

20. In a model with two consumers, two goods, and no production, the contract curve must be a line going from one consumer's origin to the other consumer's origin.

Difficulty: 2
Correct Answer: False

21. In a competitive pure exchange economy, if the initial endowment is on the diagonal line between the two origins, then, according to the first welfare theorem of economics, there must always be a competitive equilibrium in which no trade takes place.

MULTIPLE CHOICE

Difficulty: 2
Correct Answer: e

1. In a pure exchange economy with two persons and two goods, one person always prefers more to less of both goods and one person likes one of the goods and hates the other so much that she would have to be paid to consume it. Both are initially endowed with positive amounts of both goods. The competitive equilibrium price of the good that one person hates
   a. must be negative.
   b. must be smaller than the price of the good both people like.
   c. must be less than 1.
   d. could be positive or negative, depending on details of tastes and technology.
   e. must be positive.

Difficulty: 2
Correct Answer: a

2. If an allocation is Pareto optimal and if indifference curves between the two goods have no kinks, then
   a. two consumers who consume both goods must have the same MRS between them, but consumers may consume the goods in different ratios.
   b. two consumers with the same income who consume both goods must have the same MRS, but if their incomes differ, their MRSs may differ.
   c. any two consumers who consume both goods must consume them in the same ratio.
   d. for any two consumers who consume both goods, neither will prefer the other consumer's bundle to his own.
   e. all consumers receive the bundle that they prefer to any other bundle the economy could produce for them.

Difficulty: 2
Correct Answer: e

3. According to the first theorem of welfare economics:
   a. every competitive equilibrium is fair.
   b. if the economy is in a competitive equilibrium, there is no way to make anyone better off.
   c. a competitive equilibrium always exists.
   d. at a Pareto optimum, all consumers must be equally wealthy.
   e. None of the above.

Difficulty: 2
Correct Answer: a

4. A small economy has only two consumers, Charlie and Doreen. Charlie's utility function is $U(x, y) = x + 154y^{1/2}$. Doreen's utility function is $U(x, y) = x + 7y$. At a Pareto optimal allocation in which both individuals consume some of each good, how much y does Charlie consume?
   a. 121
   b. 9
   c. 22
   d. 18
   e. We can't tell without knowing the initial endowments.

Difficulty: 2
Correct Answer: c

5. A small economy has only two consumers, Nick and Minnie. Nick's utility function is $U(x, y) = x + 154y^{1/2}$. Minnie's utility function is $U(x, y) = x + 7y$. At a Pareto optimal allocation in which both individuals consume some of each good, how much y does Nick consume?
   a. 22
   b. 18
   c. 121
   d. 9
   e. We can't tell without knowing the initial endowments.

Difficulty: 2
Correct Answer: a

6. A small economy has only two consumers, Zeke and Maude. Zeke's utility function is $U(x, y) = x + 48y^{1/2}$. Maude's utility function is $U(x, y) = x + 4y$. At a Pareto optimal allocation in which both individuals consume some of each good, how much y does Zeke consume?
   a. 36
   b. 12
   c. 5
   d. 10
   e. We can't tell without knowing the initial endowments.

Difficulty: 2
Correct Answer: c

7. Eduardo and Francisca participate in an economy that is in competitive equilibrium. Although they are unacquainted with each other, both purchase strawberries and champagne. Edouardo's utility function is $U(s, c) = 2s + c$, where s is the number of boxes of strawberries he consumes per month and c is the number of bottles of champagne. Francisca's utility function is $U(s, c) = sc$.
   a. Francisca consumes equal amounts of strawberries and champagne.
   b. Eduardo consumes more strawberries than champagne.
   c. Francisca consumes twice as many bottles of champagne as boxes of strawberries.
   d. Francisca consumes twice as many boxes of strawberries as bottles of champagne.
   e. Eduardo consumes more champagne than strawberries.

Difficulty: 3
Correct Answer: d

8. Colette and Boris both consume the same goods in a pure exchange economy. Colette is originally endowed with 9 units of good 1 and 6 units of good 2. Boris is originally endowed with 18 units of good 1 and 3 units of good 2. They both have the utility function $U(x_1, x_2) = x^{1/3}{}_1x^{2/3}{}_2$. If we let good 1 be the numeraire, so that $p_1 = \$1$, then what will be the equilibrium price of good 2?
   a. \$2
   b. \$12
   c. \$1
   d. \$6
   e. \$3

Difficulty: 3
Correct Answer: a

9. Teresa and Jean-Pierre both consume the same goods in a pure exchange economy. Teresa is originally endowed with 9 units of good 1 and 6 units of good 2. Jean-Pierre is originally endowed with 91 units of good 1 and 14 units of good 2. They both have the utility function $U(x_1, x_2) = x^{1/3}{}_1x^{2/3}{}_2$. If we let good 1 be the numeraire, so that $p_1 = \$1$, then what will be the equilibrium price of good 2?
   a. \$10
   b. \$20
   c. \$2
   d. \$1
   e. \$5

Difficulty: 3
Correct Answer: a

10. Colette and Hans both consume the same goods in a pure exchange economy. Colette is originally endowed with 15 units of good 1 and 12 units of good 2. Hans is originally endowed with 97 units of good 1 and 4 units of good 2. They both have the utility function $U(x_1, x_2) = x^{1/3}{}_1x^{2/3}{}_2$. If we let good 1 be the numeraire, so that $p_1 = \$1$, then what will be the equilibrium price of good 2?
    a. \$14
    b. \$28
    c. \$2
    d. \$1
    e. \$7

Difficulty: 2
Correct Answer: c

11. Pete and Dud live in a two-commodity world. Pete's utility function is $U^P(x^P{}_1, x^P{}_2) = x^P{}_1 x^P{}_2$. Dud's utility function is $U^D(x^D{}_1, x^D{}_2) = \min\{x^D{}_1, x^D{}_2\}$. Pete is initially endowed with 3 units of commodity 1 and 4 units of commodity 2. Dud is initially endowed with 7 units of commodity 1 and 6 units of commodity 2.
    a. Both consume 5 units of each good in competitive equilibrium.
    b. At competitive equilibrium, Dud consumes 6 units of each, since the 7th unit of his endowment of commodity 1 gives him no added utility.
    c. At a competitive equilibrium, Dud must consume equal amounts of both goods, so the price of good 1 must equal the price of good 2.
    d. The prices of the two goods cannot be equal in equilibrium since Pete and Dud do not have equal endowments.
    e. None of the above.

Difficulty: 1
Correct Answer: c

12. A situation is Pareto efficient if
    a. there is no way to make everyone worse off without making someone better off.
    b. aggregate profits are maximized.
    c. there is no way to make someone better off without making someone else worse off.
    d. there is some way to make everyone better off.
    e. there is no way to make anyone better off.

Difficulty: 2
Correct Answer: e

13. Dan and Marilyn consume two goods, x and y. They have identical Cobb-Douglas utility functions. Initially Dan owns 10 units of x and 10 units of y. Initially Marilyn owns 40 units of x and 20 units of y. They make exchanges to reach a Pareto optimal allocation which is better for both than the no-trade allocation. Which of the following is *not* necessarily true about the allocation they trade to?
    a. Marilyn consumes 5 units of x for every 3 units of y that she consumes.
    b. The locus of Pareto optimal allocations is a diagonal straight line in the Edgeworth box.
    c. Dan's consumption of x is greater than his consumption of y.
    d. Dan consumes more than 10 units of x.
    e. Marilyn consumes at least 40 units of x.

Difficulty: 3
Correct Answer: d

14. Xavier and Yvette are the only two persons on a desert island. There are only two goods, nuts and berries. Xavier's utility function is $U(N_x, B_x) = N_x B_x$. Yvette's utility function is $U(N_y, B_y) = 2N_y + B_y$. Xavier is endowed with 3 units of berries and 8 units of nuts. Yvette is endowed with 6 units of berries and 8 units of nuts. In a competitive equilibrium for this economy, how many units of berries does Xavier consume?
    a. 12.50
    b. 19
    c. 7.50
    d. 9.50
    e. None of the above.

Difficulty: 3
Correct Answer: c

15. Xavier and Yvette are the only two persons on a desert island. There are only two goods, nuts and berries. Xavier's utility function is $U(N_x, B_x) = N_x B_x$. Yvette's utility function is $U(N_y, B_y) = 2N_y + B_y$. Xavier is endowed with 5 units of berries and 13 units of nuts. Yvette is endowed with 6 units of berries and 8 units of nuts. In a competitive equilibrium for this economy, how many units of berries does Xavier consume?
    a. 13.50
    b. 18.50
    c. 15.50
    d. 31
    e. None of the above.

Difficulty: 3
Correct Answer: c

16. Xavier and Yvette are the only two persons on a desert island. There are only two goods, nuts and berries. Xavier's utility function is $U(N_x, B_x) = N_x B_x$. Yvette's utility function is $U(N_y, B_y) = 5N_y + B_y$. Xavier is endowed with 4 units of berries and 13 units of nuts. Yvette is endowed with 6 units of berries and 8 units of nuts. In a competitive equilibrium for this economy, how many units of berries does Xavier consume?
    a. 37.50
    b. 69
    c. 34.50
    d. 32.50
    e. None of the above.

Difficulty: 2
Correct Answer: b

17. Irene and Orville live in an isolated valley and trade with no one but each other. They consume only cantaloupes and grapefruits. Irene has an initial endowment of 5 cantaloupes and 12 grapefruits. Orville has an initial endowment of 19 cantaloupes and 25 grapefruits. For Irene, the two goods are perfect substitutes, one for one. For Orville, they are perfect complements, one for one. At all Pareto efficient allocations,

a. Irene must consume at least 17 grapefruits.
b. Irene must consume at least 13 grapefruits.
c. Orville must consume 21.50 cantaloupes.
d. the slopes of the two traders' indifference curves are the same.
e. Orville must consume all of the cantaloupes.

Difficulty: 2
Correct Answer: d

18. Sheila and Ivan live in an isolated valley and trade with no one but each other. They consume only apples and oranges. Sheila has an initial endowment of 6 apples and 19 oranges. Ivan has an initial endowment of 18 apples and 20 oranges. For Sheila, the two goods are perfect substitutes, one for one. For Ivan, they are perfect complements, one for one. At all Pareto efficient allocations,
a. Sheila must consume at least 25 oranges.
b. the slopes of the two traders' indifference curves are the same.
c. Ivan must consume 17.50 apples.
d. Sheila must consume at least 15 oranges.
e. Ivan must consume all of the apples.

Difficulty: 2
Correct Answer: c

19. Marilyn and Chen live in an isolated valley and trade with no one but each other. They consume only bananas and tomatoes. Marilyn has an initial endowment of 4 bananas and 11 tomatoes. Chen has an initial endowment of 20 bananas and 27 tomatoes. For Marilyn, the two goods are perfect substitutes, one for one. For Chen, they are perfect complements, one for one. At all Pareto efficient allocations,
a. Marilyn must consume at least 15 tomatoes.
b. the slopes of the two traders' indifference curves are the same.
c. Marilyn must consume at least 14 tomatoes.
d. Chen must consume 22.50 bananas.
e. Chen must consume all of the bananas.

Difficulty: 3
Correct Answer: c

20. Amaranda and Bartolo consume only two goods, X and Y. They can trade only with each other and there is no production. The total endowment of good X equals the total endowment of good Y. Amaranda's utility function is $U(x_A, y_A) = \min\{x_A, y_A\}$ and Bartolo's utility function is $U(x_B, y_B) = \max\{x_B, y_B\}$. In an Edgeworth box for Amaranda and Bartolo, the set of Pareto optimal allocations is
a. the main diagonal.
b. both diagonals.
c. the whole Edgeworth box.
d. the edges of the box and the main diagonal.
e. the edges of the box.

Difficulty: 3
Correct Answer: c

21. Adelino and Benito consume only two goods, X and Y. They trade only with each other and there is no production. Adelino's utility function is given by $U(x_A, y_A) = 2x_A + 5y_A$ and Benito's utility function is given by $U(x_B, y_B) = 2(6x_B + 15y_B)^{1/2}$. In the Edgeworth box constructed for Adelino and Benito, the set of Pareto optimal allocations is
a. the main diagonal.
b. both diagonals.
c. the entire contents of the Edgeworth box.
d. the right and left edges of the box.
e. the upper and lower edges of the box.

Difficulty: 2
Correct Answer: d

22. Tamara and Julio consume only bread and wine. They trade only with each other and there is no production. They both have strictly convex preferences. Tamara's initial endowment of bread and wine is the same as Julio's.
a. At the initial endowment their marginal rates of substitution must be the same.
b. In a competitive equilibrium, the ratio of the two prices must be 1.
c. In a competitive equilibrium, they must consume identical consumption bundles.
d. If they have identical utility functions, then the initial allocation is Pareto optimal.
e. None of the above.

Difficulty: 2
Correct Answer: e

23. Arturo and Belen consume only two goods, X and Y. They have strictly convex preferences and no kinks in their indifference curves. At the initial allocation, the ratio of Arturo's marginal utility of X to his marginal utility of Y is A and the ratio of Belen's marginal utility of X to his marginal utility of Y is B, where $A < B$. The competitive equilibrium price ratio is $p_x/p_y = C$.
a. $C > B$.
b. $C < A$.
c. $C = A$.
d. $C = B$.
e. $A < C < B$.

Difficulty: 2
Correct Answer: b

24. In a two-person, two-good, exchange economy, both consumers have quasilinear utility functions, linear in good 2. If quantities of good 1 are measured horizontally and quantities of good 2 are measured vertically in the Edgeworth box, the set of Pareto optimal allocations includes

a. a horizontal line through the interior of the box.
b. a vertical line.
c. a straight line from the lower left to the upper right corner of the box.
d. a curved line from the lower left to the upper right corner of the box.
e. all four edges of the box.

Difficulty:
Correct Answer: b

25. A small economy has only two consumers, Harold and Irene. Harold's utility function is $U(x, y) = x + 50y^{1/2}$. Irene's utility function is $U(x, y) = x + 5y$. Harold is endowed with 500 units of x and 60 units of y. They make trades to reach a Pareto optimal allocation of resources in which both persons consume positive amounts. How much y does Harold consume?
a. 50 units
b. 25 units
c. 28 units
d. 23 units
e. There is not enough information to determine how much y he will consume.

Difficulty:
Correct Answer: c

26. A small economy has only two consumers, Ivan and Marilyn. Ivan's utility function is $U(x, y) = x + 18y^{1/2}$. Marilyn's utility function is $U(x, y) = x + 3y$. Ivan is endowed with 135 units of x and 60 units of y. They make trades to reach a Pareto optimal allocation of resources in which both persons consume positive amounts. How much y does Ivan consume?
a. 7 units
b. 12 units
c. 9 units
d. 18 units
e. There is not enough information to determine how much y he will consume.

Difficulty:
Correct Answer: d

27. A small economy has only two consumers, Boris and Vanessa. Boris's utility function is $U(x, y) = x + 16y^{1/2}$. Vanessa's utility function is $U(x, y) = x + 2y$. Boris is endowed with 160 units of x and 60 units of y. They make trades to reach a Pareto optimal allocation of resources in which both persons consume positive amounts. How much y does Boris consume?
a. 32 units
b. 19 units
c. 14 units
d. 16 units
e. There is not enough information to determine how much y he will consume.

Difficulty: 2
Correct Answer: a

28. Abdul's utility is $U(X_A, Y_A) = \min\{X_A, Y_A\}$, where X_A and Y_A are his consumptions of goods X and Y respectively. Babette's utility function is $U(X_B, Y_B) = X_BY_B$, where X_B and Y_B are her consumptions of goods X and Y. Abdul's initial endowment is no units of Y and 6 units of X. Babette's initial endowment is no units of X and 10 units of Y. If X is the numeraire good and p is the price of good Y, then supply will equal demand in the market for Y if
a. $6/(p + 1) + 5 = 10$.
b. $10/6 = p$.
c. $10/(p + 1) + 3 = 10$.
d. $\min\{6, 10\} + 6/2p = 10$.
e. $\min\{6, 10\} + 10/2p = 10$.

Difficulty: 2
Correct Answer: b

29. Abdul's utility is $U(X_A, Y_A) = \min\{X_A, Y_A\}$, where X_A and Y_A are his consumptions of goods X and Y respectively. Babette's utility function is $U(X_B, Y_B) = X_BY_B$, where X_B and Y_B are her consumptions of goods X and Y. Abdul's initial endowment is no units of Y and 5 units of X. Babette's initial endowment is no units of X and 11 units of Y. If X is the numeraire good and p is the price of good Y, then supply will equal demand in the market for Y if
a. $11/(p + 1) + 2.50 = 11$.
b. $5/(p + 1) + 5.50 = 11$.
c. $11/5 = p$.
d. $\min\{5, 11\} + 5/2p = 11$.
e. $\min\{5, 11\} + 11/2p = 11$.

Difficulty: 2
Correct Answer: b

30. Abdul's utility is $U(X_A, Y_A) = \min\{X_A, Y_A\}$, where X_A and Y_A are his consumptions of goods X and Y respectively. Babette's utility function is $U(X_B, Y_B) = X_BY_B$, where X_B and Y_B are her consumptions of goods X and Y. Abdul's initial endowment is no units of Y and 7 units of X. Babette's initial endowment is no units of X and 6 units of Y. If X is the numeraire good and p is the price of good Y, then supply will equal demand in the market for Y if
a. $\min\{7, 6\} + 7/2p = 6$.
b. $7/(p + 1) + 3 = 6$.
c. $6/7 = p$.
d. $6/(p + 1) + 3.50 = 6$.
e. $\min\{7, 6\} + 6/2p = 6$.

Difficulty: 2
Correct Answer: b

31. Professor Nightsoil's utility function is $U_N(B_N, P_N) = B_N + 4P^{1/2}_N$ and Dean Interface's utility function is $U_I(B_I, P_I) = B_I + 2P^{1/2}{}_I$, where B_N and B_I are the number of bromides and P_N and P_I are the number of platitudes consumed by Nightsoil and Interface respectively. If Nightsoil's initial endowment is 5 bromides and 20 platitudes and if Interface's initial endowment is 3 bromides and 20 platitudes, then at any Pareto efficient allocation in which both consume positive amounts of both goods,
   a. Nightsoil consumes the same ratio of bromides to platitudes as Interface.
   b. Interface consumes 8 platitudes.
   c. Interface consumes 4 bromides.
   d. Interface consumes 4 bromides.
   e. Interface consumes 4 bromides.

Difficulty: 2
Correct Answer: d

32. Professor Nightsoil's utility function is $U_N(B_N, P_N) = B_N + 4P^{1/2}{}_N$ and Dean Interface's utility function is $U_I(B_I, P_I) = B_I + P^{1/2}{}_I$, where B_N and B_I are the number of bromides and P_N and P_I are the number of platitudes consumed by Nightsoil and Interface respectively. If Nightsoil's initial endowment is 4 bromides and 10 platitudes and if Interface's initial endowment is 3 bromides and 15 platitudes, then at any Pareto efficient allocation in which both consume positive amounts of both goods,
   a. Interface consumes 3.50 bromides.
   b. Nightsoil consumes the same ratio of bromides to platitudes as Interface.
   c. Interface consumes 2 bromides.
   d. Interface consumes 5 platitudes.
   e. Interface consumes 3 bromides.

Difficulty: 2
Correct Answer: b

33. Professor Nightsoil's utility function is $U_N(B_N, P_N) = B_N + 4P^{1/2}{}_N$ and Dean Interface's utility function is $U_I(B_I, P_I) = B_I + 2P^{1/2}{}_I$, where B_N and B_I are the number of bromides and P_N and P_I are the number of platitudes consumed by Nightsoil and Interface respectively. If Nightsoil's initial endowment is 4 bromides and 25 platitudes and if Interface's initial endowment is 2 bromides and 20 platitudes, then at any Pareto efficient allocation in which both consume positive amounts of both goods,
   a. Nightsoil consumes the same ratio of bromides to platitudes as Interface.
   b. Interface consumes 9 platitudes.
   c. Interface consumes 5 bromides.
   d. Interface consumes 3 bromides.
   e. Interface consumes 4 bromides.

Difficulty: 2
Correct Answer: b

34. An economy has two people, Charlie and Doris. There are two goods, apples and bananas. Charlie has an initial endowment of 3 apples and 10 bananas. Doris has an initial endowment of 6 apples and 5 bananas. Charlie's utility function is $U(A_C, B_C) = A_C B_C$, where A_C is his apple consumption and B_C is his banana consumption. Doris's utility function is $U(A_D, B_D) = A_D B_D$, where A_D and B_D are her apple and banana consumptions. At every Pareto optimal allocation,
   a. Charlie consumes the same number of apples as Doris.
   b. Charlie consumes 9 apples for every 15 bananas that he consumes.
   c. Doris consumes equal numbers of apples and bananas.
   d. Charlie consumes more bananas per apple than Doris does.
   e. Doris consumes 6 apples for every 5 bananas that she consumes.

Difficulty: 2
Correct Answer: c

35. An economy has two people, Charlie and Doris. There are two goods, apples and bananas. Charlie has an initial endowment of 6 apples and 6 bananas. Doris has an initial endowment of 12 apples and 3 bananas. Charlie's utility function is $U(A_C, B_C) = A_C B_C$, where A_C is his apple consumption and B_C is his banana consumption. Doris's utility function is $U(A_D, B_D) = A_D B_D$, where A_D and B_D are her apple and banana consumptions. At every Pareto optimal allocation,
   a. Charlie consumes more bananas per apple than Doris does.
   b. Charlie consumes the same number of apples as Doris.
   c. Charlie consumes 18 apples for every 9 bananas that he consumes.
   d. Doris consumes equal numbers of apples and bananas.
   e. Doris consumes 12 apples for every 3 bananas that she consumes.

Difficulty: 2
Correct Answer: d

36. An economy has two people, Charlie and Doris. There are two goods, apples and bananas. Charlie has an initial endowment of 6 apples and 6 bananas. Doris has an initial endowment of 12 apples and 3 bananas. Charlie's utility function is $U(A_C, B_C) = A_C B_C$, where A_C is his apple consumption and B_C is his banana consumption. Doris's utility function is $U(A_D, B_D) = A_D B_D$, where A_D and B_D are her apple and banana consumptions. At every Pareto optimal allocation,

a. Charlie consumes more bananas per apple than Doris does.
b. Doris consumes equal numbers of apples and bananas.
c. Charlie consumes the same number of apples as Doris.
d. Charlie consumes 18 apples for every 9 bananas that he consumes.
e. Doris consumes 12 apples for every 3 bananas that she consumes.

Difficulty: 2
Correct Answer: c

37. Ken's utility function is $U(Q_K, W_K) = Q_K W_K$ and Barbie's utility function is $U(Q_B, W_B) = Q_B W_B$. If Ken's initial endowment were 3 units of quiche and 11 units of wine and Barbie's endowment were 6 units of quiche and 11 units of wine, then at any Pareto optimal allocation where both persons consumed some of each good,
   a. Ken would consume 3 units of quiche for every 11 units of wine that he consumed.
   b. Barbie would consume twice as much quiche as Ken.
   c. Ken would consume 9 units of quiche for every 22 units of wine that he consumed.
   d. Barbie would consume 6 units of quiche for every 11 units of wine that she consumed.
   e. None of the above.

Difficulty: 2
Correct Answer: a

38. Ken's utility function is $U(Q_K, W_K) = Q_K W_K$ and Barbie's utility function is $U(Q_B, W_B) = Q_B W_B$. If Ken's initial endowment were 5 units of quiche and 9 units of wine and Barbie's endowment were 10 units of quiche and 9 units of wine, then at any Pareto optimal allocation where both persons consumed some of each good,
   a. Ken would consume 15 units of quiche for every 18 units of wine that he consumed.
   b. Barbie would consume twice as much quiche as Ken.
   c. Ken would consume 5 units of quiche for every 9 units of wine that he consumed.
   d. Barbie would consume 10 units of quiche for every 9 units of wine that she consumed.
   e. None of the above.

Difficulty: 2
Correct Answer: a

39. Ken's utility function is $U(Q_K, W_K) = Q_K W_K$ and Barbie's utility function is $U(Q_B, W_B) = Q_B W_B$. If Ken's initial endowment were 5 units of quiche and 7 units of wine and Barbie's endowment were 10 units of quiche and 7 units of wine, then at any Pareto optimal allocation where both persons consumed some of each good,
   a. Ken would consume 15 units of quiche for every 14 units of wine that he consumed.
   b. Barbie would consume 10 units of quiche for every 7 units of wine that she consumed.
   c. Ken would consume 5 units of quiche for every 7 units of wine that he consumed.
   d. Barbie would consume twice as much quiche as Ken.
   e. None of the above.

Difficulty: 3
Correct Answer: d

40. Morris has the utility function $U(b, w) = 3b + 3w$ and Philip has the utility function $U(b, w) = bw$, where b is the number of books consumed per month and w is bottles of wine consumed per month. If we draw an Edgeworth box with books on the horizontal axis and wine on the vertical axis and if we measure Morris's consumptions from the lower left corner of the box, then the contract curve contains
   a. a straight line running from the upper right corner of the box to the lower left.
   b. a curve that gets steeper as you move from left to right.
   c. a straight line with slope 1/1 passing through the lower left corner of the box.
   d. a straight line with slope 1/1 passing through the upper right corner of the box.
   e. a curve that gets flatter as you move from left to right.

Difficulty: 3
Correct Answer: b

41. Morris has the utility function $U(b, w) = 4b + 4w$ and Philip has the utility function $U(b, w) = bw$, where b is the number of books consumed per month and w is bottles of wine consumed per month. If we draw an Edgeworth box with books on the horizontal axis and wine on the vertical axis and if we measure Morris's consumptions from the lower left corner of the box, then the contract curve contains
   a. a curve that gets steeper as you move from left to right.
   b. a straight line with slope 1/1 passing through the upper right corner of the box.
   c. a straight line with slope 1/1 passing through the lower left corner of the box.
   d. a straight line running from the upper right corner of the box to the lower left.
   e. a curve that gets flatter as you move from left to right.

Difficulty: 3
Correct Answer: c

42. Morris has the utility function $U(b, w) = 4b + 16w$ and Philip has the utility function $U(b, w) = bw$, where b is the number of books consumed per month and w is bottles of wine consumed per month. If we draw an Edgeworth box with books on the horizontal axis and wine on the vertical axis and if we measure Morris's consumptions from the lower left corner of the box, then the contract curve contains
    a. a straight line with slope 1/4 passing through the lower left corner of the box.
    b. a straight line running from the upper right corner of the box to the lower left.
    c. a straight line with slope 1/4 passing through the upper right corner of the box.
    d. a curve that gets steeper as you move from left to right.
    e. a curve that gets flatter as you move from left to right.

Difficulty: 2
Correct Answer: a

43. Astrid's utility function is $U(H_A, C_A) = H_A C_A$. Birger's utility function is $\min\{H_B, C_B\}$. If Astrid's initial endowment is no cheese and 11 units of herring and if Birger's initial endowments are 4 units of cheese and no herring, then where p is a competitive equilibrium price of herring and cheese is the numeraire, it must be that demand equals supply in the herring market. This implies that
    a. $4/(p + 1) + 6 = 12$.
    b. $4/12 = p$.
    c. $12/4 = p$.
    d. $4/p + 12/2p = 12$.
    e. $\min\{12, 4\} = p$.

Difficulty: 2
Correct Answer: a

44. Astrid's utility function is $U(H_A, C_A) = H_A C_A$. Birger's utility function is $\min\{H_B, C_B\}$. If Astrid's initial endowment is no cheese and 5 units of herring and if Birger's initial endowments are 6 units of cheese and no herring, then where p is a competitive equilibrium price of herring and cheese is the numeraire, it must be that demand equals supply in the herring market. This implies that
    a. $6/(p + 1) + 2.50 = 5$.
    b. $5/6 = p$.
    c. $6/p + 5/2p = 5$.
    d. $6/5 = p$.
    e. $\min\{5, 6\} = p$.

Difficulty: 2
Correct Answer: d

45. Astrid's utility function is $U(H_A, C_A) = H_A C_A$. Birger's utility function is $\min\{H_B, C_B\}$. If Astrid's initial endowment is no cheese and 13 units of herring and if Birger's initial endowments are 8 units of cheese and no herring, then where p is a competitive equilibrium price of herring and cheese is the numeraire, it must be that demand equals supply in the herring market. This implies that
    a. $13/8 = p$.
    b. $8/p + 13/2p = 13$.
    c. $8/13 = p$.
    d. $8/(p + 1) + 6.50 = 13$.
    e. $\min\{13, 8\} = p$.

Difficulty: 2
Correct Answer: b

46. Mutt's utility function is $U(m, j) = \max\{3m, j\}$ and Jeff's utility function is $U(m, j) = 2m + j$. Mutt is initially endowed with 3 units of milk and 2 units of juice and Jeff is initially endowed with 5 units of milk and 6 units of juice. If we draw an Edgeworth box with milk on the horizontal axis and juice on the vertical axis and if we measure goods for Mutt by the distance from the lower left corner of the box, then the set of Pareto optimal allocations includes the
    a. left edge of the Edgeworth box but no other edges.
    b. bottom edge of the Edgeworth box but no other edges.
    c. left edge and bottom edge of the Edgeworth box.
    d. right edge of the Edgeworth box but no other edges.
    e. right edge and top edge of the Edgeworth box.

Difficulty: 2
Correct Answer: d

47. Mutt's utility function is $U(m, j) = \max\{3m, j\}$ and Jeff's utility function is $U(m, j) = 3m + j$. Mutt is initially endowed with 6 units of milk and 2 units of juice and Jeff is initially endowed with 2 units of milk and 6 units of juice. If we draw an Edgeworth box with milk on the horizontal axis and juice on the vertical axis and if we measure goods for Mutt by the distance from the lower left corner of the box, then the set of Pareto optimal allocations includes the
    a. bottom edge of the Edgeworth box but no other edges.
    b. left edge of the Edgeworth box but no other edges.
    c. right edge of the Edgeworth box but no other edges.
    d. left edge and bottom edge of the Edgeworth box.
    e. right edge and top edge of the Edgeworth box.

Difficulty: 2
Correct Answer: d

48. Mutt's utility function is $U(m, j) = \max\{3m, j\}$ and Jeff's utility function is $U(m, j) = 4m + j$. Mutt is initially endowed with 4 units of milk and 2 units of juice and Jeff is initially endowed with 4 units of milk and 6 units of juice. If we draw an Edgeworth box with milk on the horizontal axis and juice on the vertical axis and if we measure goods for Mutt by the distance from the lower left corner of the box, then the set of Pareto optimal allocations includes the
    a. left edge and bottom edge of the Edgeworth box.
    b. right edge of the Edgeworth box but no other edges.
    c. bottom edge of the Edgeworth box but no other edges.
    d. left edge of the Edgeworth box but no other edges.
    e. right edge and top edge of the Edgeworth box.

PROBLEMS

Difficulty: 2

1. In a pure exchange economy, Ollie's utility function is $U(x, y) = 3x + y$ and Fawn's utility function is $U(x, y) = xy$. Ollie's initial allocation is 1 x and no y's. Fawn's initial allocation is no x's and 2 y's. Draw an Edgeworth box for Fawn and Ollie. Put x on the horizontal axis and y on the vertical axis. Measure goods for Ollie from the lower left and goods for Fawn from the upper right. Mark the initial allocation with the letter W. The locus of Pareto optimal points consists of two line segments. Describe these line segments in words or formulas and show them on your graph.

Answer: The Edgeworth box is 1 unit wide and 2 units high. Along the contract curve, Fawn consumes 3 times as much y as x. The contract curve consists of a line running from the upper right corner of the box to the point on the bottom of the box where Fawn consumes all of the y and 2/3 unit of x, and a line from this point to the lower left of the box.

Difficulty: 3

2. An economy has 2,000 people. 1,000 of them have utility functions $U(x, y) = x + y$ and 1,000 of them have utility functions $U(x, y) = \min\{2x, y\}$. Everybody has an initial allocation of 1 unit of x and 1 unit of y. Find the competitive equilibrium prices and consumptions for each type of person.

Answer: Prices are \$1 and \$1. The first type of person will consume 2/3 unit of y and 4/3 units of x and the second type of person will consume 4/3 units of y and 2/3 unit of x.

Difficulty: 2

3. Will likes apples and hates bananas. Wanda likes both apples and bananas. Both of them have convex preferences. Will's initial endowment is 10 apples and 5 bananas. Wanda's initial endowment is 5 bananas and 10 apples.
    a. Draw an Edgeworth box with apples on the horizontal axis. Label the initial endowment point W.
    b. Show two indifference curves for each person.
    c. Show where on your diagram the Pareto optimal allocations are.

Answer: (c) The Pareto optimal allocations include all of the allocations where Will has no bananas. If stuff for Will is measured from the lower left corner, then these allocations are all along the bottom of the box.

CHAPTER 32 Production

TRUE-FALSE

Difficulty: 2
Correct Answer: True

1. If there are constant returns to scale in an industry, then in competitive equilibrium, profits in that industry must necessarily be zero.

Difficulty: 1
Correct Answer: False

2. When there is production, a competitive equilibrium is not Pareto optimal unless there are increasing returns to scale.

Difficulty: 1
Correct Answer: True

3. The marginal rate of transformation between two goods indicates the rate at which an efficient economy would have to give up one good to obtain more of the other.

Difficulty: 2
Correct Answer: False

4. There are two people and two goods, person *A* has comparative advantage in the production of good 1 if and only if it takes person *A* less time to produce good 1 than it takes person *B*.

MULTIPLE CHOICE

Difficulty: 1
Correct Answer: a

1. A small company produces two goods, swords and plowshares. The company has 100 type alpha employees and 100 type beta employees. If an alpha devotes all his time to producing swords, he can make 2 swords per week. If he devotes all his time to producing plowshares, he can make 4 plowshares per week. A beta can produce either 1 plowshare per week or 1 sword per week. The company wants to produce 218 swords and as many plowshares as it can. How many type betas should it employ at making swords?
   a. 100
   b. 18
   c. 90
   d. 0
   e. None of the above.

Difficulty: 1
Correct Answer: c

2. A small company produces two goods, swords and plowshares. The company has 100 type alpha employees and 100 type beta employees. If an alpha devotes all his time to producing swords, he can make 4 swords per week. If he devotes all his time to producing plowshares, he can make 20 plowshares per week. A beta can produce either 1 plowshare per week or 1 sword per week. The company wants to produce 413 swords and as many plowshares as it can. How many type betas should it employ at making swords?
   a. 80
   b. 0
   c. 100
   d. 13
   e. None of the above.

Difficulty: 1
Correct Answer: d

3. A small company produces two goods, swords and plowshares. The company has 100 type alpha employees and 100 type beta employees. If an alpha devotes all his time to producing swords, he can make 3 swords per week. If he devotes all his time to producing plowshares, he can make 6 plowshares per week. A beta can produce either 1 plowshare per week or 1 sword per week. The company wants to produce 324 swords and as many plowshares as it can. How many type betas should it employ at making swords?
   a. 0
   b. 85
   c. 24
   d. 100
   e. None of the above.

Difficulty: 2
Correct Answer: b

4. Ernie and Burt both make pizzas for a living. Making a pizza consists of two tasks: making the crust and applying toppings. Ernie can make crusts at the rate of 30 crusts per hour. He can apply toppings at the rate of 15 toppings per hour. Burt can make crusts at the rate of 15 crusts per hour. He can apply toppings at the rate of 30 toppings per hour. After years of operating separate, one-man shops, they realize they can produce more efficiently by combining operations and dividing the tasks between them. How many more pizzas per hour can they make if they work together and allocate tasks efficiently than they made when they worked separately?
   a. 5
   b. 10
   c. 14
   d. 25
   e. 8

Difficulty: 2
Correct Answer: a

5. Mandy is a master wood-carver and Jerry is her apprentice. They will each work the same number of hours making toy cars. Each car requires 4 wheels and 1 body. Mandy makes wheels at the rate of 25 per hour and bodies at the rate of 10 per hour. Jerry makes wheels at the rate of 10 per hour and bodies at the rate of 10 per hour. If they wish to maximize output, how many wheels should Jerry make per hour?
   a. 3
   b. 2
   c. 10
   d. 6
   e. There is not enough information to determine the answer.

Difficulty: 1
Correct Answer: c

6. Amy Canvas is an artist who produces sketches and paintings. She can produce 12 sketches a week if she spends all of her workday sketching. She can produce 3 paintings a week if she spends all of her workdays painting. The rate at which she produces either sketches or paintings is independent of how many she makes. She can divide her time in any way she wishes between sketching and painting. If you draw her production possibilities frontier with sketches on the horizontal axis and paintings on the vertical axis, the production possibilities frontier will be
   a. the outer two sides of a rectangle.
   b. a downward-sloping curve that gets steeper as you move to the left.
   c. a downward-sloping straight line.
   d. an upward-sloping straight line.
   e. an upward-sloping curve that gets steeper as you move to the left.

Difficulty: 2
Correct Answer: d

7. Last year a pestilential fungus ravaged the cocoa fields. The price of chocolate has risen abruptly to \$1 per ounce. The government is considering emergency measures to aid suffering chocolate addicts. One plan being considered is the Chocolate Relief Plan (CRP). This plan would set a price ceiling of \$.80 per ounce on chocolate. This would cause a shortage, so the CRP will limit consumption to no more than 10 ounces of chocolate per person per week. At \$.80 per ounce, enough chocolate would be produced for everyone to have 10 ounces. Jill buys less than 10 ounces per week at \$1 per ounce but would buy more than 10 ounces if the price dropped to \$.80.
   a. Jill is definitely better off without the CRP.
   b. Jill is better off without the CRP if \$1 is the competitive equilibrium price without the CRP.
   c. Jill is better off with CRP only if the industry is monopolized and the price exceeds marginal cost in the absence of the CRP.
   d. Jill is definitely better off with the CRP.
   e. None of the above.

Difficulty: 2
Correct Answer: c

8. Robinson Crusoe's preferences over coconut consumption, C, and leisure, R, are represented by the utility function $U(C, R) = CR$. There are 48 hours available for Robinson to allocate between labor and leisure. If he works L hours, he will produce the square root of L of coconuts. He will choose to work
   a. 8 hours.
   b. 12 hours.
   c. 16 hours.
   d. 20 hours.
   e. 24 hours.

Difficulty: 2
Correct Answer: c

9. Robinson Crusoe spends 4 hours a day catching fish and picking coconuts. He can always catch 2 fish per hour and he can always gather 3 coconuts per hour. His utility function is CF, where C is the number of coconuts he eats per day and F is the number of fish he eats per day. How many fish will he choose to eat per day?
   a. 8
   b. 6
   c. 4
   d. 2
   e. 1

Difficulty:
Correct Answer: a

10. Tip can write 3 pages of term paper or solve 9 workbook problems in an hour, while Spot can write 4 pages of term paper or solve 4 workbook problems in an hour. If they each decide to work a total of 7 hours and to share their output, then if they produce as many pages of term paper as possible given that they produce 18 workbook problems,
    a. Spot will spend all of his time writing term papers and Tip will spend some time at each task.
    b. Tip will spend all of his time writing term papers and Spot will spend some time at each task.
    c. both students will spend some time at each task.
    d. Spot will write term papers only and Tip will do workbook problems only.
    e. Tip will write term papers only and Spot will do workbook problems only.

Difficulty:
Correct Answer: d

11. Tip can write 2 pages of term paper or solve 4 workbook problems in an hour, while Spot can write 4 pages of term paper or solve 12 workbook problems in an hour. If they each decide to work a total of 6 hours and to share their output, then if they produce as many pages of term paper as possible given that they produce 10 workbook problems,
    a. Spot will write term papers only and Tip will do workbook problems only.
    b. Spot will spend all of his time writing term papers and Tip will spend some time at each task.
    c. both students will spend some time at each task.
    d. Tip will spend all of his time writing term papers and Spot will spend some time at each task.
    e. Tip will write term papers only and Spot will do workbook problems only.

Difficulty:
Correct Answer: a

12. Tip can write 2 pages of term paper or solve 2 workbook problems in an hour, while Spot can write 2 pages of term paper or solve 6 workbook problems in an hour. If they each decide to work a total of 8 hours and to share their output, then if they produce as many pages of term paper as possible given that they produce 14 workbook problems,
    a. Tip will spend all of his time writing term papers and Spot will spend some time at each task.
    b. Spot will spend all of his time writing term papers and Tip will spend some time at each task.
    c. Spot will write term papers only and Tip will do workbook problems only.
    d. both students will spend some time at each task.
    e. Tip will write term papers only and Spot will do workbook problems only.

Difficulty:
Correct Answer: a

13. Al and Bill are the only workers in a small factory which makes geegaws and doodads. Al can make 5 geegaws per hour or 15 doodads per hour. Bill can make 2 geegaws per hour or 12 doodads per hour. Assuming that neither of them finds one task more odious than the other,
    a. Al has a comparative advantage in producing geegaws and Bill has a comparative advantage in producing doodads.
    b. Bill has a comparative advantage in producing geegaws and Al has a comparative advantage in producing doodads.
    c. Al has a comparative advantage in producing both geegaws and doodads.
    d. Bill has a comparative advantage in producing both geegaws and doodads.
    e. both have a comparative advantage in producing doodads.

Difficulty:
Correct Answer: d

14. Al and Bill are the only workers in a small factory which makes geegaws and doodads. Al can make 5 geegaws per hour or 15 doodads per hour. Bill can make 4 geegaws per hour or 8 doodads per hour. Assuming that neither of them finds one task more odious than the other,
    a. Al has a comparative advantage in producing geegaws and Bill has a comparative advantage in producing doodads.
    b. Bill has a comparative advantage in producing both geegaws and doodads.
    c. Al has a comparative advantage in producing both geegaws and doodads.
    d. Bill has a comparative advantage in producing geegaws and Al has a comparative advantage in producing doodads.
    e. both have a comparative advantage in producing doodads.

Difficulty:
Correct Answer: a

15. Al and Bill are the only workers in a small factory which makes geegaws and doodads. Al can make 4 geegaws per hour or 12 doodads per hour. Bill can make 2 geegaws per hour or 8 doodads per hour. Assuming that neither of them finds one task more odious than the other,
    a. Al has a comparative advantage in producing geegaws and Bill has a comparative advantage in producing doodads.
    b. Bill has a comparative advantage in producing geegaws and Al has a comparative advantage in producing doodads.

c. Al has a comparative advantage in producing both geegaws and doodads.
d. Bill has a comparative advantage in producing both geegaws and doodads.
e. both have a comparative advantage in producing doodads.

Difficulty:
Correct Answer: a

16. Every consumer has a red-money income and a blue-money income and each commodity has a red price and a blue price. You can buy a good by paying for it either with blue money at the blue price or with red money at the red price. Harold has 7 units of red money to spend and 32 units of blue money to spend. The red price of ambrosia is 1 and the blue price of ambrosia is 4. The red price of bubble gum is 1 and the blue price of bubble gum is 2. If ambrosia is on the horizontal axis, and bubble gum on the vertical axis, then Harold's budget set is bounded by
a. two line segments, one running from (0, 23) to (7, 16) and another running from (7, 16) to (15, 0).
b. two line segments one running from (0, 23) to (8, 7) and the other running from (8, 7) to (15, 0).
c. two line segments, one running from (0, 24) to (7, 16) and the other running from (7, 16) to (14, 0).
d. a vertical line segment and a horizontal line segement, intersecting at (7, 16).
e. a vertical line segment and a horizontal line segment, intersecting at (8, 7).

Difficulty:
Correct Answer: d

17. Every consumer has a red-money income and a blue-money income and each commodity has a red price and a blue price. You can buy a good by paying for it either with blue money at the blue price or with red money at the red price. Harold has 40 units of red money to spend and 35 units of blue money to spend. The red price of ambrosia is 4 and the blue price of ambrosia is 5. The red price of bubble gum is 1 and the blue price of bubble gum is 1. If ambrosia is on the horizontal axis, and bubble gum on the vertical axis, then Harold's budget set is bounded by
a. two line segments one running from (0, 75) to (7, 40) and the other running from (7, 40) to (17, 0).
b. two line segments, one running from (0, 42) to (10, 35) and the other running from (10, 35) to (50, 0).
c. a vertical line segment and a horizontal line segement, intersecting at (10, 35).
d. two line segments, one running from (0, 75) to (10, 35) and another running from (10, 35) to (17, 0).
e. a vertical line segment and a horizontal line segment, intersecting at (7, 40).

Difficulty:
Correct Answer: c

18. Every consumer has a red-money income and a blue-money income and each commodity has a red price and a blue price. You can buy a good by paying for it either with blue money at the blue price or with red money at the red price. Harold has 12 units of red money to spend and 40 units of blue money to spend. The red price of ambrosia is 1 and the blue price of ambrosia is 4. The red price of bubble gum is 1 and the blue price of bubble gum is 2. If ambrosia is on the horizontal axis, and bubble gum on the vertical axis, then Harold's budget set is bounded by
a. a vertical line segment and a horizontal line segement, intersecting at (12, 20).
b. two line segments one running from (0, 32) to (10, 12) and the other running from (10, 12) to (22, 0).
c. two line segments, one running from (0, 32) to (12, 20) and another running from (12, 20) to (22, 0).
d. two line segments, one running from (0, 30) to (12, 20) and the other running from (12, 20) to (24, 0).
e. a vertical line segment and a horizontal line segment, intersecting at (10, 12).

Difficulty:
Correct Answer: a

19. Robinson Crusoe has exactly 14 hours per day to spend gathering coconuts or catching fish. He can catch 4 fish per hour or he can pick 12 coconuts per hour. His utility function is $U(F, C) = FC$, where F is his consumption of fish and C is his consumption of coconuts. If he allocates his time in the best possible way between catching fish and picking coconuts, his consumption will be the same as it would be if he could buy fish and coconuts in a competitive market where the price of coconuts is $1.
a. His income is $168 and the price of fish is $3.
b. His income is $56 and the price of fish is $4.
c. His income is $224 and the price of fish is $4.
d. His income is $168 and the price of fish is $.25.
e. His income is $112 and the price of fish is $.25.

Difficulty:
Correct Answer: b

20. Robinson Crusoe has exactly 8 hours per day to spend gathering coconuts or catching fish. He can catch 3 fish per hour or he can pick 6 coconuts per hour. His utility function is $U(F, C) = FC$, where F is his consumption of fish and C is his consumption of coconuts. If he allocates his time in the best possible way between catching fish and picking coconuts, his consumption will be the same as it would be if he could buy fish and coconuts in a competitive market where the price of coconuts is $1.

a. His income is \$24 and the price of fish is \$3.
b. His income is \$48 and the price of fish is \$2.
c. His income is \$72 and the price of fish is \$3.
d. His income is \$48 and the price of fish is \$.33.
e. His income is \$36 and the price of fish is \$.33.

Difficulty:
Correct Answer: a

21. Robinson Crusoe has exactly 10 hours per day to spend gathering coconuts or catching fish. He can catch 3 fish per hour or he can pick 6 coconuts per hour. His utility function is $U(F, C) = FC$, where F is his consumption of fish and C is his consumption of coconuts. If he allocates his time in the best possible way between catching fish and picking coconuts, his consumption will be the same as it would be if he could buy fish and coconuts in a competitive market where the price of coconuts is \$1.
a. His income is \$60 and the price of fish is \$2.
b. His income is \$60 and the price of fish is \$.33.
c. His income is \$90 and the price of fish is \$3.
d. His income is \$30 and the price of fish is \$3.
e. His income is \$45 and the price of fish is \$.33.

Difficulty:
Correct Answer: b

22. On a certain island there are only two goods, wheat and milk. The only scarce resource is land. There are 1,000 acres of land. An acre of land will produce either 14 units of milk or 15 units of wheat. Some citizens have lots of land; some have just a little bit. The citizens of the island all have utility functions of the form $U(M, W) = MW$. At every Pareto optimal allocation,
a. the number of units of milk produced equals the number of units of wheat produced.
b. total milk production is 7,000 units.
c. all citizens consume the same commodity bundle.
d. every consumer's marginal rate of substitution between milk and wheat is -1.
e. None of the above is true at *every* Pareto optimal allocation.

Difficulty:
Correct Answer: c

23. On a certain island there are only two goods, wheat and milk. The only scarce resource is land. There are 1,000 acres of land. An acre of land will produce either 8 units of milk or 15 units of wheat. Some citizens have lots of land; some have just a little bit. The citizens of the island all have utility functions of the form $U(M, W) = MW$. At every Pareto optimal allocation,
a. every consumer's marginal rate of substitution between milk and wheat is -1.
b. the number of units of milk produced equals the number of units of wheat produced.
c. total milk production is 4,000 units.
d. all citizens consume the same commodity bundle.
e. None of the above is true at *every* Pareto optimal allocation.

Difficulty:
Correct Answer: d

24. On a certain island there are only two goods, wheat and milk. The only scarce resource is land. There are 1,000 acres of land. An acre of land will produce either 3 units of milk or 32 units of wheat. Some citizens have lots of land; some have just a little bit. The citizens of the island all have utility functions of the form $U(M, W) = MW$. At every Pareto optimal allocation,
a. the number of units of milk produced equals the number of units of wheat produced.
b. all citizens consume the same commodity bundle.
c. every consumer's marginal rate of substitution between milk and wheat is -1.
d. total milk production is 1,500 units.
e. None of the above is true at *every* Pareto optimal allocation.

Difficulty:
Correct Answer: d

25. In the process of producing 1 hormone-free, stress-free, happy cow, the New Age Cattle Ranch produces 1 ton of natural, organic plant fertilizer. Demand for the ranch's cattle is given by $P_c = 2{,}000 - 20Q_c$, and demand for fertilizer is given by $P_f = 500 - 4Q_f$. The cost of producing Q cow-fertilizer bundles is $C = 5{,}000 + 400Q$. To maximize profits, the ranch should
a. produce 40 cow-fertilizer units, sell 40 cattle, and sell 40 tons of fertilizer.
b. produce 40 cow-fertilizer units, sell 40 cattle, and sell 12.50 tons of fertilizer.
c. produce 62.50 cow-fertilizer units, sell 40 cattle, and sell 62.50 tons of fertilizer.
d. produce 43.75 cow-fertilizer units, sell 43.75 cattle, and sell 43.75 tons of fertilizer.
e. produce 50 cow-fertilizer units, sell 50 cattle, and dispose of all the fertilizer in an environmentally friendly manner.

Difficulty:
Correct Answer: a

26. In the process of producing 1 hormone-free, stress-free, happy cow, the New Age Cattle Ranch produces 1 ton of natural, organic plant fertilizer. Demand for the ranch's cattle is given by $P_c = 2{,}000 - 5Q_c$, and demand for fertilizer is given by $P_f = 500 - 4Q_f$. The cost of producing Q cow-fertilizer bundles is $C = 5{,}000 + 400Q$. To maximize profits, the ranch should
a. produce 160 cow-fertilizer units, sell 160 cattle, and sell 62.50 tons of fertilizer.
b. produce 160 cow-fertilizer units, sell 160 cattle, and sell 12.50 tons of fertilizer.
c. produce 160 cow-fertilizer units, sell 160 cattle, and sell 160 tons of fertilizer.

d. produce 116.67 cow-fertilizer units, sell 116.67 cattle, and sell 116.67 tons of fertilizer.
e. produce 200 cow-fertilizer units, sell 200 cattle, and dispose of all the fertilizer in an environmentally friendly manner.

Difficulty:
Correct Answer: b

27. In the process of producing 1 hormone-free, stress-free, happy cow, the New Age Cattle Ranch produces 1 ton of natural, organic plant fertilizer. Demand for the ranch's cattle is given by $P_c = 2{,}000 - 5Q_c$, and demand for fertilizer is given by $P_f = 500 - 2Q_f$. The cost of producing Q cow-fertilizer bundles is $C = 5{,}000 + 200Q$. To maximize profits, the ranch should
a. produce 164.29 cow-fertilizer units, sell 164.29 cattle, and sell 164.29 tons of fertilizer.
b. produce 180 cow-fertilizer units, sell 180 cattle, and sell 125 tons of fertilizer.
c. produce 180 cow-fertilizer units, sell 180 cattle, and sell 75 tons of fertilizer.
d. produce 180 cow-fertilizer units, sell 180 cattle, and sell 180 tons of fertilizer.
e. produce 200 cow-fertilizer units, sell 200 cattle, and dispose of all the fertilizer in an environmentally friendly manner.

Difficulty:
Correct Answer: a

28. For each carload of ore removed from the Matchless Mine, 1 pound of lead and 1 ounce of silver is smelted. The cost of mining and processing 1 carload of ore is $C(Q) = 400 + 2Q + 0.04Q^2$. The demand for silver (per ounce) is $P_s = 30 - 0.30Q_s$ and the demand for lead (per pound) is $P_l = 6 - 0.02Q_l$. What should the owners of the Matchless Mine do to maximize profits (in the long run)?
a. Mine and process 47.22 carloads of ore, sell 47.22 ounces of silver, and sell 47.22 pounds of lead.
b. Mine and process 50 carloads of ore, sell 50 ounces of silver, and sell 33.33 pounds of lead.
c. Mine and process 150 carloads of ore, sell 41.18 ounces of silver, and sell 150 pounds of lead.
d. Mine and process 150 carloads of ore, sell 50 ounces of silver, and sell 150 pounds of lead.
e. Shut down the mine.

Difficulty:
Correct Answer: d

29. For each carload of ore removed from the Matchless Mine, 1 pound of lead and 1 ounce of silver is smelted. The cost of mining and processing 1 carload of ore is $C(Q) = 300 + 3Q + 0.02Q^2$. The demand for silver (per ounce) is $P_s = 30 - 0.10Q_s$ and the demand for lead (per pound) is $P_l = 6 - 0.03Q_l$. What should the owners of the Matchless Mine do to maximize profits (in the long run)?
a. Mine and process 150 carloads of ore, sell 150 ounces of silver, and sell 30 pounds of lead.
b. Mine and process 150 carloads of ore, sell 150 ounces of silver, and sell 100 pounds of lead.
c. Mine and process 110 carloads of ore, sell 110 ounces of silver, and sell 110 pounds of lead.
d. Mine and process 112.50 carloads of ore, sell 112.50 ounces of silver, and sell 100 pounds of lead.
e. Shut down the mine.

Difficulty:
Correct Answer: a

30. For each carload of ore removed from the Matchless Mine, 1 pound of lead and 1 ounce of silver is smelted. The cost of mining and processing 1 carload of ore is $C(Q) = 700 + 2Q + 0.09Q^2$. The demand for silver (per ounce) is $P_s = 40 - 0.30Q_s$ and the demand for lead (per pound) is $P_l = 5 - 0.02Q_l$. What should the owners of the Matchless Mine do to maximize profits (in the long run)?
a. Mine and process 52.44 carloads of ore, sell 52.44 ounces of silver, and sell 52.44 pounds of lead.
b. Mine and process 66.67 carloads of ore, sell 66.67 ounces of silver, and sell 13.64 pounds of lead.
c. Mine and process 125 carloads of ore, sell 66.67 ounces of silver, and sell 125 pounds of lead.
d. Mine and process 125 carloads of ore, sell 48.72 ounces of silver, and sell 125 pounds of lead.
e. Shut down the mine.

PROBLEM

Difficulty: 2

1. On a certain small island, there are 100 units of labor and 200 units of capital. Two goods can be produced. Good A is produced with fixed coefficients, using 1 unit of labor and 3 units of capital per unit of output. Good B is produced with fixed coefficients, using 1 unit of labor and 1 unit of capital per unit of output. Let X_a denote the quantity of good A and X_b be the quantity of good B that is produced. The set of feasible output combinations for this economy is restricted by the fact that it cannot use more than 100 units of labor or 200 units of capital.
a. Write down two inequalities expressed in terms of X_a and X_b that must be satisfied at feasible output combinations.
b. Draw a graph showing the economy's production possibility set. Put numerical labels on your graph so that this graph is precisely described.

Answer:
a. $X_a + X_b \leq 100$, $3X_a + X_b \leq 200$.
b. Production possibilities set is the area in the intersection of the halfspaces from (a).

CHAPTER 33 Welfare

TRUE-FALSE

Difficulty: 1
Correct Answer: False

1. According to Arrow's impossibility theorem, it is impossible to find a social ordering that is complete, reflexive, and transitive.

Difficulty: 1
Correct Answer: False

2. An allocation is fair if whenever one person envies another, the envied person does not envy the envier.

Difficulty: 2
Correct Answer: False

3. In a pure exchange economy if the initial allocation is Pareto optimal, then competitive equilibrium is fair.

Difficulty: 2
Correct Answer: True

4. In a competitive equilibrium, no matter how different their preferences may be, no two people with the same income will envy each other's consumption bundles.

Difficulty: 1
Correct Answer: False

5. An allocation that is worse for somebody than the initial allocation cannot be Pareto optimal.

Difficulty: 2
Correct Answer: False

6. If allocation x is Pareto optimal and allocation y is not, then everyone is at least as well off with x as with y, and someone is better off with x than with y.

Difficulty: 1
Correct Answer: False

7. The utility possibilities frontier is the boundary of the production possibilities set.

Difficulty: 1
Correct Answer: True

8. In a pure exchange economy, if an allocation is Pareto efficient, it is impossible to have two people who prefer each other's consumption bundles to their own.

Difficulty: 2
Correct Answer: True

9. If a social welfare function is an increasing function of each person's utility, then every allocation that maximizes this social welfare function must be a Pareto optimum.

MULTIPLE CHOICE

Difficulty: 1
Correct Answer: b

1. Mr. Angst has two children, Dick and Jane. Dick is a slow learner and Jane is very bright. If Mr. Angst spends $\$X$ per month on Dick's education, Dick will score a total of $X/2$ points on his SAT tests. If Mr. Angst spends $\$Y$ per month on Jane's education, she will score a total of $2Y$ on her SAT tests. Mr. Angst has a utility function $U(D, J) = \min\{D, J\}$, where D is Dick's SAT score and J is Jane's SAT score. To maximize his utility, he will spend
   a. equal amounts of money on the two children.
   b. 4 times as much money on Dick's education as on Jane's.
   c. 4 times as much money on Jane's education as on Dick's.
   d. between 1 and 2 times as much money on Dick's education as on Jane's.
   e. between 1 and 2 times as much money on Jane's education as on Dick's.

Difficulty:
Correct Answer: c

2. A Borda count is used to decide an election between 3 candidates, x, y, and z, where a score of 1 is awarded to a first choice, 2 to a second choice, and 3 to a third choice. There are 29 voters. 10 voters rank the candidates x first, y second, and z third; 3 voters rank the candidates x first, z second, and y third; 8 voters rank the candidates z first, y second, and x third; 8 voters rank the candidates y first, z second, and x third. Which candidate wins?
   a. Candidate x.
   b. Candidate y.
   c. Candidate z.
   d. There is a tie between x and y, with z coming in third.
   e. There is a tie between y and z, with x coming in third.

Difficulty:
Correct Answer: d

3. A Borda count is used to decide an election between 3 candidates, x, y, and z, where a score of 1 is awarded to a first choice, 2 to a second choice, and 3 to a third choice. There are 28 voters. 5 voters rank the candidates x first, y second, and z third; 10 voters rank the candidates x first, z second, and y third; 4 voters rank the candidates z first, y second, and x third; 9 voters rank the candidates y first, z second, and x third. Which candidate wins?
   a. Candidate y.
   b. Candidate z.
   c. There is a tie between x and y, with z coming in third.
   d. Candidate x.
   e. There is a tie between y and z, with x coming in third.

Difficulty:
Correct Answer: c

4. A Borda count is used to decide an election between 3 candidates, x, y, and z, where a score of 1 is awarded to a first choice, 2 to a second choice, and 3 to a third choice. There are 14 voters. 6 voters rank the candidates x first, y second, and z third; 3 voters rank the candidates x first, z second, and y third; 3 voters rank the candidates z first, y second, and x third; 2 voters rank the candidates y first, z second, and x third. Which candidate wins?
   a. There is a tie between x and y, with z coming in third.
   b. Candidate y.
   c. Candidate x.
   d. Candidate z.
   e. There is a tie between y and z, with x coming in third.

Difficulty:
Correct Answer: a

5. A parent has two children living in cities with different costs of living. The cost of living in city B is 4 times the cost of living in city A. The child in city A has an income of $3,000 and the child in city B has an income of $12,000. The parent wants to give a total of $1,000 to her two children. Her utility function is $U(C_A, C_B) = C_A C_B$, where C_A and C_B are the consumptions of the children living in cities A and B respectively. She will choose to give
   a. each child $500, even though this will buy less goods for the child in city B.
   b. the child in city B 4 times as much money as the child in city A.
   c. the child in city A 4 times as much money as the child in city B.
   d. the child in city B 2 times as much money as the child in city A.
   e. the child in city A 2 times as much money as the child in city B.

Difficulty:
Correct Answer: a

6. A parent has two children living in cities with different costs of living. The cost of living in city B is 3 times the cost of living in city A. The child in city A has an income of $2,000 and the child in city B has an income of $6,000. The parent wants to give a total of $2,000 to her two children. Her utility function is $U(C_A, C_B) = C_A C_B$, where C_A and C_B are the consumptions of the children living in cities A and B respectively. She will choose to give
   a. each child $1,000, even though this will buy less goods for the child in city B.
   b. the child in city B 3 times as much money as the child in city A.
   c. the child in city B 1.50 times as much money as the child in city A.
   d. the child in city A 3 times as much money as the child in city B.
   e. the child in city A 1.50 times as much money as the child in city B.

Difficulty:
Correct Answer: c

7. A parent has two children living in cities with different costs of living. The cost of living in city B is 3 times the cost of living in city A. The child in city A has an income of $2,000 and the child in city B has an income of $6,000. The parent wants to give a total of $1,000 to her two children. Her utility function is $U(C_A, C_B) = C_A C_B$, where C_A and C_B are the consumptions of the children living in cities A and B respectively. She will choose to give

a. the child in city B 3 times as much money as the child in city A.
b. the child in city B 1.50 times as much money as the child in city A.
c. each child \$500, even though this will buy less goods for the child in city B.
d. the child in city A 3 times as much money as the child in city B.
e. the child in city A 1.50 times as much money as the child in city B.

Difficulty:
Correct Answer: b

8. Suppose that Paul and David have utility functions $U = 4A_P + O_P$ and $U = A_D + 4O_D$, respectively, where A_P and O_P are Paul's consumptions of apples and oranges and A_D and O_D are David's consumptions of apples and oranges. The total supply of apples and oranges to be divided between them is 20 apples and 12 oranges. The "fair" allocations consist of all allocations satisfying the following conditions.
   a. $A_D = A_P$ and $O_D = O_P$.
   b. $8A_P + 2O_P$ is at least 92 and $2A_D + 8O_D$ is at least 68.
   c. $4A_P + O_P$ is at least 92 and $2A_D + 4O_D$ is at least 68.
   d. $A_D + O_D$ is at least 16 and $A_S + O_S$ is at least 16.
   e. $4A_P + O_P$ is at least $A_D + 4O_D$ and $A_D + 4O_D$ is at least $4A_P + O_P$.

Difficulty:
Correct Answer: b

9. Suppose that Paul and David have utility functions $U = 4A_P + O_P$ and $U = A_D + 3O_D$, respectively, where A_P and O_P are Paul's consumptions of apples and oranges and A_D and O_D are David's consumptions of apples and oranges. The total supply of apples and oranges to be divided between them is 18 apples and 18 oranges. The "fair" allocations consist of all allocations satisfying the following conditions.
   a. $A_D = A_P$ and $O_D = O_P$.
   b. $8A_P + 2O_P$ is at least 90 and $2A_D + 6O_D$ is at least 72.
   c. $4A_P + O_P$ is at least 90 and $2A_D + 3O_D$ is at least 72.
   d. $A_D + O_D$ is at least 18 and $A_S + O_S$ is at least 18.
   e. $4A_P + O_P$ is at least $A_D + 3O_D$ and $A_D + 3O_D$ is at least $4A_P + O_P$.

Difficulty:
Correct Answer: d

10. Suppose that Paul and David have utility functions $U = 4A_P + O_P$ and $U = A_D + 5O_D$, respectively, where A_P and O_P are Paul's consumptions of apples and oranges and A_D and O_D are David's consumptions of apples and orange. The total supply of apples and oranges to be divided between them is 20 apples and 14 oranges. The "fair" allocations consist of all allocations satisfying the following conditions.
   a. $4A_P + O_P$ is at least 94 and $2A_D + 5O_D$ is at least 90.
   b. $A_D + O_D$ is at least 17 and $A_S + O_S$ is at least 17.
   c. $A_D = A_P$ and $O_D = O_P$.
   d. $8A_P + 2O_P$ is at least 94 and $2A_D + 10O_D$ is at least 90.
   e. $4A_P + O_P$ is at least $A_D + 5O_D$ and $A_D + 5O_D$ is at least $4A_P + O_P$.

Difficulty:
Correct Answer: e

11. Suppose that Romeo has the utility function $U = S^5{}_R S^1{}_J$ and Juliet has the utility function $U = S^1{}_R S^5{}_J$, where S_R is Romeo's spaghetti consumption and S_J is Juliet's. They have 36 units of spaghetti to divide between them.
   a. Romeo would want to give Juliet some spaghetti if he had more than 18 units of spaghetti.
   b. Juliet would want to give Romeo some spaghetti if she had more than 28 units.
   c. Romeo and Juliet would never disagree about how to divide the spaghetti.
   d. Romeo would want to give Juliet some spaghetti if he had more than 26 units of spaghetti.
   e. Juliet would want to give Romeo some spaghetti if she had more than 30 units of spaghetti.

Difficulty:
Correct Answer: e

12. Suppose that Romeo has the utility function $U = S^7{}_R S^3{}_J$ and Juliet has the utility function $U = S^3{}_R S^7{}_J$, where S_R is Romeo's spaghetti consumption and S_J is Juliet's. They have 60 units of spaghetti to divide between them.
   a. Romeo would want to give Juliet some spaghetti if he had more than 30 units of spaghetti.
   b. Romeo would want to give Juliet some spaghetti if he had more than 38 units of spaghetti.
   c. Romeo and Juliet would never disagree about how to divide the spaghetti.
   d. Juliet would want to give Romeo some spaghetti if she had more than 40 units.
   e. Juliet would want to give Romeo some spaghetti if she had more than 42 units of spaghetti.

Difficulty:
Correct Answer: e

13. Suppose that Romeo has the utility function $U = S^5{}_R S^1{}_J$ and Juliet has the utility function $U = S^1{}_R S^5{}_J$, where S_R is Romeo's spaghetti consumption and S_J is Juliet's. They have 48 units of spaghetti to divide between them.

a. Juliet would want to give Romeo some spaghetti if she had more than 38 units.
b. Romeo would want to give Juliet some spaghetti if he had more than 24 units of spaghetti.
c. Romeo and Juliet would never disagree about how to divide the spaghetti.
d. Romeo would want to give Juliet some spaghetti if he had more than 36 units of spaghetti.
e. Juliet would want to give Romeo some spaghetti if she had more than 40 units of spaghetti.

Difficulty:
Correct Answer: b

14. Hatfield and McCoy burn with hatred for each other. They both consume corn whisky. Hatfield's utility function is $U = W_H - W^2_M/8$ and McCoy's utility is $U = W_M - W^2_H/8$, where W_H is Hatfield's whisky consumption and W_M is McCoy's whisky consumption, measured in gallons. The sheriff has a total of 28 gallons of confiscated whisky which he could give back to them. For some reason, the sheriff wants them both to be as happy as possible and he wants to treat them equally. The sheriff should give them each
a. 14 gallons.
b. 4 gallons and spill 20 gallons in the creek.
c. 2 gallons and spill 24 gallons in the creek.
d. 8 gallons and spill the rest in the creek.
e. 1 gallon and spill the rest in the creek.

Difficulty:
Correct Answer: b

15. Hatfield and McCoy burn with hatred for each other. They both consume corn whisky. Hatfield's utility function is $U = W_H - W^2_M/40$ and McCoy's utility is $U = W_M - W^2_H/40$, where W_H is Hatfield's whisky consumption and W_M is McCoy's whisky consumption, measured in gallons. The sheriff has a total of 60 gallons of confiscated whisky which he could give back to them. For some reason, the sheriff wants them both to be as happy as possible and he wants to treat them equally. The sheriff should give them each
a. 30 gallons.
b. 20 gallons and spill 20 gallons in the creek.
c. 24 gallons and spill the rest in the creek.
d. 10 gallons and spill 40 gallons in the creek.
e. 5 gallons and spill the rest in the creek.

Difficulty:
Correct Answer: b

16. Hatfield and McCoy burn with hatred for each other. They both consume corn whisky. Hatfield's utility function is $U = W_H - W^2_M/8$ and McCoy's utility is $U = W_M - W^2_H/8$, where W_H is Hatfield's whisky consumption and W_M is McCoy's whisky consumption, measured in gallons. The sheriff has a total of 58 gallons of confiscated whisky which he could give back to them. For some reason, the sheriff wants them both to be as happy as possible and he wants to treat them equally. The sheriff should give them each
a. 2 gallons and spill 54 gallons in the creek.
b. 4 gallons and spill 50 gallons in the creek.
c. 29 gallons.
d. 8 gallons and spill the rest in the creek.
e. 1 gallon and spill the rest in the creek.

Difficulty:
Correct Answer: a

17. A tiny fishing village has 3 residents. Ann has a utility of 10, Bruce has a utility of 6, and Charlie has a utility of 7. If the mayor uses a Rawlsian social welfare function, the social welfare of this tiny village would be
a. 6.
b. 10.
c. 23.
d. 420.
e. 20.49.

PROBLEM

Difficulty: 2

1. No one is meaner and uglier than Gladys. Someone is meaner and uglier than Harold. Therefore Gladys is meaner and uglier than Harold. Is this reasoning correct? If so, explain why. If not, explain why not. (Assume that people can be ranked from ugliest to least ugly by a complete transitive ordering and that there are no ties. Likewise assume that people can be ranked from meanest to least mean by a complete transitive ordering and that there are no ties.)

Answer: The reasoning is incorrect. Consider the following example. There are 3 people: Fred, Gladys and Harold. The rankings for ugly are Gladys is ugliest, Fred is second ugliest and Harold is least ugly. The rankings for mean are Fred is meanest, Harold is second meanest and Gladys is least mean. Then nobody is meaner and uglier than Gladys. Fred is meaner and uglier than Harold, but Gladys is not meaner and uglier than Harold.

CHAPTER 34 Externalities

TRUE-FALSE

Difficulty: 1
Correct Answer: False

1. A trade between two people is an example of an externality.

Difficulty: 1
Correct Answer: False

2. The only known way to eliminate externalities is through taxes or subsidies.

Difficulty: 1
Correct Answer: False

3. The efficient amount of air pollution is in general independent of whether polluters or pollutees pay to reduce pollution.

Difficulty: 1
Correct Answer: False

4. A Pigouvian tax on pollution is designed to collect enough revenue to pay for pollution detection by the government.

Difficulty: 2
Correct Answer: False

5. If there are negative externalities in production or consumption, competitive equilibrium is unlikely to be Pareto efficient but positive externalities enhance the efficiency of the market.

Difficulty: 1
Correct Answer: True

6. The "tragedy of the commons" refers to the tendency for common property to be overused.

Difficulty: 1
Correct Answer: False

7. If preferences are quasilinear, then the delineation of property rights has no distributional consequences.

Difficulty: 1
Correct Answer: True

8. If your consumption of toothpaste produces positive externalities for your neighbors (which you ignore), then you are consuming less toothpaste than is Pareto optimal.

Difficulty: 1
Correct Answer: False

9. Mobil Oil Corporation recently bought the right to emit an additional 900 pounds of noxious gas vapors per day at its Torrance, California, refinery. This suggests that allowing pollution rights to be marketed is likely to lead to more pollution than there would be if there were no restrictions on polluting.

MULTIPLE CHOICE

Difficulty: 2
Correct Answer: e

1. A mountain village owns a common pasture where villagers graze their goats. The cost to a goat owner of owning and caring for a goat is 4 groschens. The pasture gets overgrazed if too many goats share the pasture. The total revenue from all goats on the common pasture is $f(g) = 48g - 2g^2$, where g is the number of goats on the pasture. The town council notices that total profit from the pasture is not maximized if villagers are allowed to pasture goats for free. The council decides to allow a goat to use the common pasture only if its owner buys it a goat license. To maximize total profit (of villagers and council), how many groschens per goat should the council charge?
   a. 12
   b. 20
   c. 24
   d. 26
   e. 22

Difficulty: 2
Correct Answer: a

2. The 130 campers at Bear Creek Campground love their own campfires but hate the smoke from their neighbors' campfires. Each camper's utility function is $U = 22f - f^2 - s$, where f is the number of hours her own campfire burns per day and where s is the amount of smoke in the air. It happens that s is 10 times the average amount of hours that campers use their fires. The campground authority could make all campers better off by limiting the number of hours of campfire per day for everyone. How many hours of campfire per day should the authority allow each camper in order to make the typical camper as well off as possible?
   a. 6
   b. 11
   c. 4
   d. 7
   e. Campers will be best off if they are free to choose their own amounts of campfire.

Difficulty: 2
Correct Answer: d

3. The 130 campers at Bear Creek Campground love their own campfires but hate the smoke from their neighbors' campfires. Each camper's utility function is $U = 17f - f^2 - s$, where f is the number of hours her own campfire burns per day and where s is the amount of smoke in the air. It happens that s is 7 times the average amount of hours that campers use their fires. The campground authority could make all campers better off by limiting the number of hours of campfire per day for everyone. How many hours of campfire per day should the authority allow each camper in order to make the typical camper as well off as possible?
   a. 3
   b. 6
   c. 8.50
   d. 5
   e. Campers will be best off if they are free to choose their own amounts of campfire.

Difficulty: 2
Correct Answer: b

4. The 130 campers at Bear Creek Campground love their own campfires but hate the smoke from their neighbors' campfires. Each camper's utility function is $U = 25f - f^2 - s$, where f is the number of hours her own campfire burns per day and where s is the amount of smoke in the air. It happens that s is 11 times the average amount of hours that campers use their fires. The campground authority could make all campers better off by limiting the number of hours of campfire per day for everyone. How many hours of campfire per day should the authority allow each camper in order to make the typical camper as well off as possible?
   a. 5
   b. 7
   c. 12.50
   d. 8
   e. Campers will be best off if they are free to choose their own amounts of campfire.

Difficulty: 2
Correct Answer: a

5. Two stores are located side by side. They attract customers to each other and to themselves by advertising. The profit functions of the two stores are $(45 + x_2)x_1 - 2x^2{}_1$ for store 1 and $(90 + x_1)x_2 - 2x^2{}_2$ for store 2, where x_1 and x_2 are total advertising expenditures by stores 1 and 2 respectively. If each store sets its advertising expenditures independently (as in Nash equilibrium), how much would store 1 spend on advertising?
   a. \$18
   b. \$20
   c. \$15
   d. \$23
   e. None of the above.

Difficulty: 2
Correct Answer: a

6. Two stores are located side by side. They attract customers to each other and to themselves by advertising. The profit functions of the two stores are $(75 + x_2)x_1 - 2x^2{}_1$ for store 1 and $(105 + x_1)x_2 - 2x^2{}_2$ for store 2, where x_1 and x_2 are total advertising expenditures by stores 1 and 2 respectively. If each store sets its advertising expenditures independently (as in Nash equilibrium), how much would store 1 spend on advertising?
   a. \$27
   b. \$29
   c. \$32
   d. \$24
   e. None of the above.

Difficulty: 2
Correct Answer: d

7. Two stores are located side by side. They attract customers to each other and to themselves by advertising. The profit functions of the two stores are $(45 + x_2)x_1 - 2x^2{}_1$ for store 1 and $(75 + x_1)x_2 - 2x^2{}_2$ for store 2, where x_1 and x_2 are total advertising expenditures by stores 1 and 2 respectively. If each store sets its advertising expenditures independently (as in Nash equilibrium), how much would store 1 spend on advertising?
   a. \$14

b. \$19
c. \$22
d. \$17
e. None of the above.

Difficulty: 3
Correct Answer: c

8. Two stores are located side by side and attract customers to each other and to themselves by advertising. Where x_1 and x_2 are the advertising expenditures of stores 1 and 2, the profits of the firms are $(48 + x_2)x_1 - 2(x_1)^2$ for store 1 and $(54 + x_1)x_2 - 2(x_2)^2$ for store 2. Knowing these functions, one investor buys both stores. In order to maximize his total profits, how much should he spend on advertising for store 1?
a. \$10
b. \$26
c. \$25
d. \$35
e. None of the above.

Difficulty: 2
Correct Answer: a

9. A small coffee company roasts coffee beans in its shop. The unroasted beans cost the company \$2 per pound. The *marginal* cost of roasting coffee beans is $\$(150 - 10q + q^2)/100$ per pound when q pounds are roasted. The smell of roasting beans imposes costs on the company's neighbors. The total amount that neighbors would be willing to pay to have the shop stop roasting altogether is $5q^2$, where q is the number of pounds being roasted. The company sells its output in a competitive market at \$4.50 per pound. What is the socially efficient amount of coffee for the company to roast?
a. 10 pounds.
b. 15 pounds.
c. the square root of 10 pounds.
d. 45 pounds.
e. None of the above.

Difficulty: 2
Correct Answer: b

10. Firm 1 produces output x with a cost function $c_1(x) = x^2 + 10$. Firm 2 produces output y with a cost function $c_2(y, x) = y^2 + x$. Thus, the more that firm 1 produces, the greater are firm 2's costs. Both firms face competitive product markets. The competitive price of x is \$20 and the competitive price of y is \$40. No new firms can enter the industry and the old ones must remain. The efficient Pigouvian tax on the x good is
a. \$0.
b. \$1.
c. \$2.
d. \$3.
e. \$4.

Difficulty: 2
Correct Answer: a

11. Mike's utility function is $U(c, d, h) = 8c + 12d - d^2 - 6h$, where d is the number of hours per day that he spends driving around, h is the average number of hours per day spent driving around by other citizens of his town, and c is the amount of money he has to spend on other things than gasoline and auto repairs. There are 1,001 identical citizens in Mike's home town. Mike's expenses for gasoline and auto repairs amount to \$.50 per hour for the time he spends driving. If Mike believes that his amount of driving won't affect the amount that others drive, how many hours per day will he choose to drive?
a. 4
b. 6
c. 8
d. 2
e. 1

Difficulty: 2
Correct Answer: a

12. Mike's utility function is $U(c, d, h) = 8c + 12d - d^2 - 6h$, where d is the number of hours per day that he spends driving around, h is the average number of hours per day spent driving around by other citizens of his town, and c is the amount of money he has to spend on other things than gasoline and auto repairs. There are 1,001 identical citizens in Mike's home town. Mike's expenses for gasoline and auto repairs amount to \$.50 per hour for the time he spends driving. If Mike believes that his amount of driving won't affect the amount that others drive, how many hours per day will he choose to drive?
a. 4
b. 8
c. 2
d. 6
e. 1

Difficulty: 2
Correct Answer: c

13. Mike's utility function is $U(c, d, h) = 4c + 14d - d^2 - 6h$, where d is the number of hours per day that he spends driving around, h is the average number of hours per day spent driving around by other citizens of his town, and c is the amount of money he has to spend on other things than gasoline and auto repairs. There are 1,001 identical citizens in Mike's home town. Mike's expenses for gasoline and auto repairs amount to \$.50 per hour for the time he spends driving. If Mike believes that his amount of driving won't affect the

amount that others drive, how many hours per day will he choose to drive?
a. 7
b. 8
c. 6
d. 3
e. 0.50

Difficulty: 2
Correct Answer: c

14. Marbella has 101 residents. All wear the same fancy clothes and each has the same utility function, $u(m, b, B) = m + 24b - b^2 - B/50$, where m is the amount of maccaroni (in kilograms) that he or she eats per day, b is the number of hours that he or she spends on the beach per day, and B is the total number of person-hours spent per day on the beach by other residents of Marbella. Each has an income of \$10 per day and maccaroni costs \$1 per kilogram. The city council is considering a law that would limit the amount of time that any person can spend on the beach. How many hours per day should they allow in order to maximize the utility of a typical Marbellite?
a. 12
b. 14
c. 11
d. 15
e. They could not possibly be made better off by legislation that limits their freedom to choose.

Difficulty: 2
Correct Answer: a

15. Marbella has 101 residents. All wear the same fancy clothes and each has the same utility function, $u(m, b, B) = m + 14b - b^2 - B/50$, where m is the amount of maccaroni (in kilograms) that he or she eats per day, b is the number of hours that he or she spends on the beach per day, and B is the total number of person-hours spent per day on the beach by other residents of Marbella. Each has an income of \$10 per day and maccaroni costs \$1 per kilogram. The city council is considering a law that would limit the amount of time that any person can spend on the beach. How many hours per day should they allow in order to maximize the utility of a typical Marbellite?
a. 6
b. 9
c. 10
d. 7
e. They could not possibly be made better off by legislation that limits their freedom to choose.

Difficulty: 2
Correct Answer: d

16. Marbella has 101 residents. All wear the same fancy clothes and each has the same utility function, $u(m, b, B) = m + 14b - b^2 - B/50$, where m is the amount of maccaroni (in kilograms) that he or she eats per day, b is the number of hours that he or she spends on the beach per day, and B is the total number of person-hours spent per day on the beach by other residents of Marbella. Each has an income of \$10 per day and maccaroni costs \$1 per kilogram. The city council is considering a law that would limit the amount of time that any person can spend on the beach. How many hours per day should they allow in order to maximize the utility of a typical Marbellite?
a. 10
b. 7
c. 9
d. 6
e. They could not possibly be made better off by legislation that limits their freedom to choose.

Difficulty:
Correct Answer: c

17. Suppose that in Horsehead, Massachusetts, the cost of operating a lobster boat is \$4,000 per month. Suppose that if x lobster boats operate in the bay, the total monthly revenue from lobster boats in the bay is \$1,000$(12x - x^2)$. If there are no restrictions on entry and new boats come into the bay until there is no profit to be made by a new entrant, then the number of boats who enter will be X_1. If the number of boats that operate in the bay is regulated to maximize total profits, the number of boats in the bay will be X_2.
a. $X_1 = 8$ and $X_2 = 8$.
b. $X_1 = 4$ and $X_2 = 2$.
c. $X_1 = 8$ and $X_2 = 4$.
d. $X_1 = 12$ and $X_2 = 8$.
e. None of the above.

Difficulty:
Correct Answer: c

18. Suppose that in Horsehead, Massachusetts, the cost of operating a lobster boat is \$4,000 per month. Suppose that if x lobster boats operate in the bay, the total monthly revenue from lobster boats in the bay is \$1,000$(28x - x^2)$. If there are no restrictions on entry and new boats come into the bay until there is no profit to be made by a new entrant, then the number of boats who enter will be X_1. If the number of boats that operate in the bay is regulated to maximize total profits, the number of boats in the bay will be X_2.
a. $X_1 = 24$ and $X_2 = 24$.
b. $X_1 = 28$ and $X_2 = 16$.
c. $X_1 = 24$ and $X_2 = 12$.
d. $X_1 = 12$ and $X_2 = 10$.
e. None of the above.

Difficulty:
Correct Answer: c

19. Suppose that in Horsehead, Massachusetts, the cost of operating a lobster boat is \$4,000 per month. Suppose that if x lobster boats operate in the bay, the total monthly revenue from lobster boats in the bay is \$1,000($28x - x^2$). If there are no restrictions on entry and new boats come into the bay until there is no profit to be made by a new entrant, then the number of boats who enter will be X_1. If the number of boats that operate in the bay is regulated to maximize total profits, the number of boats in the bay will be X_2.
   a. $X_1 = 12$ and $X_2 = 10$.
   b. $X_1 = 28$ and $X_2 = 16$.
   c. $X_1 = 24$ and $X_2 = 12$.
   d. $X_1 = 24$ and $X_2 = 24$.
   e. None of the above.

Difficulty:
Correct Answer: d

20. An apiary is located next to an apple orchard. The apiary produces honey and the apple orchard produces apples. The cost function of the apiary is $C_H(H, A) = H^2/100 - 2A$ and the cost function of the apple orchard is $C_A(H, A) = A^2/100$, where H and A are the number of units of honey and apples produced respectively. The price of honey is \$1 and the price of apples is \$3 per unit. Let A_1 be the output of apples if the firms operate independently, and let A_2 be the output of apples if the firms are operated by a single owner so as to maximize total profit.
   a. $A_1 = 75$ and $A_2 = 150$.
   b. $A_1 = A_2 = 150$.
   c. $A_1 = 125$ and $A_2 = 150$.
   d. $A_1 = 150$ and $A_2 = 250$.
   e. $A_1 = 50$ and $A_2 = 150$.

Difficulty:
Correct Answer: a

21. An apiary is located next to an apple orchard. The apiary produces honey and the apple orchard produces apples. The cost function of the apiary is $C_H(H, A) = H^2/100 - 1A$ and the cost function of the apple orchard is $C_A(H, A) = A^2/100$, where H and A are the number of units of honey and apples produced respectively. The price of honey is \$5 and the price of apples is \$6 per unit. Let A_1 be the output of apples if the firms operate independently, and let A_2 be the output of apples if the firms are operated by a single owner so as to maximize total profit.
   a. $A_1 = 300$ and $A_2 = 350$.
   b. $A_1 = A_2 = 300$.
   c. $A_1 = 175$ and $A_2 = 300$.
   d. $A_1 = 150$ and $A_2 = 300$.
   e. $A_1 = 250$ and $A_2 = 300$.

Difficulty:
Correct Answer: d

22. An apiary is located next to an apple orchard. The apiary produces honey and the apple orchard produces apples. The cost function of the apiary is $C_H(H, A) = H^2/100 - 3A$ and the cost function of the apple orchard is $C_A(H, A) = A^2/100$, where H and A are the number of units of honey and apples produced respectively. The price of honey is \$2 and the price of apples is \$7 per unit. Let A_1 be the output of apples if the firms operate independently, and let A_2 be the output of apples if the firms are operated by a single owner so as to maximize total profit.
   a. $A_1 = A_2 = 350$.
   b. $A_1 = 250$ and $A_2 = 350$.
   c. $A_1 = 175$ and $A_2 = 350$.
   d. $A_1 = 350$ and $A_2 = 500$.
   e. $A_1 = 100$ and $A_2 = 350$.

Difficulty:
Correct Answer: a

23. Peter's utility is $U(c, d, h) = 8c + 18d - d^2 - 6h$, where d is the number of hours per day that he spends driving around, h is the number of hours per day spent driving around by other people in his home town, and c is the amount of money he has left to spend on other stuff besides gasoline and auto repairs. Gas and auto repairs cost \$.50 per hour of driving. All the people in Peter's home town have the same tastes. If each citizen believes that his own driving will not affect the amount of driving done by others, they will all drive D_1 hours per day. If they are all drive the same amount, they would all be best off if each drove D_2 hours per day, where
   a. $D_1 = 7$ and $D_2 = 4$.
   b. $D_1 = D_2 = 7$.
   c. $D_1 = 9$ and $D_2 = 5$.
   d. $D_1 = 10$ and $D_2 = 0$.
   e. $D_1 = 7$ and $D_2 = 2$.

Difficulty:
Correct Answer: d

24. Charlie's utility is $U(c, d, h) = 4c + 10d - d^2 - 4h$, where d is the number of hours per day that he spends driving around, h is the number of hours per day spent driving around by other people in his home town, and c is the amount of money he has left to spend on other stuff besides gasoline and auto repairs. Gas and auto repairs cost \$.50 per hour of driving. All the people in Charlie's home town have the same tastes. If each citizen believes that his own driving will not affect the amount of driving done by others, they will all drive D_1 hours per day. If they are all drive the same amount, they would all be best off if each drove D_2 hours per day, where

a. $D_1 = 6$ and $D_2 = 3$.
b. $D_1 = 7$ and $D_2 = 1$.
c. $D_1 = D_2 = 4$.
d. $D_1 = 4$ and $D_2 = 2$.
e. $D_1 = 4$ and $D_2 = 0$.

Difficulty:
Correct Answer: a

25. Peter's utility is $U(c, d, h) = 2c + 9d - d^2 - 6h$, where d is the number of hours per day that he spends driving around, h is the number of hours per day spent driving around by other people in his home town, and c is the amount of money he has left to spend on other stuff besides gasoline and auto repairs. Gas and auto repairs cost \$.50 per hour of driving. All the people in Peter's home town have the same tastes. If each citizen believes that his own driving will not affect the amount of driving done by others, they will all drive D_1 hours per day. If they are all drive the same amount, they would all be best off if each drove D_2 hours per day, where
a. $D_1 = 4$ and $D_2 = 1$.
b. $D_1 = 7$ and $D_2 = 0$.
c. $D_1 = 6$ and $D_2 = 2$.
d. $D_1 = D_2 = 4$.
e. $D_1 = 4$ and $D_2 = 0$.

Difficulty:
Correct Answer: b

26. An airport is located next to a housing development. Where X is the number of planes that land per day and Y is the number of houses in the housing development, profits of the airport are $28X - X^2$ and profits of the developer are $20Y - Y^2 - XY$. Let H_1 be the number of houses built if a single profit-maximizing company owns the airport and the housing development. Let H_2 be the number of houses built if the airport and the housing development are operated independently and the airport has to pay the developer the total "damages" XY done by the planes to the profits of the developer.
a. $H_1 = H_2 = 4$.
b. $H_1 = 4$ and $H_2 = 10$.
c. $H_1 = 10$ and $H_2 = 4$.
d. $H_1 = 6$ and $H_2 = 9$.
e. $H_1 = 9$ and $H_2 = 13$.

Difficulty:
Correct Answer: d

27. An airport is located next to a housing development. Where X is the number of planes that land per day and Y is the number of houses in the housing development, profits of the airport are $26X - X^2$ and profits of the developer are $22Y - Y^2 - XY$. Let H_1 be the number of houses built if a single profit-maximizing company owns the airport and the housing development. Let H_2 be the number of houses built if the airport and the housing development are operated independently and the airport has to pay the developer the total "damages" XY done by the planes to the profits of the developer.
a. $H_1 = 11$ and $H_2 = 6$.
b. $H_1 = H_2 = 6$.
c. $H_1 = 8$ and $H_2 = 10$.
d. $H_1 = 6$ and $H_2 = 11$.
e. $H_1 = 10$ and $H_2 = 14$.

Difficulty:
Correct Answer: d

28. An airport is located next to a housing development. Where X is the number of planes that land per day and Y is the number of houses in the housing development, profits of the airport are $36X - X^2$ and profits of the developer are $42Y - Y^2 - XY$. Let H_1 be the number of houses built if a single profit-maximizing company owns the airport and the housing development. Let H_2 be the number of houses built if the airport and the housing development are operated independently and the airport has to pay the developer the total "damages" XY done by the planes to the profits of the developer.
a. $H_1 = 18$ and $H_2 = 20$.
b. $H_1 = 21$ and $H_2 = 16$.
c. $H_1 = H_2 = 16$.
d. $H_1 = 16$ and $H_2 = 21$.
e. $H_1 = 20$ and $H_2 = 24$.

Difficulty: 2
Correct Answer: a

29. A clothing store and a jeweler are located side by side in a shopping mall. If the clothing store spend C dollars on advertising and the jeweler spends J dollars on advertising, then the profits of the clothing store will be $(36 + J)C - 2C^2$ and the profits of the jeweler will be $(30 + C)J - 2J^2$. The clothing store gets to choose its amount of advertising first, knowing that the jeweler will find out how much the clothing store advertised before deciding how much to spend. The amount spent by the clothing store will be
a. \$17.
b. \$34.
c. \$51.
d. \$8.50.
e. \$25.50.

Difficulty: 2
Correct Answer: b

30. A clothing store and a jeweler are located side by side in a shopping mall. If the clothing store spend C dollars on advertising and the jeweler spends J dollars on advertising, then the profits of the clothing store will be $(30 + J)C - 2C^2$ and the profits of the jeweler will be $(24 + C)J - 2J^2$. The clothing store gets to choose its amount of advertising first, knowing that the jeweler will find out how much the clothing store advertised

before deciding how much to spend. The amount spent by the clothing store will be

a. \$42.
b. \$14.
c. \$28.
d. \$7.
e. \$21.

Difficulty: 2
Correct Answer: a

31. A clothing store and a jeweler are located side by side in a shopping mall. If the clothing store spend C dollars on advertising and the jeweler spends J dollars on advertising, then the profits of the clothing store will be $(18 + J)C - 2C^2$ and the profits of the jeweler will be $(24 + C)J - 2J^2$. The clothing store gets to choose its amount of advertising first, knowing that the jeweler will find out how much the clothing store advertised before deciding how much to spend. The amount spent by the clothing store will be
    a. \$10.
    b. \$5.
    c. \$20.
    d. \$30.
    e. \$15.

Difficulty: 2
Correct Answer: e

32. Millie Bush has written a best-seller. Revenues net of production costs are $\$300T^{1/3}A^{1/3}$, where T is the number of publicity trips Millie takes and A is the number of ads for the book that appear. Millie has to pay for all of her own publicity trips, which cost \$100 each. Her publisher pays for the advertising, which costs \$100 per ad. Revenues from the book are split equally between Millie and her publisher. Let T_1 be the number of trips that Millie would choose to make in a Nash equilibrium where she chooses the number of trips and the publisher chooses the amount of advertising. Let T_2 be the number of trips that Millie should make if trips and advertising are determined so as to maximize total profits net of trip and ad costs.
    a. $T_1 = 1$ and $T_2 = 1$.
    b. $T_1 = 1$ and $T_2 = 2$.
    c. $T_1 = 2$ and $T_2 = 1$.
    d. $T_1 = 1$ and $T_2 = 1/8$.
    e. $T_1 = 1/8$ and $T_2 = 1$.

PROBLEM

Difficulty: 3

1. Two firms in a grimy Ohio town produce the same product in a competitive industry. Each has an old factory using an old technology. It still pays to operate these factories but it would not pay to expand them. The only variable factor used by either firm is labor. Each firm pollutes the other and thus reduces the output of the other firm. The production functions of firms A and B respectively are $Q_a = L^{.5}_a - (2/3)Q_b$ and $Q_b = L^{.5}_b - (1/3)Q_a$, where $L^{.5}_a$ and $L^{.5}_b$ are the square roots respectively of the amount of labor used by firms A and B. The wage rate of labor is \$1 and the price of the firms' output is \$12.
    a. If the two firms each maximize profits independently, what is their total output and how much quasi-rents do their factories earn?
    b. If someone buys them both and maximizes joint profits, how much quasi-rent is earned in total?

Answer:

a. Each produces 48 and quasi-rents are \$12 for each.
b. Each produces 36 and quasi-rents total \$40.

CHAPTER 35 Information Technology

TRUE-FALSE

Difficulty:
Correct Answer: True

1. Network externalities are a special kind of externality in which people care about the number of other people who consume the good.

Difficulty:
Correct Answer: False

2. For a good with network externalities, the number of people who are willing to buy a unit of the good is uniquely determined by the price.

Difficulty:
Correct Answer: False

3. Copyright protection discourages the production of new software.

Difficulty:
Correct Answer: False

4. If the probability that a firm is caught making illegal copies of software increases with the number of copies that the firm makes, then the larger the fine assessed for copying, the smaller will be the number of copies made by each software-copying firm.

Difficulty:
Correct Answer: False

5. Economic theory suggests that the existence of a used-book market lowers the profits of publishers below what they would be if every reader had to buy a new copy.

Difficulty:
Correct Answer: True

6. Video marketers and publishers are more likely to profit from allowing rentals of their products, the higher the ratio of cost of production of originals to the transaction cost of rentals.

Difficulty:
Correct Answer: False

7. Intel produces the overwhelming majority of computer central processing units (CPUs) that run the Microsoft Windows operating system. Systems competition reasoning would suggest that Intel could only benefit from an outcome of the Microsoft antitrust case that is unfavorable to Microsoft.

Difficulty:
Correct Answer: False

8. Systems competition reasoning would suggest that when setting prices of its operating systems, Microsoft need not consider the profitability of PC manufacturers who purchase Microsoft Windows to install on their PCs.

MULTIPLE CHOICE

Difficulty:
Correct Answer: c

1. If the demand curve for the DoorKnobs operating system is related to perceived market share s and actual market share t by the equation $p = 144s(1 - x)$, then in the long run, the highest price at which DoorKnobs would maintain a market share of 4/6 would be
   a. \$48.
   b. \$41.60.
   c. \$32.
   d. \$28.80.
   e. \$38.40.

Difficulty:
Correct Answer: d

2. If the demand curve for the DoorKnobs operating system is related to perceived market share s and actual market share t by the equation $p = 98s(1 - x)$, then in the long run, the highest price at which DoorKnobs would maintain a market share of 6/7 would be

a. \$18.
b. \$15.60.
c. \$10.80.
d. \$12.
e. \$14.40.

Difficulty:
Correct Answer: a

3. If the demand curve for the DoorKnobs operating system is related to perceived market share s and actual market share t by the equation $p = 147s(1 - x)$, then in the long run, the highest price at which DoorKnobs would maintain a market share of 4/7 would be
   a. \$36.
   b. \$46.80.
   c. \$54.
   d. \$32.40.
   e. \$43.20.

Difficulty:
Correct Answer: e

4. Professor Kremepuff has published a new textbook. This book will be used in classes for two years, at which time it will be replaced by a new edition. The publisher charges a price of $\$p_1$ in the first year and $\$p_2$ in the second year. After the first year, bookstores buy back copies from students for $\$p_2/2$ and resell them to students in the second year for $\$p_2$. (Students are indifferent between new and used copies.) The cost to a student in the first year of owning the book for a year is therefore $\$(p_1 - p_2/2)$. In the first year of publication, the number of students willing to pay $\$v$ to own the book for a year is $60{,}000 - 1{,}000v$. The number of students taking the course in the first year who are willing to pay at least $\$w$ to keep the book for reference rather than resell it is $60{,}000 - 5{,}000w$. In the second year, the number of students who have not previously taken the course and are willing to pay at least $\$p$ for a copy of the book is $50{,}000 - 1{,}000p$. If the publisher sets a price of $\$p_1$ in the first year and $\$p_2$ in the second year, with $p_1 \geq p_2$, then the total number of copies that the publisher sells over two years will be equal to
   a. $110{,}000 - 1{,}000(p_1 + p_2/2)$.
   b. $120{,}000 - 1{,}000(p_1 - p_2/2)$.
   c. $120{,}000 - 3{,}000p_2$.
   d. $120{,}000 - 1{,}000p_1 - 1{,}000p_2$.
   e. $110{,}000 - 1{,}500p_2$.

Difficulty:
Correct Answer: e

5. Professor Kremepuff has published a new textbook. This book will be used in classes for two years, at which time it will be replaced by a new edition. The publisher charges a price of $\$p_1$ in the first year and $\$p_2$ in the second year. After the first year, bookstores buy back copies from students for $\$p_2/2$ and resell them to students in the second year for $\$p_2$. (Students are indifferent between new and used copies.) The cost to a student in the first year of owning the book for a year is therefore $\$(p_1 - p_2/2)$. In the first year of publication, the number of students willing to pay $\$v$ to own the book for a year is $70{,}000 - 1{,}000v$. The number of students taking the course in the first year who are willing to pay at least $\$w$ to keep the book for reference rather than resell it is $70{,}000 - 5{,}000w$. In the second year, the number of students who have not previously taken the course and are willing to pay at least $\$p$ for a copy of the book is $60{,}000 - 1{,}000p$. If the publisher sets a price of $\$p_1$ in the first year and $\$p_2$ in the second year, with $p_1 \geq p_2$, then the total number of copies that the publisher sells over two years will be equal to
   a. $130{,}000 - 1{,}000(p_1 + p_2/2)$.
   b. $140{,}000 - 1{,}000(p_1 - p_2/2)$.
   c. $140{,}000 - 1{,}000p_1 - 1{,}000p_2$.
   d. $140{,}000 - 3{,}000p_2$.
   e. $130{,}000 - 1{,}500p_2$.

Difficulty:
Correct Answer: e

6. Professor Kremepuff has published a new textbook. This book will be used in classes for two years, at which time it will be replaced by a new edition. The publisher charges a price of $\$p_1$ in the first year and $\$p_2$ in the second year. After the first year, bookstores buy back copies from students for $\$p_2/2$ and resell them to students in the second year for $\$p_2$. (Students are indifferent between new and used copies.) The cost to a student in the first year of owning the book for a year is therefore $\$(p_1 - p_2/2)$. In the first year of publication, the number of students willing to pay $\$v$ to own the book for a year is $40{,}000 - 1{,}000v$. The number of students taking the course in the first year who are willing to pay at least $\$w$ to keep the book for reference rather than resell it is $40{,}000 - 5{,}000w$. In the second year, the number of students who have not previously taken the course and are willing to pay at least $\$p$ for a copy of the book is $30{,}000 - 1{,}000p$. If the publisher sets a price of $\$p_1$ in the first year and $\$p_2$ in the second year, with $p_1 \geq p_2$, then the total number of copies that the publisher sells over two years will be equal to
   a. $80{,}000 - 3{,}000p_2$.
   b. $80{,}000 - 1{,}000(p_1 - p_2/2)$.
   c. $80{,}000 - 1{,}000p_1 - 1{,}000p_2$.
   d. $70{,}000 - 1{,}000(p_1 + p_2/2)$.
   e. $70{,}000 - 1{,}500p_2$.

Difficulty:
Correct Answer: e

7. A group of 9 consumers are trying to decide whether to connect to a new communications network. Consumer 1 is of type 1, consumer 2 of type 2, consumer 3 of type 3, and so on. Each consumer's willingness to pay to belong to the network is proportional to the number of consumers who belong. Where *k* is the number of consumers who belong, the willingness to pay of a type *n* consumer is equal to *k* times *n*. What is the highest price at which 7 consumers could all connect to the network and either make a profit or at least break even?
   a. $23
   b. $19
   c. $18
   d. $26
   e. $21

Difficulty:
Correct Answer: e

8. A group of 13 consumers are trying to decide whether to connect to a new communications network. Consumer 1 is of type 1, consumer 2 of type 2, consumer 3 of type 3, and so on. Each consumer's willingness to pay to belong to the network is proportional to the number of consumers who belong. Where *k* is the number of consumers who belong, the willingness to pay of a type *n* consumer is equal to *k* times *n*. What is the highest price at which 9 consumers could all connect to the network and either make a profit or at least break even?
   a. $47
   b. $50
   c. $43
   d. $42
   e. $45

Difficulty:
Correct Answer: e

9. A group of 9 consumers are trying to decide whether to connect to a new communications network. Consumer 1 is of type 1, consumer 2 of type 2, consumer 3 of type 3, and so on. Each consumer's willingness to pay to belong to the network is proportional to the number of consumers who belong. Where *k* is the number of consumers who belong, the willingness to pay of a type *n* consumer is equal to *k* times *n*. What is the highest price at which 7 consumers could all connect to the network and either make a profit or at least break even?
   a. $23
   b. $26
   c. $18
   d. $19
   e. $21

Difficulty:
Correct Answer: b

10. Banks have started offering electronic bill pay for free. This decision can best be explained as
   a. matching free services provided by competitor banks to win over new customers.
   b. increasing switching costs. Customers would have to set up electronic bill pay again at their new bank.
   c. banks wanting to enhance their reputation for good service.
   d. banks reducing their costs of paper check processing.
   e. a fad or novelty.

Difficulty:
Correct Answer: a

11. Given the many components of a personal computer that are perfect complements, which of the following factors would NOT contribute to increased profit for Microsoft as a supplier of operating systems?
   a. A single corporation (Intel) controls the overwhelming majority of the market for CPU chips.
   b. Hardware has largely become a commodity.
   c. The market for DRAM memory chips is highly competitive.
   d. Microsoft Office is frequently bundled with PCs.
   e. More than one of the above answers is correct.

Difficulty:
Correct Answer: c

12. Why might a profit-maximizing firm producing a new product with network externalities want to give its product away for free?
   a. To lock customers in then raise prices at a later date.
   b. Although this practice loses money, it can get the firm valuable publicity.
   c. By building market share, the product becomes much more valuable and the firm can make money by offering a premium version of the product for sale.
   d. The product becomes a more valuable place to advertise if it doesn't cost anything.
   e. A profit-maximizing firm would never give its product away for free.

Difficulty:
Correct Answer: c

13. Our old friend Edmund Stench from Chapter 2 has now grown up and is in the business of producing punk rock DVDs. He must choose between selling his DVDs to final consumers, or selling his DVDs to firms that will rent them to the public. Which of the following factors would make rentals more attractive than sales?

a. A large number of people interested in viewing punk rock DVDs
b. Large transaction costs of renting
c. A high cost of making DVDs relative to transaction costs of renting
d. A small number of people interested in viewing punk rock DVDs
e. High fixed costs of production

PROBLEMS

Difficulty:

1. List three examples of products for which there are significant network externalities. Explain why you believe network externalities are present in each case.

Answer: Computer operating systems, word processors, spreadsheets, DVDs.

Difficulty:

2. For a good with network externalities, draw a diagram showing the relation between the number of units sold and the willingness to pay of demanders. Find a price at which there are two stable and one unstable equilibrium quantities. Label these equilibria and explain why the unstable equilibrium is unstable.

Answer: Supply is horizontal at marginal cost. Demand is an inverted U. Supply must intersect the demand curve twice. One stable equilibrium is at a quantity of zero and the other is at the right-most intersection of supply and demand. Unstable equilibrium is in the middle. The middle equilibrium is unstable because if a slightly smaller quantity is sold, the quantity demanded continues to decline toward zero. If a slightly larger quantity is sold, quantity demanded exceeds quantity supplied, and suppliers will increase the quantity of the product until the high equilibrium point is reached.

Difficulty:

3. One proposed remedy for the Microsoft antitrust case is to break Microsoft into three equal parts and strictly prohibit any coordination between the parts. The three mini-Microsofts would then compete with one another in both the operating system and applications markets. From a Systems Competition perspective, comment on how this proposed settlement might eventually affect consumers.

Answer: From a Systems Competition perspective, consumers benefit from standardization. To the extent that the three mini-Microsofts build incompatible products, consumers would be harmed by this arrangement.

CHAPTER 36 Public Goods

TRUE-FALSE

Difficulty: 1
Correct Answer: False

1. To say that preferences are single peaked means that everybody either prefers more public goods to less or everybody prefers less public goods to more.

Difficulty: 1
Correct Answer: True

2. If preferences are single peaked, then pairwise majority voting among alternative options will not lead to voting cycles.

Difficulty: 1
Correct Answer: False

3. A tax imposed on polluters to give them an incentive to make an efficient reduction in pollution is called a Clarke tax.

Difficulty: 1
Correct Answer: True

4. If a pure public good is provided by voluntary contributions, economic theory predicts that in general too little will be supplied.

Difficulty: 2
Correct Answer: False

5. A Pareto optimal amount of public goods is shown on a graph (with quantities of public goods on the x axis) by the point at which the horizontal sum of the marginal rate of substitution curves meets the marginal cost curve.

Difficulty: 2
Correct Answer: False

6. One of the problems with the Clarke tax mechanism is that when it is used, people have an incentive to lie about their preferences.

Difficulty: 1
Correct Answer: False

7. Economists define public goods to be those goods that are supplied by the government and private goods to be those goods that are supplied by the private sector.

Difficulty: 2
Correct Answer: False

8. If the supply of public goods is determined by majority vote, then the outcome must be Pareto optimal.

Difficulty: 1
Correct Answer: False

9. If preferences are single peaked, then everyone will agree about the right amount of public goods to be supplied.

MULTIPLE CHOICE

Difficulty: 2
Correct Answer: e

1. A quiet town in Kansas has 2,000 people, all of whom have the same preferences. There is one private good and one public good. Each person I in town has utility $U(x_i, y) = x_i + y^{.5}$, where x_i is private good for person i and y is the amount of public good that the town provides. If the private good costs $1 per unit and the public good costs $10 per unit, then the Pareto optimal amount of public good for the town to provide is
   a. 100 units.
   b. 500 units.
   c. 2,000 units.
   d. 8,000 units.
   e. 10,000 units.

Difficulty: 2
Correct Answer: c

2. The Sons of Knute had a hunting lodge up on Loon Lake that burned down last winter. They plan to rebuild

it this summer and are trying to decide how large the new lodge should be. The organization has 50 members. The marginal rate of substitution of each of them between square feet of hunting lodge and money for other goods is $1.2 - 0.0004y$, where y is the size of the hunting lodge in square feet. What is the efficient size for the new hunting lodge?

a. 1,000 square feet
b. 1,200 square feet
c. 2,000 square feet
d. 2,400 square feet
e. None of the above.

Difficulty: 2
Correct Answer: d

3. Anton, Bertha, and Cecilia all consume crackers and music. Crackers are a pure private good and music is a pure public good. Their utility functions are $U^A(c_A, m) = c_A m$, $U_B(c_B, m) = c_B m$, and $U^B(c_C, m) = 2c_C m$, where c_A is Anton's cracker consumption, c_B is Bertha's cracker consumption, c_C is Cecilia's cracker consumption, and where m is the amount of music jointly consumed by all three of them. Music is measured in hours. Crackers cost \$1 each. Music costs \$10 an hour. Anton's wealth is \$30, Bertha's wealth is \$50, and Cecilia's wealth is \$20. What is the efficient amount of music for them to consume?

a. 2 hours
b. 3 hours
c. 4 hours
d. 5 hours
e. 6 hours

Difficulty: 3
Correct Answer: c

4. Which of the following is the best example of a public good as defined in your text?

a. Cable television
b. Day care
c. Radio broadcasts
d. Medical care
e. Disneyland

Difficulty: 2
Correct Answer: a

5. A small coffee company roasts coffee beans in its shop. The unroasted beans cost the company \$2 per pound. The marginal cost of roasting coffee beans is $\$(150 - 10q + q^2)/100$ per pound when q pounds are roasted. The smell of roasting beans imposes costs on the company's neighbors. The total amount that neighbors would be willing to pay to have the shop stop roasting altogether is $5q^2$, where q is the number of pounds being roasted. The company sells its output in a competitive market at \$4.50 per pound. What is the socially efficient amount of coffee for the company to roast?

a. 10 pounds.
b. 15 pounds.
c. the square root of 10 pounds.
d. 45 pounds.
e. None of the above.

Difficulty: 2
Correct Answer: a

6. Nadia Comaneci and Mr. X have preferences defined over pizza, p, and trampolines, t. They have identical utility functions, $U(p, t) = p + 2{,}000t^{1/2}$. Each pizza costs \$1 and each trampoline costs \$1,000. Nadia and Mr. X like to share, and indeed trampolines are a public good for them. Pizza, however, is a private good. We don't know their exact incomes, but we do know that each of them earns at least \$10,000.

a. The Pareto efficient number of trampolines for them is 4.
b. The Pareto efficient number of trampolines for them is 1.
c. The Pareto efficient number of trampolines for them cannot be determined without knowing how the costs will be shared.
d. The Pareto efficient number of trampolines for them is 2.
e. Since their preferences are homothetic, their income elasticity of demand for pizza is -1.

Difficulty:
Correct Answer: a

7. Just north of the town of Muskrat, Ontario, is the town of Brass Monkey, population 6,400. Brass Monkey, like Muskrat, has a single public good, the town skating rink, and a single private good, Labatt Ale. Everyone's utility function is $U_i(X_i, Y) = X_i - 81/Y$, where X_i is the number of bottles of ale consumed by i and Y is the size of the skating rink in square meters. The price of ale is \$1 per bottle. The cost of the skating rink to the city is \$4 per square meter. Everyone has an income of at least \$5,000. What is the Pareto efficient size for the town skating rink?

a. 360 square meters
b. 480 square meters
c. 240 square meters
d. 725 square meters
e. None of the above.

Difficulty:
Correct Answer: d

8. Bob and Ray are thinking of buying a sofa. Bob's utility function is $U_B(S, M_B) = (1 + S)M_B$ and Ray's

utility function is $U_R(S, M_R) = (3 + S)M_R$, where $S = 0$ if they don't get the sofa and $S = 1$ if they do and where M_B and M_R are the amounts of money they have respectively to spend on their private consumptions. Bob has a total of \$1,200 to spend on the sofa and other stuff. Ray has a total of \$1,600 to spend on the sofa and other stuff. The maximum amount that they could pay for the sofa and still arrange to both be better off than without it is

a. \$1,500.
b. \$533.33.
c. \$550.
d. \$1,000.
e. \$2,000.

Difficulty:
Correct Answer: c

9. Bob and Ray are thinking of buying a sofa. Bob's utility function is $U_B(S, M_B) = (1 + S)M_B$ and Ray's utility function is $U_R(S, M_R) = (3 + S)M_R$, where $S = 0$ if they don't get the sofa and $S = 1$ if they do and where M_B and M_R are the amounts of money they have respectively to spend on their private consumptions. Bob has a total of \$2,000 to spend on the sofa and other stuff. Ray has a total of \$2,400 to spend on the sofa and other stuff. The maximum amount that they could pay for the sofa and still arrange to both be better off than without it is
   a. \$2,400.
   b. \$800.
   c. \$1,600.
   d. \$850.
   e. \$3,200.

Difficulty:
Correct Answer: b

10. Bob and Ray are thinking of buying a sofa. Bob's utility function is $U_B(S, M_B) = (1 + S)M_B$ and Ray's utility function is $U_R(S, M_R) = (3 + S)M_R$, where $S = 0$ if they don't get the sofa and $S = 1$ if they do and where M_B and M_R are the amounts of money they have respectively to spend on their private consumptions. Bob has a total of \$800 to spend on the sofa and other stuff. Ray has a total of \$1,600 to spend on the sofa and other stuff. The maximum amount that they could pay for the sofa and still arrange to both be better off than without it is
    a. \$533.33.
    b. \$800.
    c. \$1,200.
    d. \$450.
    e. \$1,600.

Difficulty:
Correct Answer: c

11. Remember Bonnie and Clyde from your workbook? Suppose that their total profits are $40H$, where H is the number of hours they work per year. Their utility functions are, respectively, $U_B(C_B, H) = C_B - 0.02H^2$ and $U_C(C_C, H) = C_C - 0.03H^2$, where C_B and C_C are their private goods consumptions and H is the number of hours they work per year. If they find a Pareto optimal choice of hours of work and income distribution, the number of hours they work per year must be
    a. 500.
    b. 400.
    c. 150.
    d. 250.

Difficulty:
Correct Answer: d

12. Remember Bonnie and Clyde from your workbook? Suppose that their total profits are $112H$, where H is the number of hours they work per year. Their utility functions are, respectively, $U_B(C_B, H) = C_B - 0.02H^2$ and $U_C(C_C, H) = C_C - 0.02H^2$, where C_B and C_C are their private goods consumptions and H is the number of hours they work per year. If they find a Pareto optimal choice of hours of work and income distribution, the number of hours they work per year must be
    a. 1,400.
    b. 750.
    c. 1,500.
    d. 650.

Difficulty:
Correct Answer: a

13. Remember Bonnie and Clyde from your workbook? Suppose that their total profits are $160H$, where H is the number of hours they work per year. Their utility functions are, respectively, $U_B(C_B, H) = C_B - 0.04H^2$ and $U_C(C_C, H) = C_C - 0.01H^2$, where C_B and C_C are their private goods consumptions and H is the number of hours they work per year. If they find a Pareto optimal choice of hours of work and income distribution, the number of hours they work per year must be
    a. 750.
    b. 1,600.
    c. 850.
    d. 1,700.

Difficulty:
Correct Answer: b

14. Lucy's utility function is $2X_L + G$ and Melvin's utility function is $X_M G$, where G is their expenditures on the public goods they share in their apartment and where X_L and X_M are their respective private consumption expenditures. The total amount they have to spend on private goods and public goods is \$30,000. They agree on a Pareto optimal pattern of expenditures in which the amount that is spent on Lucy's private consumption is \$9,000. How much do they spent on public goods?
    a. \$7,000
    b. \$14,000
    c. \$8,050
    d. \$3,500
    e. There is not enough information here to be able to determine the answer.

Difficulty:
Correct Answer: b

15. Lucy's utility function is $2X_L + G$ and Melvin's utility function is $X_M G$, where G is their expenditures on the public goods they share in their apartment and where X_L and X_M are their respective private consumption expenditures. The total amount they have to spend on private goods and public goods is \$33,000. They agree on a Pareto optimal pattern of expenditures in which the amount that is spent on Lucy's private consumption is \$9,000. How much do they spent on public goods?
    a. \$4,000
    b. \$16,000
    c. \$8,550
    d. \$8,000
    e. There is not enough information here to be able to determine the answer.

Difficulty:
Correct Answer: a

16. Lucy's utility function is $2X_L + G$ and Melvin's utility function is $X_M G$, where G is their expenditures on the public goods they share in their apartment and where X_L and X_M are their respective private consumption expenditures. The total amount they have to spend on private goods and public goods is \$28,000. They agree on a Pareto optimal pattern of expenditures in which the amount that is spent on Lucy's private consumption is \$10,000. How much do they spent on public goods?
    a. \$12,000
    b. \$3,000
    c. \$6,000
    d. \$8,050
    e. There is not enough information here to be able to determine the answer.

PROBLEM

Difficulty: 3

1. An otherwise charming island is inhabited by two religious groups who hate each other. The island is presided over by a benevolent monarch who is extremely concerned about envy between groups. He chooses the distribution of income on the island so as to maximize the social welfare function, $W(x, y) = \min\{2x - y, 2y - x\}$, where x is the utility of the average member of group X and y is the utility of the average member of group Y.
    a. If the monarch can accomplish any distribution of utility such that $x + 3y = 24$, diagram the utility possibilities frontier and the monarch's isowelfare lines.
    b. What income distribution maximizes W?
    c. Show that an equal increase in both groups' income will always please the monarch.
    d. If the initial incomes are equal, when do increases in both groups' utility reduce W?

Answer:
    a. The feasible set of distributions is defined by $x + 3y = 24$. Isowelfare lines kink where $x = y$ and have a slope of -2 to the left and $-1/2$ to the right.
    b. 6, 6.
    c. Adding a constant to both x and y increases $2x - y$ and $2y - x$.
    d. When either's income increases by more than twice the increase in the other's.

CHAPTER 37 Asymmetric Information

TRUE-FALSE

Difficulty: 1
Correct Answer: True

1. An insurance company must be concerned about the possibility that someone will buy fire insurance on a building and then set fire to it. This is an example of moral hazard.

Difficulty: 1
Correct Answer: True

2. A life insurance company must be concerned about the possibility that the people who buy life insurance may tend to be less healthy than those who do not. This is an example of adverse selection.

Difficulty: 1
Correct Answer: False

3. In a market where there is signaling, a separating equilibrium occurs when economic agents separate their actions as consumers from their actions as producers.

Difficulty: 1
Correct Answer: True

4. In a market where there is a separating equilibrium, different types of agents make different choices of actions.

Difficulty: 1
Correct Answer: True

5. In a market where there is a pooling equilibrium, different types of agents choose the same action.

Difficulty: 1
Correct Answer: False

6. The incentive compatibility constraint requires that incentives be consistent with a consumer's budget constraint.

Difficulty: 1
Correct Answer: False

7. An example of adverse selection is the situation where someone chooses a car that is not as good as it is claimed to be.

MULTIPLE CHOICE

Difficulty: 2
Correct Answer: d

1. A firm hires two kinds of workers, alphas and betas. The population at large has equal number of alphas and betas. One can't tell a beta from an alpha by looking at her, but an alpha will produce $3,000 worth of output per month and a beta will produce $2,500 worth of output in a month. The firm decides to distinguish alphas from betas by having workers take an examination. A worker will be paid $3,000 if she gets at least 60 answers right and $2,500 otherwise. For each question that they get right on the exam, alphas have to spend 1/2 hour studying and betas have to spend 1 hour. For either type, an hour's studying is as bad as giving up $20 of income per month. This scheme leads to
   a. a separating equilibrium where alphas score 60 and betas score 0.
   b. a pooling equilibrium where alphas score 60 and betas score 0.
   c. a pooling equilibrium where everybody scores 60.
   d. a pooling equilibrium where everybody scores 0.
   e. a separating equilibrium where everybody scores 60.

Difficulty: 1
Correct Answer: a

2. Ten workers work jointly on a project. All 10 workers are equally skilled. The total value of the output produced is $70 times the sum of the number of hours worked by all 10 workers. Each worker's utility is equal to his income minus the square of the number of

hours he works. Each worker is selfish. The employers have no way of keeping track of any individual's work effort, so they decide to let each person work as long as he wants to and they divide the total value of the output equally among the workers. How much income will each worker get?

a. $245
b. $2,450
c. $35
d. $260
e. None of the above.

Difficulty: 1
Correct Answer: b

3. Ten workers work jointly on a project. All 10 workers are equally skilled. The total value of the output produced is $60 times the sum of the number of hours worked by all 10 workers. Each worker's utility is equal to his income minus the square of the number of hours he works. Each worker is selfish. The employers have no way of keeping track of any individual's work effort, so they decide to let each person work as long as he wants to and they divide the total value of the output equally among the workers. How much income will each worker get?
   a. $1,800
   b. $180
   c. $30
   d. $195
   e. None of the above.

Difficulty: 1
Correct Answer: c

4. Ten workers work jointly on a project. All 10 workers are equally skilled. The total value of the output produced is $90 times the sum of the number of hours worked by all 10 workers. Each worker's utility is equal to his income minus the square of the number of hours he works. Each worker is selfish. The employers have no way of keeping track of any individual's work effort, so they decide to let each person work as long as he wants to and they divide the total value of the output equally among the workers. How much income will each worker get?
   a. $420
   b. $45
   c. $405
   d. $4,050
   e. None of the above.

Difficulty: 1
Correct Answer: a

5. Which of the following is the best example of adverse selection?
   a. People who face the highest risks are the people most likely to buy insurance against these risks.
   b. The residual claimant will have to bear the consequences of the most adverse outcomes.
   c. An individual can influence the probability that she has an accident.
   d. Items in the most popular styles sell out the quickest.
   e. People sometimes mistakenly choose low-quality products.

Difficulty: 2
Correct Answer: c

6. A certain city has two kinds of workers, alphas and betas. An alpha can produce $100 worth of output per day working for himself. If he works in the local factory, he produces $120 worth of output a day. A beta produces $60 worth of output per day working for himself, and he produces $80 worth of output per day if he works for the local factory. Workers either work for themselves or work in the factory. The factory owner can't tell alphas from betas. He pays a wage equal to the average product of his labor force and he has at least some alphas working for him. Workers are free to choose to work for themselves or the factory, depending on which offers more money.
   a. At least 5/6 of the factory's employees must be alphas.
   b. At least half of the factory's employees must be betas.
   c. At least half of the factory's employees must be alphas.
   d. None of the factory's employees can be betas.
   e. No more than 5/6 of the betas can work in the factory.

Difficulty:
Correct Answer: a

7. Enigma, Ohio, has two kinds of workers, klutzes whose labor is worth $1,000 a month and kandos whose labor is worth $2,500 a month. Enigma has exactly twice as many klutzes as kandos. Klutzes look just like kandos and are accomplished liars, so if you ask, they claim to be kandos. It is too expensive to monitor anybody's work. A professor who likes to talk offers to give free lectures on personal hygiene and macroeconomics. Klutzes and kandos find these lectures excruciatingly dull. An hour's lecture is as bad as losing $50 for a kando and as bad as losing $100 for a klutz. If all other firms pay wages equal to the productivity of an average citizen of Enigma, which of these strategies would be most profitable for a new firm?
   a. Offer a wage of $2,000 per month and require its workers to listen to 6 hours of lectures per month.

b. Offer a wage of $2,000 per month and require its workers to listen to 4 hours of lectures per month.
c. Offer a wage of $1,750 per month and require its workers to listen to 6 hours of lectures per month.
d. Offer a wage of $1,660 per month and require its workers to attend 1 hour of lectures per month.
e. Offer a wage of $2,600 per month and require its workers to attend 8 hours of lectures per month.

Difficulty: 3
Correct Answer: d

8. Jan's utility function is $C - H^2$, where C is consumption and H is hours worked per day. She can work in the city for 8 hours per day, earning $100 a day. Alternatively, she can rent a small farm from Mr. Porksniffer. If she rents the farm, she can work as many hours a day as she wishes. If she works H hours per day, she can sell her crops for a total of 20H$ per day, but she must pay Mr. Porksniffer an annual rent of $$R$. Mr. Porksniffer wants to charge the highest rent $$R$ that he can and still be able to have Jan rent from him. What is the highest rent he can charge? A penny less than
a. $100 per day.
b. $64 per day.
c. $60 per day.
d. $50 per day.
e. $36 per day.

Difficulty:
Correct Answer: a

9. Suppose that low-productivity workers all have marginal products of 10 and high-productivity workers have marginal products of 16. The community has equal numbers of each type of worker. The local community college offers a course in microeconomics. High-productivity workers think taking this course is as bad as a cut in wages of $4 and low-productivity workers think it is as bad as a wage cut of $8.
a. There is a separating equilibrium in which high-productivity workers take the course and are paid $16 and low-productivity workers do not take the course and are paid $10.
b. There is no separating equilibrium and no pooling equilibrium.
c. There is no separating equilibrium, but there is a pooling equilibrium in which everybody is paid $13.
d. There is a separating equilibrium in which high-productivity workers take the course and are paid $20 and low-productivity workers do not take the course and are paid $10.
e. There is a separating equilibrium in which high-productivity workers take the course and are paid $16 and low-productivity workers are paid $13.

Difficulty:
Correct Answer: b

10. Suppose that low-productivity workers all have marginal products of 10 and high-productivity workers have marginal products of 16. The community has equal numbers of each type of worker. The local community college offers a course in microeconomics. High-productivity workers think taking this course is as bad as a cut in wages of $5 and low-productivity workers think it is as bad as a wage cut of $9.
a. There is no separating equilibrium, but there is a pooling equilibrium in which everybody is paid $13.
b. There is a separating equilibrium in which high-productivity workers take the course and are paid $16 and low-productivity workers do not take the course and are paid $10.
c. There is a separating equilibrium in which high-productivity workers take the course and are paid $21 and low-productivity workers do not take the course and are paid $10.
d. There is no separating equilibrium and no pooling equilibrium.
e. There is a separating equilibrium in which high-productivity workers take the course and are paid $16 and low-productivity workers are paid $13.

Difficulty:
Correct Answer: d

11. Suppose that low-productivity workers all have marginal products of 10 and high-productivity workers have marginal products of 16. The community has equal numbers of each type of worker. The local community college offers a course in microeconomics. High-productivity workers think taking this course is as bad as a cut in wages of $5 and low-productivity workers think it is as bad as a wage cut of $9.
a. There is no separating equilibrium and no pooling equilibrium.
b. There is no separating equilibrium, but there is a pooling equilibrium in which everybody is paid $13.
c. There is a separating equilibrium in which high-productivity workers take the course and are paid $21 and low-productivity workers do not take the course and are paid $10.
d. There is a separating equilibrium in which high-productivity workers take the course and are paid $16 and low-productivity workers do not take the course and are paid $10.
e. There is a separating equilibrium in which high-productivity workers take the course and are paid $16 and low-productivity workers are paid $13.

Difficulty:
Correct Answer: a

12. Suppose that in Enigma, Ohio, klutzes have a productivity of $1,000 and kandos have a productivity of $4,000 per month. You can't tell klutzes from kandos by looking at them or asking them, and it is too expensive to monitor individual productivity. Kandos, however, have more patience than klutzes. Listening to an hour of dull lectures is as bad as losing $250 for a klutz and $100 for a kando. There will be a separating equilibrium in which anybody who attends a course of H hours of lectures is paid $4,000 per month and anybody who does not is paid $1,000 per month
    a. if $12 < H < 30$.
    b. if $12 < H < 60$.
    c. for all positive values of H.
    d. only in the limit as H approaches infinity.
    e. if $10 < H < 25$.

Difficulty:
Correct Answer: b

13. Suppose that in Enigma, Ohio, klutzes have a productivity of $1,000 and kandos have a productivity of $5,000 per month. You can't tell klutzes from kandos by looking at them or asking them, and it is too expensive to monitor individual productivity. Kandos, however, have more patience than klutzes. Listening to an hour of dull lectures is as bad as losing $250 for a klutz and $100 for a kando. There will be a separating equilibrium in which anybody who attends a course of H hours of lectures is paid $5,000 per month and anybody who does not is paid $1,000 per month
    a. if $16 < H < 80$.
    b. if $16 < H < 40$.
    c. only in the limit as H approaches infinity.
    d. for all positive values of H.
    e. if $14 < H < 35$.

Difficulty:
Correct Answer: d

14. Suppose that in Enigma, Ohio, klutzes have a productivity of $1,000 and kandos have a productivity of $5,000 per month. You can't tell klutzes from kandos by looking at them or asking them, and it is too expensive to monitor individual productivity. Kandos, however, have more patience than klutzes. Listening to an hour of dull lectures is as bad as losing $250 for a klutz and $150 for a kando. There will be a separating equilibrium in which anybody who attends a course of H hours of lectures is paid $5,000 per month and anybody who does not is paid $1,000 per month
    a. only in the limit as H approaches infinity.
    b. if $16 < H < 53.33$.
    c. for all positive values of H.
    d. if $16 < H < 26.67$.
    e. if $14 < H < 23.33$.

Difficulty:
Correct Answer: b

15. In Rustbucket, Michigan, there are 200 used cars for sale; half of these cars are good and half of them are lemons. Owners of lemons are willing to sell them for $100. Owners of good used cars are willing to sell them for prices above $1,500 but will keep them if the price is lower than $1,500. There is a large number of potential buyers who are willing to pay $300 for a lemon and $1,900 for a good car. Buyers can't tell good cars from bad, but original owners know.
    a. There will be an equilibrium in which all used cars sell for $1,100.
    b. The only equilibrium is one in which all used cars on the market are lemons and they sell for $300.
    c. There will be an equilibrium in which lemons sell for $100 and good used cars sell for $1,500.
    d. There will be an equilibrium in which all used cars sell for $800.
    e. There will be an equilibrium in which lemons sell for $300 and good used cars sell for $1,900.

Difficulty:
Correct Answer: b

16. In Rustbucket, Michigan, there are 200 used cars for sale; half of these cars are good and half of them are lemons. Owners of lemons are willing to sell them for $500. Owners of good used cars are willing to sell them for prices above $1,300 but will keep them if the price is lower than $1,300. There is a large number of potential buyers who are willing to pay $600 for a lemon and $2,300 for a good car. Buyers can't tell good cars from bad, but original owners know.
    a. There will be an equilibrium in which lemons sell for $500 and good used cars sell for $1,300.
    b. There will be an equilibrium in which all used cars sell for $1,450.
    c. The only equilibrium is one in which all used cars on the market are lemons and they sell for $600.
    d. There will be an equilibrium in which all used cars sell for $900.
    e. There will be an equilibrium in which lemons sell for $600 and good used cars sell for $2,300.

Difficulty:
Correct Answer: c

17. In Rustbucket, Michigan, there are 200 used cars for sale; half of these cars are good and half of them are lemons. Owners of lemons are willing to sell them for $500. Owners of good used cars are willing to sell them for prices above $1,100 but will keep them if the price is lower than $1,100. There is a large number of potential buyers who are willing to pay $600 for a lemon and $1,700 for a good car. Buyers can't tell good cars from bad, but original owners know.

a. There will be an equilibrium in which all used cars sell for $800.
b. There will be an equilibrium in which lemons sell for $500 and good used cars sell for $1,100.
c. There will be an equilibrium in which all used cars sell for $1,150.
d. The only equilibrium is one in which all used cars on the market are lemons and they sell for $600.
e. There will be an equilibrium in which lemons sell for $600 and good used cars sell for $1,700.

Difficulty:
Correct Answer: d

18. Suppose that in New Crankshaft, Pennsylvania, the quality distribution of the 8,000 used cars on the market is such that the number of used cars of value less than V is $V/2$. Original owners must sell their used cars. Original owners know what their cars are worth, but buyers can't determine a car's quality until they buy it. An owner can either take his car to an appraiser and pay the appraiser $100 to appraise the car (accurately and credibly) or sell the car unappraised. In equilibrium, car owners will have their cars appraised if and only if the car's value is at least
    a. $100.
    b. $4,000.
    c. $300.
    d. $200.
    e. $400.

Difficulty:
Correct Answer: d

19. Suppose that in New Crankshaft, Pennsylvania, the quality distribution of the 6,000 used cars on the market is such that the number of used cars of value less than V is $V/2$. Original owners must sell their used cars. Original owners know what their cars are worth, but buyers can't determine a car's quality until they buy it. An owner can either take his car to an appraiser and pay the appraiser $400 to appraise the car (accurately and credibly) or sell the car unappraised. In equilibrium, car owners will have their cars appraised if and only if the car's value is at least
    a. $1,200.
    b. $3,000.
    c. $400.
    d. $800.
    e. $1,600.

Difficulty:
Correct Answer: d

20. Suppose that in New Crankshaft, Pennsylvania, the quality distribution of the 4,000 used cars on the market is such that the number of used cars of value less than V is $V/2$. Original owners must sell their used cars. Original owners know what their cars are worth, but buyers can't determine a car's quality until they buy it. An owner can either take his car to an appraiser and pay the appraiser $100 to appraise the car (accurately and credibly) or sell the car unappraised. In equilibrium, car owners will have their cars appraised if and only if the car's value is at least
    a. $2,000.
    b. $100.
    c. $300.
    d. $200.
    e. $400.

Difficulty:
Correct Answer: c

21. There are two types of used cars, high quality and low quality. Buyers cannot distinguish the two types until after they have purchased them. Owners of high-quality cars will sell them if the price is $2,000 or higher. Owners of low-quality cars will sell them if the price is $1,000 or higher. Buyers value a high-quality used car at $4,266 and a low-quality used car at $1,200. Suppose that 30% of used cars are of high quality and 70% of used cars are of low quality. In equilibrium,
    a. only high-quality used cars will be sold.
    b. only low-quality used cars will be sold.
    c. all used cars will be sold.
    d. no used cars will be sold.
    e. high-quality used cars will sell for a uniformly higher price than low-quality used cars.

Difficulty:
Correct Answer: c

22. There are two types of used cars, high quality and low quality. Buyers cannot distinguish the two types until after they have purchased them. Owners of high-quality cars will sell them if the price is $2,000 or higher. Owners of low-quality cars will sell them if the price is $1,000 or higher. Buyers value a high-quality used car at $3,466 and a low-quality used car at $1,200. Suppose that 30% of used cars are of high quality and 70% of used cars are of low quality. In equilibrium,
    a. all used cars will be sold.
    b. only low-quality used cars will be sold.
    c. no used cars will be sold.
    d. only high-quality used cars will be sold.
    e. high-quality used cars will sell for a uniformly higher price than low-quality used cars.

Difficulty:
Correct Answer: c

23. There are two types of used cars, high quality and low quality. Buyers cannot distinguish the two types until

after they have purchased them. Owners of high-quality cars will sell them if the price is \$2,000 or higher. Owners of low-quality cars will sell them if the price is \$1,000 or higher. Buyers value a high-quality used car at \$1,942 and a low-quality used car at \$1,200. Suppose that 70% of used cars are of high quality and 30% of used cars are of low quality. In equilibrium,

a. only low-quality used cars will be sold.
b. only high-quality used cars will be sold.
c. no used cars will be sold.
d. all used cars will be sold.
e. high-quality used cars will sell for a uniformly higher price than low-quality used cars.

PROBLEM

Difficulty:

1. Lexus has recently begun a program in which a used Lexus automobile which passes a 100+ point inspection is designated by the local dealer to be a Lexus Certified Pre-owned Vehicle. Would local Lexus dealers find it in their best interest to participate? Explain.

Answer: Yes. If the certification is credible to car buyers, they will be willing to pay more for cars which pass the inspection. As long as this premium exceeds dealer costs, this breaks the adverse selection problem.

Part II

Alternative Quizzes

CHAPTER 2 Budget Constraint

MULTIPLE CHOICE

Difficulty:
Correct Answer: c

1. In Problem 1, if you have an income of \$18 to spend, if commodity 1 cost \$3 per unit, and if commodity 2 costs \$9 per unit, then the equation for your budget line can be written
   a. $x_1/3 + x_2/9 = 18$.
   b. $(x_1 + x_2)/12 = 18$.
   c. $x_1 + 3x_2 = 6$.
   d. $4x_1 + 10x_2 = 19$.
   e. $12(x_1 + x_2) = 18$.

Difficulty:
Correct Answer: c

2. In Problem 1, if you have an income of \$18 to spend, if commodity 1 costs \$3 per unit, and if commodity 2 costs \$9 per unit, then the equation for your budget line can be written
   a. $x_1/3 + x_2/9 = 18$.
   b. $4x_1 + 10x_2 = 19$.
   c. $x_1 + 3x_2 = 6$.
   d. $(x_1 + x_2)/12 = 18$.
   e. $12(x_1 + x_2) = 18$.

Difficulty:
Correct Answer: c

3. In Problem 1, if you have an income of \$30 to spend, if commodity 1 costs \$5 per unit, and if commodity 2 costs \$10 per unit, then the equation for your budget line can be written
   a. $6x_1 + 11x_2 = 31$.
   b. $(x_1 + x_2)/15 = 30$.
   c. $x_1 + 2x_2 = 6$.
   d. $x_1/5 + x_2/10 = 30$.
   e. $15(x_1 + x_2) = 30$.

Difficulty:
Correct Answer: a

4. In Problem 1, if you have an income of \$16 to spend, if commodity 1 costs \$2 per unit, and if commodity 2 costs \$4 per unit, then the equation for your budget line can be written
   a. $x_1 + 2x_2 = 8$.
   b. $3x_1 + 5x_2 = 17$.
   c. $(x_1 + x_2)/6 = 16$.
   d. $x_1/2 + x_2/4 = 16$.
   e. $6(x_1 + x_2) = 16$.

Difficulty:
Correct Answer: a

5. In Problem 1, if you have an income of \$80 to spend, if commodity 1 costs \$4 per unit, and if commodity 2 costs \$16 per unit, then the equation for your budget line can be written
   a. $x_1 + 4x_2 = 20$.
   b. $(x_1 + x_2)/20 = 80$.
   c. $x_1/4 + x_2/16 = 80$.
   d. $5x_1 + 17x_2 = 81$.
   e. $20(x_1 + x_2) = 80$.

Difficulty: 1
Correct Answer: a

6. In Problem 3, if you could exactly afford either 2 units of x and 7 units of y, or 4 units of x and 3 units of y, then if you spent all of your income on y, how many units of y could you buy?
   a. 11
   b. 7
   c. 15
   d. 6
   e. None of the above.

Difficulty: 1
Correct Answer: a

7. In Problem 3, if you could exactly afford either 4 units of x and 8 units of y, or 6 units of x and 2 units of y,

then if you spent all of your income on y, how many units of y could you buy?
a. 20
b. 26
c. 10
d. 14
e. None of the above.

Difficulty: 1
Correct Answer: c

8. In Problem 3, if you could exactly afford either 2 units of x and 10 units of y, or 4 units of x and 2 units of y, then if you spent all of your income on y, how many units of y could you buy?
a. 6
b. 10
c. 18
d. 26
e. None of the above.

Difficulty: 1
Correct Answer: c

9. In Problem 3, if you could exactly afford either 4 units of x and 27 units of y, or 9 units of x and 7 units of y, then if you spent all of your income on y, how many units of y could you buy?
a. 23
b. 63
c. 43
d. 13
e. None of the above.

Difficulty: 1
Correct Answer: b

10. In Problem 3, if you could exactly afford either 2 units of x and 11 units of y, or 4 units of x and 7 units of y, then if you spent all of your income on y, how many units of y could you buy?
a. 19
b. 15
c. 11
d. 6
e. None of the above.

Difficulty:
Correct Answer: b

11. In Problem 4, Murphy used to consume 100 units of X and 50 units of Y when the price of X was \$2 and the price of Y was \$4. If the price of X rose to \$5 and the price of Y rose to \$5, how much would Murphy's income have to rise so that he could still afford his original bundle?
a. \$400
b. \$350
c. \$200
d. \$600
e. None of the above.

Difficulty:
Correct Answer: d

12. In Problem 4, Murphy used to consume 100 units of X and 50 units of Y when the price of X was \$2 and the price of Y was \$4. If the price of X rose to \$6 and the price of Y rose to \$6, how much would Murphy's income have to rise so that he could still afford his original bundle?
a. \$300
b. \$900
c. \$600
d. \$500
e. None of the above.

Difficulty:
Correct Answer: c

13. In Problem 4, Murphy used to consume 100 units of X and 50 units of Y when the price of X was \$2 and the price of Y was \$4. If the price of X rose to \$4 and the price of Y rose to \$7, how much would Murphy's income have to rise so that he could still afford his original bundle?
a. \$500
b. \$750
c. \$350
d. \$250
e. None of the above.

Difficulty:
Correct Answer: c

14. In Problem 4, Murphy used to consume 100 units of X and 50 units of Y when the price of X was \$2 and the price of Y was \$4. If the price of X rose to \$4 and the price of Y rose to \$7, how much would Murphy's income have to rise so that he could still afford his original bundle?
a. \$750
b. \$500
c. \$350
d. \$250
e. None of the above.

Difficulty:
Correct Answer: c

15. In Problem 4, Murphy used to consume 100 units of X and 50 units of Y when the price of X was \$2 and the price of Y was \$4. If the price of X rose to \$6 and the price of Y rose to \$5, how much would Murphy's income have to rise so that he could still afford his original bundle?
a. \$750
b. \$250
c. \$450
d. \$500
e. None of the above.

Difficulty:
Correct Answer: c

16. In Problem 7, Edmund must pay \$6 each for punk rock video cassettes. If Edmund is paid \$48 per sack for accepting garbage and if his relatives send him an allowance of \$432, then his budget line is described by the equation
    a. $6V = 48G$.
    b. $6V + 48G = 432$.
    c. $6V - 48G = 432$.
    d. $6V = 432 - G$.
    e. None of the above.

Difficulty:
Correct Answer: c

17. In Problem 7, Edmund must pay \$6 each for punk rock video cassettes. If Edmund is paid \$18 per sack for accepting garbage and if his relatives send him an allowance of \$108, then his budget line is described by the equation
    a. $6V + 18G = 108$.
    b. $6V = 108 - G$.
    c. $6V - 18G = 108$.
    d. $6V = 18G$.
    e. None of the above.

Difficulty:
Correct Answer: a

18. In Problem 7, Edmund must pay \$6 each for punk rock video cassettes. If Edmund is paid \$48 per sack for accepting garbage and if his relatives send him an allowance of \$336, then his budget line is described by the equation
    a. $6V - 48G = 336$.
    b. $6V = 48G$.
    c. $6V = 336 - G$.
    d. $6V + 48G = 336$.
    e. None of the above.

Difficulty:
Correct Answer: b

19. In Problem 7, Edmund must pay \$6 each for punk rock video cassettes. If Edmund is paid \$36 per sack for accepting garbage and if his relatives send him an allowance of \$360, then his budget line is described by the equation
    a. $6V + 36G = 360$.
    b. $6V - 36G = 360$.
    c. $6V = 360 - G$.
    d. $6V = 36G$.
    e. None of the above.

Difficulty:
Correct Answer: a

20. In Problem 7, Edmund must pay \$6 each for punk rock video cassettes. If Edmund is paid \$18 per sack for accepting garbage and if his relatives send him an allowance of \$180, then his budget line is described by the equation
    a. $6V - 18G = 180$.
    b. $6V = 180 - G$.
    c. $6V + 18G = 180$.
    d. $6V = 18G$.
    e. None of the above.

Difficulty:
Correct Answer: c

21. In Problem 10, if in the same amount of time that it takes her to read 40 pages of economics and 30 pages of sociology, Martha could read 10 pages of economics and 90 pages of sociology, then which of these equations describes combinations of pages of economics, E, and sociology, S, that she could read in the time it takes to read 40 pages of economics and 30 pages of sociology?
    a. $E + S = 70$.
    b. $E/2 + S = 50$.
    c. $2E + S = 110$.
    d. $E + S = 100$.
    e. All of the above.

Difficulty:
Correct Answer: d

22. In Problem 10, if in the same amount of time that it takes her to read 40 pages of economics and 30 pages of sociology, Martha could read 20 pages of economics and 110 pages of sociology, then which of these equations describes combinations of pages of economics, E, and sociology, S, that she could read in the time it takes to read 40 pages of economics and 30 pages of sociology?
    a. $E + S = 130$.
    b. $E/2 + S = 50$.
    c. $E + S = 70$.
    d. $4E + S = 190$.
    e. All of the above.

Difficulty:
Correct Answer: a

23. In Problem 10, if in the same amount of time that it takes her to read 40 pages of economics and 30 pages of sociology, Martha could read 30 pages of economics and 70 pages of sociology, then which of these equations describes combinations of pages of economics, E, and sociology, S, that she could read in the time it takes to read 40 pages of economics and 30 pages of sociology?
    a. $4E + S = 190$.
    b. $E + S = 70$.
    c. $E + S = 100$.
    d. $E/2 + S = 50$.
    e. All of the above.

Difficulty:
Correct Answer: c

24. In Problem 10, if in the same amount of time that it takes her to read 40 pages of economics and 30 pages of sociology, Martha could read 20 pages of economics and 90 pages of sociology, then which of these equations describes combinations of pages of economics, E, and sociology, S, that she could read in the time it takes to read 40 pages of economics and 30 pages of sociology?
    a. $E + S = 110$.
    b. $E/2 + S = 50$.
    c. $3E + S = 150$.
    d. $E + S = 70$.
    e. All of the above.

Difficulty:
Correct Answer: d

25. In Problem 10, if in the same amount of time that it takes her to read 40 pages of economics and 30 pages of sociology, Martha could read 20 pages of economics and 110 pages of sociology, then which of these equations describes combinations of pages of economics, E, and sociology, S, that she could read in the time it takes to read 40 pages of economics and 30 pages of sociology?
    a. $E + S = 130$.
    b. $E/2 + S = 50$.
    c. $E + S = 70$.
    d. $4E + S = 190$.
    e. All of the above.

Difficulty:
Correct Answer: a

26. In Problem 11, ads in the boring business magazine are read by 300 lawyers and 1,000 M.B.A.s. Ads in the consumer publication are read by 250 lawyers and 300 M.B.A.s. If Harry had $3,000 to spend on advertising, if the price of ads in the boring business magazine were $600, and if the price of ads in the consumer magazine were $300, then the combinations of recent M.B.A.s and lawyers with hot tubs whom he could reach with his advertising budget would be represented by the integer values along a line segment that runs between the two points
    a. (2, 500, 3, 000) and (1, 500, 5, 000).
    b. (3, 000, 3, 500) and (1, 500, 6, 000).
    c. (0, 3, 000) and (1, 500, 0).
    d. (3, 000, 0) and (0, 6, 000).
    e. (2, 000, 0) and (0, 5, 000).

Difficulty:
Correct Answer: b

27. In Problem 11, ads in the boring business magazine are read by 300 lawyers and 1,000 M.B.A.s. Ads in the consumer publication are read by 250 lawyers and 300 M.B.A.s. If Harry had $3,250 to spend on advertising, if the price of ads in the boring business magazine were $500, and if the price of ads in the consumer magazine were $250, then the combinations of recent M.B.A.s and lawyers with hot tubs whom he could reach with his advertising budget would be represented by the integer values along a line segment that runs between the two points
    a. (3, 900, 0) and (0, 7, 800).
    b. (3, 250, 3, 900) and (1, 950, 6, 500).
    c. (0, 3, 900) and (1, 950, 0).
    d. (3, 900, 4, 550) and (1, 950, 7, 800).
    e. (2, 600, 0) and (0, 6, 500).

Difficulty:
Correct Answer: a

28. In Problem 11, ads in the boring business magazine are read by 300 lawyers and 1,000 M.B.A.s. Ads in the consumer publication are read by 250 lawyers and 300 M.B.A.s. If Harry had $2,250 to spend on advertising, if the price of ads in the boring business magazine were $300, and if the price of ads in the consumer magazine were $150, then the combinations of recent M.B.A.s and lawyers with hot tubs whom he could reach with his advertising budget would be represented by the integer values along a line segment that runs between the two points
    a. (3, 750, 4, 500) and (2, 250, 7, 500).
    b. (0, 4, 500) and (2, 250, 0).
    c. (4, 500, 0) and (0, 9, 000).
    d. (4, 500, 5, 250) and (2, 250, 9, 000).
    e. (3, 000, 0) and (0, 7, 500).

Difficulty:
Correct Answer: b

29. In Problem 11, ads in the boring business magazine are read by 300 lawyers and 1,000 M.B.A.s. Ads in the consumer publication are read by 250 lawyers and 300 M.B.A.s. If Harry had $4,200 to spend on advertising, if the price of ads in the boring business magazine were $700, and if the price of ads in the consumer magazine were $350, then the combinations of recent M.B.A.s and lawyers with hot tubs whom he could reach with his advertising budget would be represented by the integer values along a line segment that runs between the two points
    a. (3, 600, 0) and (0, 7, 200).
    b. (3, 000, 3, 600) and (1, 800, 6, 000).
    c. (0, 3, 600) and (1, 800, 0).
    d. (3, 600, 4, 200) and (1, 800, 7, 200).
    e. (2, 400, 0) and (0, 6, 000).

Difficulty:
Correct Answer: d

30. In Problem 11, ads in the boring business magazine are read by 300 lawyers and 1,000 M.B.A.s. Ads in the consumer publication are read by 250 lawyers and 300 M.B.A.s. If Harry had $3,250 to spend on advertising, if the price of ads in the boring business magazine were $500, and if the price of ads in the consumer magazine were $250, then the combinations of recent M.B.A.s and lawyers with hot tubs whom he could reach with his advertising budget would be represented by the integer values along a line segment that runs between the two points
   a. (3, 900, 4, 550) and (1, 950, 7, 800).
   b. (3, 900, 0) and (0, 7, 800).
   c. (0, 3, 900) and (1, 950, 0).
   d. (3, 250, 3, 900) and (1, 950, 6, 500).
   e. (2, 600, 0) and (0, 6, 500).

Difficulty: 2
Correct Answer: b

31. In the economy of Mungo, discussed in Problem 12, there is a third person called Ike. Ike has a red income of 82 and a blue income of 25. Recall that blue prices are 1 bcu (blue currency unit) per unit of ambrosia and 1 bcu per unit of bubble gum. Red prices are 2 rcus (red currency units) per unit of ambrosia and 6 rcus per unit of bubble gum. You have to pay twice for what you buy, once in red currency, once in blue currency. If Ike spends all of his blue income but not all of his red income he must consume
   a. at least 8 units of bubble gum.
   b. at least 17 units of ambrosia.
   c. exactly twice as much bubble gum as ambrosia.
   d. at least 13 units of bubble gum.
   e. equal amounts of ambrosia and bubble gum.

Difficulty: 2
Correct Answer: a

32. In the economy of Mungo, discussed in Problem 12, there is a third person called Ike. Ike has a red income of 104 and a blue income of 30. Recall that blue prices are 1 bcu (blue currency unit) per unit of ambrosia and 1 bcu per unit of bubble gum. Red prices are 2 rcus (red currency units) per unit of ambrosia and 6 rcus per unit of bubble gum. You have to pay twice for what you buy, once in red currency, once in blue currency. If Ike spends all of his blue income but not all of his red income, he must consume
   a. at least 19 units of ambrosia.
   b. at least 11 units of bubble gum.
   c. exactly twice as much bubble gum as ambrosia.
   d. at least 21 units of bubble gum.
   e. equal amounts of ambrosia and bubble gum.

Difficulty: 2
Correct Answer: d

33. In the economy of Mungo, discussed in Problem 12, there is a third person called Ike. Ike has a red income of 56 and a blue income of 10. Recall that blue prices are 1 bcu (blue currency unit) per unit of ambrosia and 1 bcu per unit of bubble gum. Red prices are 2 rcus (red currency units per unit of ambrosia and 6 rcus per unit of bubble gum. You have to pay twice for what you buy, once in red currency, once in blue currency. If Ike spends all of his blue income but not all of his red income, he must consume
   a. at least 9 units of bubble gum.
   b. at least 17 units of bubble gum.
   c. exactly twice as much bubble gum as ambrosia.
   d. at least 1 unit of ambrosia.
   e. equal amounts of ambrosia and bubble gum.

Difficulty: 2
Correct Answer: a

34. In the economy of Mungo, discussed in Problem 12, there is a third person called Ike. Ike has a red income of 90 and a blue income of 25. Recall that blue prices are 1 bcu (blue currency unit) per unit of ambrosia and 1 bcu per unit of bubble gum. Red prices are 2 rcus (red currency units per unit of ambrosia and 6 rcus per unit of bubble gum. You have to pay twice for what you buy, once in red currency, once in blue currency. If Ike spends all of his blue income but not all of his red income, he must consume
   a. at least 15 units of ambrosia.
   b. at least 15 units of bubble gum.
   c. at least 10 units of bubble gum.
   d. exactly twice as much bubble gum as ambrosia.
   e. equal amounts of ambrosia and bubble gum.

Difficulty: 2
Correct Answer: a

35. In the economy of Mungo, discussed in Problem 12, there is a third person called Ike. Ike has a red income of 88 and a blue income of 30. Recall that blue prices are 1 bcu (blue currency unit) per unit of ambrosia and 1 bcu per unit of bubble gum. Red prices are 2 rcus (red currency units per unit of ambrosia and 6 rcus per unit of bubble gum. You have to pay twice for what you buy, once in red currency, once in blue currency. If Ike spends all of his blue income but not all of his red income, he must consume
   a. at least 23 units of ambrosia.
   b. exactly twice as much bubble gum as ambrosia.
   c. at least 17 units of bubble gum.
   d. at least 7 units of bubble gum.
   e. equal amounts of ambrosia and bubble gum.

CHAPTER 3 Preferences

MULTIPLE CHOICE

Difficulty:
Correct Answer: e

1. In Problem 1, Charlie's indifference curves have the equation $x_B = constant/x_A$, where larger constants correspond to better indifference curves. Charlie strictly prefers the bundle (5, 13) to the bundle
   a. (13, 5).
   b. (6, 12).
   c. (11, 8).
   d. All of the above.
   e. None of the above.

Difficulty:
Correct Answer: e

2. In Problem 1, Charlie's indifference curves have the equation $x_B = constant/x_A$, where larger constants correspond to better indifference curves. Charlie strictly prefers the bundle (6, 15) to the bundle
   a. (15, 6).
   b. (7, 14).
   c. (11, 13).
   d. All of the above.
   e. None of the above.

Difficulty:
Correct Answer: a

3. In Problem 1, Charlie's indifference curves have the equation $x_B = constant/x_A$, where larger constants correspond to better indifference curves. Charlie strictly prefers the bundle (8, 13) to the bundle
   a. (14, 7).
   b. (9, 12).
   c. (13, 8).
   d. All of the above.
   e. None of the above.

Difficulty:
Correct Answer: e

4. In Problem 1, Charlie's indifference curves have the equation $x_B = constant/x_A$, where larger constants correspond to better indifference curves. Charlie strictly prefers the bundle (5, 14) to the bundle
   a. (6, 13).
   b. (14, 5).
   c. (11, 11).
   d. All of the above.
   e. None of the above.

Difficulty:
Correct Answer: e

5. In Problem 1, Charlie's indifference curves have the equation $x_B = constant/x_A$, where larger constants correspond to better indifference curves. Charlie strictly prefers the bundle (9, 17) to the bundle
   a. (17, 9).
   b. (14, 14).
   c. (10, 16).
   d. All of the above.
   e. None of the above.

Difficulty: 2
Correct Answer: c

6. In Problem 2, Ambrose has indifference curves with the equation $x_2 = constant \; -4x^{1/2}{}_1$, where larger constants correspond to higher indifference curves. If good 1 is drawn on the horizontal axis and good 2 on the vertical axis, what is the slope of Ambrose's indifference curve when his consumption bundle is (4, 11)?
   a. $-4/11$
   b. $-11/4$
   c. -1
   d. -13
   e. -2

Difficulty: 2
Correct Answer: a

7. In Problem 2, Ambrose has indifference curves with the equation x_2 = *constant* $-4x^{1/2}{}_1$, where larger constants correspond to higher indifference curves. If good 1 is drawn on the horizontal axis and good 2 on the vertical axis, what is the slope of Ambrose's indifference curve when his consumption bundle is (36, 10)?
   a. -0.33
   b. -16
   c. $-36/10$
   d. $-10/36$
   e. -6

Difficulty: 2
Correct Answer: a

8. In Problem 2, Ambrose has indifference curves with the equation x_2 = *constant* $-4x^{1/2}{}_1$, where larger constants correspond to higher indifference curves. If good 1 is drawn on the horizontal axis and good 2 on the vertical axis, what is the slope of Ambrose's indifference curve when his consumption bundle is (16, 10)?
   a. -0.50
   b. $-16/10$
   c. $-10/16$
   d. -14
   e. -4

Difficulty: 2
Correct Answer: d

9. In Problem 2, Ambrose has indifference curves with the equation x_2 = *constant* $-4x^{1/2}{}_1$, where larger constants correspond to higher indifference curves. If good 1 is drawn on the horizontal axis and good 2 on the vertical axis, what is the slope of Ambrose's indifference curve when his consumption bundle is (1, 11)?
   a. $-1/11$
   b. $-11/1$
   c. -12
   d. -2
   e. -1

Difficulty: 2
Correct Answer: c

10. In Problem 2, Ambrose has indifference curves with the equation x_2 = *constant* $-4x^{1/2}{}_1$, where larger constants correspond to higher indifference curves. If good 1 is drawn on the horizontal axis and good 2 on the vertical axis, what is the slope of Ambrose's indifference curve when his consumption bundle is (9, 19)?
    a. $-9/19$
    b. $-19/9$
    c. -0.67
    d. -22
    e. -3

Difficulty: 2
Correct Answer: a

11. In Problem 8, Nancy Lerner is taking a course from Professor Goodheart who will count only her best midterm grade and from Professor Stern who will count only her worst midterm grade. In one of her classes, Nancy has scores of 20 on her first midterm and 30 on her second midterm. When the first midterm score is measured on the horizontal axis and her second midterm score on the vertical, her indifference curve has a slope of zero at the point (20, 30). This class could
    a. be Professor Goodheart's but could not be Professor Stern's.
    b. be Professor Stern's but could not be Professor Goodheart's.
    c. not be either Professor Goodheart's or Professor Stern's.
    d. be either Professor Goodheart's or Professor Stern's.
    e. There is not enough information to tell whose class it could or couldn't be.

Difficulty: 2
Correct Answer: b

12. In Problem 8, Nancy Lerner is taking a course from Professor Goodheart who will count only her best midterm grade and from Professor Stern who will count only her worst midterm grade. In one of her classes, Nancy has scores of 70 on her first midterm and 30 on her second midterm. When the first midterm score is measured on the horizontal axis and her second midterm score on the vertical, her indifference curve has a slope of zero at the point (70, 30). This class could
    a. not be either Professor Goodheart's or Professor Stern's.
    b. be Professor Stern's but could not be Professor Goodheart's.
    c. be either Professor Goodheart's or Professor Stern's.
    d. be Professor Goodheart's but could not be Professor Stern's.
    e. There is not enough information to tell whose class it could or couldn't be.

Difficulty: 2
Correct Answer: a

13. In Problem 8, Nancy Lerner is taking a course from Professor Goodheart who will count only her best midterm grade and from Professor Stern who will count only her worst midterm grade. In one of her classes, Nancy has scores of 40 on her first midterm and 80 on her second midterm. When the first midterm score is measured on the horizontal axis and her second midterm score on the vertical, her indifference curve has a slope of zero at the point (40, 80). This class could
    a. be Professor Goodheart's but could not be Professor Stern's.
    b. not be either Professor Goodheart's or Professor Stern's.
    c. be either Professor Goodheart's or Professor Stern's.
    d. be Professor Stern's but could not be Professor Goodheart's.
    e. There is not enough information to tell whose class it could or couldn't be.

Difficulty: 2
Correct Answer: d

14. In Problem 8, Nancy Lerner is taking a course from Professor Goodheart who will count only her best midterm grade and from Professor Stern who will count only her worst midterm grade. In one of her classes, Nancy has scores of 40 on her first midterm and 50 on her second midterm. When the first midterm score is measured on the horizontal axis and her second midterm score on the vertical, her indifference curve has a slope of zero at the point (40, 50). This class could
    a. be Professor Stern's but could not be Professor Goodheart's.
    b. be either Professor Goodheart's or Professor Stern's.
    c. not be either Professor Goodheart's or Professor Stern's.
    d. be Professor Goodheart's but could not be Professor Stern's.
    e. There is not enough information to tell whose class it could or couldn't be.

Difficulty: 2
Correct Answer: b

15. In Problem 8, Nancy Lerner is taking a course from Professor Goodheart who will count only her best midterm grade and from Professor Stern who will count only her worst midterm grade. In one of her classes, Nancy has scores of 20 on her first midterm and 70 on her second midterm. When the first midterm score is measured on the horizontal axis and her second midterm score on the vertical, her indifference curve has a slope of zero at the point (20, 70). This class could
    a. be Professor Stern's but could not be Professor Goodheart's.
    b. be Professor Goodheart's but could not be Professor Stern's.
    c. not be either Professor Goodheart's or Professor Stern's.
    d. be either Professor Goodheart's or Professor Stern's.
    e. There is not enough information to tell whose class it could or couldn't be.

Difficulty: 2
Correct Answer: d

16. In Problem 9, if we graph Mary Granola's indifference curves with avocados on the horizontal axis and grapefruits on the vertical axis, then whenever she has more grapefruits than avocados, the slope of her indifference curve is -2. Whenever she has more avocados than grapefruits, the slope is $-1/2$. Mary would be indifferent between a bundle with 23 avocados and 29 grapefruits and another bundle with 31 avocados and
    a. 25 grapefruits.
    b. 27 grapefruits.
    c. 19 grapefruits.
    d. 22 grapefruits.
    e. 23.50 grapefruits.

Difficulty: 2
Correct Answer: d

17. In Problem 9, if we graph Mary Granola's indifference curves with avocados on the horizontal axis and grapefruits on the vertical axis, then whenever she has more grapefruits than avocados, the slope of her indifference curve is -2. Whenever she has more avocados than grapefruits, the slope is $-1/2$. Mary would be indifferent between a bundle with 9 avocados and 15 grapefruits and another bundle with 15 avocados and
    a. 13 grapefruits.
    b. 11 grapefruits.
    c. 7 grapefruits.
    d. 9 grapefruits.
    e. 10 grapefruits.

Difficulty: 2
Correct Answer: c

18. In Problem 9, if we graph Mary Granola's indifference curves with avocados on the horizontal axis and grapefruits on the vertical axis, then whenever she has more grapefruits than avocados, the slope of her indifference curve is -2. Whenever she has more

avocados than grapefruits, the slope is −1/2. Mary would be indifferent between a bundle with 9 avocados and 21 grapefruits and another bundle with 19 avocados and

a. 7 grapefruits.
b. 17 grapefruits.
c. 10 grapefruits.
d. 13 grapefruits.
e. 11.50 grapefruits.

Difficulty: 2
Correct Answer: a

19. In Problem 9, if we graph Mary Granola's indifference curves with avocados on the horizontal axis and grapefruits on the vertical axis, then whenever she has more grapefruits than avocados, the slope of her indifference curve is −2. Whenever she has more avocados than grapefruits, the slope is −1/2. Mary would be indifferent between a bundle with 21 avocados and 33 grapefruits and another bundle with 33 avocados and
a. 21 grapefruits.
b. 29 grapefruits.
c. 25 grapefruits.
d. 17 grapefruits.
e. 23 grapefruits.

Difficulty: 2
Correct Answer: b

20. In Problem 9, if we graph Mary Granola's indifference curves with avocados on the horizontal axis and grapefruits on the vertical axis, then whenever she has more grapefruits than avocados, the slope of her indifference curve is −2. Whenever she has more avocados than grapefruits, the slope is −1/2. Mary would be indifferent between a bundle with 24 avocados and 30 grapefruits and another bundle with 30 avocados and
a. 22 grapefruits.
b. 24 grapefruits.
c. 26 grapefruits.
d. 28 grapefruits.
e. 25 grapefruits.

Difficulty: 2
Correct Answer: b

21. In Problem 12, recall that Tommy Twit's mother measures the departure of any bundle from her favorite bundle for Tommy by the sum of the absolute values of the differences. Her favorite bundle for Tommy is (2, 7), that is, 2 cookies and 7 glasses of milk. Tommy's mother's indifference curve that passes through the point $(c, m) = (5, 4)$ also passes through
a. the point (8, 1).
b. the points (2, 1), (8, 7), and (5, 10).
c. the point (2, 7).
d. the points (5, 7), (2, 4), and (2, 10).
e. None of the above.

Difficulty: 2
Correct Answer: a

22. In Problem 12, recall that Tommy Twit's mother measures the departure of any bundle from her favorite bundle for Tommy by the sum of the absolute values of the differences. Her favorite bundle for Tommy is (2, 7), that is, 2 cookies and 7 glasses of milk. Tommy's mother's indifference curve that passes through the point $(c, m) = (4, 5)$ also passes through
a. the points (2, 3), (6, 7), and (4, 9).
b. the point (6, 3).
c. the point (2, 7).
d. the points (4, 7), (2, 5), and (2, 9).
e. None of the above.

Difficulty: 2
Correct Answer: d

23. In Problem 12, recall that Tommy Twit's mother measures the departure of any bundle from her favorite bundle for Tommy by the sum of the absolute values of the differences. Her favorite bundle for Tommy is (2, 7), that is, 2 cookies and 7 glasses of milk. Tommy's mother's indifference curve that passes through the point $(c, m) = (4, 5)$ also passes through
a. the points (4, 7), (2, 5), and (2, 9).
b. the point (2, 7).
c. the point (6, 3).
d. the points (2, 3), (6, 7), and (4, 9).
e. None of the above.

Difficulty: 2
Correct Answer: a

24. In Problem 12, recall that Tommy Twit's mother measures the departure of any bundle from her favorite bundle for Tommy by the sum of the absolute values of the differences. Her favorite bundle for Tommy is (2, 7), that is, 2 cookies and 7 glasses of milk. Tommy's mother's indifference curve that passes through the point $(c, m) = (5, 4)$ also passes through
a. the points (2, 1), (8, 7), and (5, 10).
b. the point (2, 7).
c. the point (8, 1).
d. the points (5, 7), (2, 4), and (2, 10).
e. None of the above.

Difficulty: 2
Correct Answer: c

25. In Problem 12, recall that Tommy Twit's mother measures the departure of any bundle from her favorite bundle for Tommy by the sum of the absolute values of the differences. Her favorite bundle for Tommy is (2, 7), that is, 2 cookies and 7 glasses of milk. Tommy's

mother's indifference curve that passes through the point $(c, m) = (4, 5)$ also passes through

a. the points (4, 7), (2, 5), and (2, 9).
b. the point (2, 7).
c. the points (2, 3), (6, 7), and (4, 9).
d. the point (6, 3).
e. None of the above.

Difficulty:
Correct Answer: e

26. In Problem 1, Charlie's indifference curves have the equation $x_B = constant/x_A$, where larger constants correspond to better indifference curves. Charlie strictly prefers the bundle (10, 15) to the bundle
    a. (15, 10).
    b. (11, 14).
    c. (12, 13).
    d. More than one of these options are correct.
    e. None of the above are correct.

Difficulty:
Correct Answer: c

27. In Problem 1, Charlie's indifference curves have the equation $x_B = constant/x_A$, where larger constants correspond to better indifference curves. Charlie strictly prefers the bundle (9, 18) to the bundle
    a. (10, 17).
    b. (18, 9).
    c. (11, 12).
    d. More than one of these options are correct.
    e. None of the above are correct.

Difficulty:
Correct Answer: e

28. In Problem 1, Charlie's indifference curves have the equation $x_B = constant/x_A$, where larger constants correspond to better indifference curves. Charlie strictly prefers the bundle (6, 15) to the bundle
    a. (12, 11).
    b. (7, 14).
    c. (15, 6).
    d. More than one of these options are correct.
    e. None of the above are correct.

Difficulty:
Correct Answer: c

29. In Problem 1, Charlie's indifference curves have the equation $x_B = constant/x_A$, where larger constants correspond to better indifference curves. Charlie strictly prefers the bundle (5, 11) to the bundle
    a. (11, 5).
    b. (6, 10).
    c. (8, 6).
    d. More than one of these options are correct.
    e. None of the above are correct.

Difficulty:
Correct Answer: e

30. In Problem 1, Charlie's indifference curves have the equation $x_B = constant/x_A$, where larger constants correspond to better indifference curves. Charlie strictly prefers the bundle (7, 15) to the bundle
    a. (8, 14).
    b. (15, 7).
    c. (10, 13).
    d. More than one of these options are correct.
    e. None of the above are correct.

CHAPTER 4 Utility

MULTIPLE CHOICE

Difficulty: 1
Correct Answer: e

1. In Problem 1, Charlie has the utility function $U(x_A, x_B) = x_A x_B$. His indifference curve passing through 6 apples and 16 bananas will also pass through the point where he consumes 2 apples and
   a. 12 bananas.
   b. 24 bananas.
   c. 50 bananas.
   d. 54 bananas.
   e. 48 bananas.

Difficulty: 1
Correct Answer: e

2. In Problem 1, Charlie has the utility function $U(x_A, x_B) = x_A x_B$. His indifference curve passing through 24 apples and 6 bananas will also pass through the point where he consumes 4 apples and
   a. 12 bananas.
   b. 40 bananas.
   c. 24 bananas.
   d. 43 bananas.
   e. 36 bananas.

Difficulty: 1
Correct Answer: e

3. In Problem 1, Charlie has the utility function $U(x_A, x_B) = x_A x_B$. His indifference curve passing through 15 apples and 16 bananas will also pass through the point where he consumes 3 apples and
   a. 40 bananas.
   b. 83 bananas.
   c. 20 bananas.
   d. 87 bananas.
   e. 80 bananas.

Difficulty: 1
Correct Answer: e

4. In Problem 1, Charlie has the utility function $U(x_A, x_B) = x_A x_B$. His indifference curve passing through 12 apples and 64 bananas will also pass through the point where he consumes 2 apples and
   a. 386 bananas.
   b. 48 bananas.
   c. 96 bananas.
   d. 394 bananas.
   e. 384 bananas.

Difficulty: 1
Correct Answer: e

5. In Problem 1, Charlie has the utility function $U(x_A, x_B) = x_A x_B$. His indifference curve passing through 40 apples and 9 bananas will also pass through the point where he consumes 5 apples and
   a. 48 bananas.
   b. 77 bananas.
   c. 80 bananas.
   d. 24 bananas.
   e. 72 bananas.

Difficulty:
Correct Answer: b

6. In Problem 1, Charlie's utility function is $U(A, B) = AB$, where A and B are the numbers of apples and bananas, respectively, that he consumes. If Charlie is consuming 15 apples and 30 bananas, then if we put apples on the horizontal axis and bananas on the vertical axis, the slope of his indifference curve at his current consumption is
   a. -16.
   b. -2.
   c. -4.
   d. $-1/2$.
   e. $-1/4$.

Difficulty:
Correct Answer: d

7. In Problem 1, Charlie's utility function is $U(A, B) = AB$, where A and B are the numbers of apples and bananas, respectively, that he consumes. If Charlie is consuming 35 apples and 175 bananas, then if we put apples on the horizontal axis and bananas on the vertical axis, the slope of his indifference curve at his current consumption is
   a. −36.
   b. −10.
   c. −1/5.
   d. −5.
   e. −1/10.

Difficulty:
Correct Answer: d

8. In Problem 1, Charlie's utility function is $U(A, B) = AB$, where A and B are the numbers of apples and bananas, respectively, that he consumes. If Charlie is consuming 40 apples and 240 bananas, then if we put apples on the horizontal axis and bananas on the vertical axis, the slope of his indifference curve at his current consumption is
   a. −1/6.
   b. −12.
   c. −41.
   d. −6.
   e. −1/12.

Difficulty:
Correct Answer: a

9. In Problem 1, Charlie's utility function is $U(A, B) = AB$, where A and B are the numbers of apples and bananas, respectively, that he consumes. If Charlie is consuming 40 apples and 160 bananas, then if we put apples on the horizontal axis and bananas on the vertical axis, the slope of his indifference curve at his current consumption is
   a. −4.
   b. −8.
   c. −41.
   d. −1/4.
   e. −1/8.

Difficulty:
Correct Answer: d

10. In Problem 1, Charlie's utility function is $U(A, B) = AB$, where A and B are the numbers of apples and bananas, respectively, that he consumes. If Charlie is consuming 30 apples and 120 bananas, then if we put apples on the horizontal axis and bananas on the vertical axis, the slope of his indifference curve at his current consumption is
   a. −31.
   b. −8.
   c. −1/4.
   d. −4.
   e. −1/8.

Difficulty: 2
Correct Answer: c

11. In Problem 2, Ambrose has the utility function $U(x_1, x_2) = 4x^{1/2}{}_1 + x_2$. If Ambrose were initially consuming 49 units of nuts (good 1) and 12 units of berries (good 2), then what is the largest number of berries that he would be willing to give up in return for an additional 32 units of nuts?
   a. 9
   b. 21
   c. 8
   d. 4
   e. 2

Difficulty: 2
Correct Answer: c

12. In Problem 2, Ambrose has the utility function $U(x_1, x_2) = 4x^{1/2}{}_1 + x_2$. If Ambrose were initially consuming 9 units of nuts (good 1) and 21 units of berries (good 2), then what is the largest number of berries that he would be willing to give up in return for an additional 16 units of nuts?
   a. 26
   b. 5
   c. 8
   d. 4
   e. 2

Difficulty: 2
Correct Answer: b

13. In Problem 2, Ambrose has the utility function $U(x_1, x_2) = 4x^{1/2}{}_1 + x_2$. If Ambrose were initially consuming 81 units of nuts (good 1) and 22 units of berries (good 2), then what is the largest number of berries that he would be willing to give up in return for an additional 40 units of nuts?
   a. 4
   b. 8
   c. 11
   d. 33
   e. 2

Difficulty: 2
Correct Answer: b

14. In Problem 2, Ambrose has the utility function $U(x_1, x_2) = 4x^{1/2}{}_1 + x_2$. If Ambrose were initially consuming 4 units of nuts (good 1) and 27 units of berries (good 2), then what is the largest number of berries that he would be willing to give up in return for an additional 21 units of nuts?

a. 5
b. 12
c. 6
d. 32
e. 3

Difficulty: 2
Correct Answer: d

15. In Problem 2, Ambrose has the utility function $U(x_1, x_2) = 4x^{1/2}{}_1 + x_2$. If Ambrose were initially consuming 4 units of nuts (good 1) and 23 units of berries (good 2), then what is the largest number of berries that he would be willing to give up in return for an additional 45 units of nuts?
a. 30
b. 7
c. 10
d. 20
e. 5

Difficulty: 2
Correct Answer: c

16. Joe Bob from Problem 12 has a cousin Ike who consumes goods 1 and 2. Ike thinks that 4 units of good 1 is always a perfect substitute for 2 units of good 2. Which of the following utility functions is the only one that would *not* represent Ike's preferences?
a. $U(x_1, x_2) = 2x_1 + 4x_2 + 1000$.
b. $U(x_1, x_2) = 4x^2{}_1 + 16x_1x_2 + 16x^2{}_2$.
c. $U(x_1, x_2) = \min\{2x_1, 4x_2\}$.
d. $U(x_1, x_2) = 20x_1 + 40x_2 - 10{,}000$.
e. More than one of the above does *not* represent Ike's preferences.

Difficulty: 2
Correct Answer: a

17. Joe Bob from Problem 12 has a cousin Don who consumes goods 1 and 2. Don thinks that 3 units of good 1 is always a perfect substitute for 2 units of good 2. Which of the following utility functions is the only one that would *not* represent Don's preferences?
a. $U(x_1, x_2) = \min\{2x_1, 3x_2\}$.
b. $U(x_1, x_2) = 20x_1 + 30x_2 - 10{,}000$.
c. $U(x_1, x_2) = 2x_1 + 3x_2 + 1000$.
d. $U(x_1, x_2) = 4x^2{}_1 + 12x_1x_2 + 9x^2{}_2$.
e. More than one of the above does *not* represent Don's preferences.

Difficulty: 2
Correct Answer: c

18. Joe Bob from Problem 12 has a cousin Pete who consumes goods 1 and 2. Pete thinks that 3 units of good 1 is always a perfect substitute for 4 units of good 2. Which of the following utility functions is the only one that would *not* represent Pete's preferences?
a. $U(x_1, x_2) = 40x_1 + 30x_2 - 10{,}000$.
b. $U(x_1, x_2) = 4x_1 + 3x_2 + 1000$.
c. $U(x_1, x_2) = \min\{4x_1, 3x_2\}$.
d. $U(x_1, x_2) = 16x^2{}_1 + 24x_1x_2 + 9x^2{}_2$.
e. More than one of the above does *not* represent Pete's preferences.

Difficulty: 2
Correct Answer: b

19. Joe Bob from Problem 12 has a cousin Sam who consumes goods 1 and 2. Sam thinks that 2 units of good 1 is always a perfect substitute for 4 units of good 2. Which of the following utility functions is the only one that would *not* represent Sam's preferences?
a. $U(x_1, x_2) = 16x^2{}_1 + 16x_1x_2 + 4x^2{}_2$.
b. $U(x_1, x_2) = \min\{4x_1, 2x_2\}$.
c. $U(x_1, x_2) = 40x_1 + 20x_2 - 10{,}000$.
d. $U(x_1, x_2) = 4x_1 + 2x_2 + 1000$.
e. More than one of the above does *not* represent Sam's preferences.

Difficulty: 2
Correct Answer: c

20. Joe Bob from Problem 12 has a cousin Martin who consumes goods 1 and 2. Martin thinks that 2 units of good 1 is always a perfect substitute for 4 units of good 2. Which of the following utility functions is the only one that would *not* represent Martin's preferences?
a. $U(x_1, x_2) = 40x_1 + 20x_2 - 10{,}000$.
b. $U(x_1, x_2) = 16x^2{}_1 + 16x_1x_2 + 4x^2{}_2$.
c. $U(x_1, x_2) = \min\{4x_1, 2x_2\}$.
d. $U(x_1, x_2) = 4x_1 + 2x_2 + 1000$.
e. More than one of the above does *not* represent Martin's preferences.

Difficulty:
Correct Answer: d

21. In Problem 7, Harry Mazzola has the utility function $U(x_1, x_2) = \min\{x_1 + 2x_2, 2x_1 + x_2\}$. He has \$40 to spend on corn chips and french fries. If the price of corn chips is \$4 per unit and the price of french fries is \$2 per unit, then Harry will
a. definitely spend all of his income on corn chips.
b. definitely spend all of his income on french fries.
c. consume at least as many corn chips as french fries but might consume both.
d. consume at least as many french fries as corn chips but might consume both.
e. consume equal amounts of french fries and corn chips.

Difficulty:
Correct Answer: e

22. In Problem 7, Harry Mazzola has the utility function $U(x_1, x_2) = \min\{x_1 + 2x_2, 2x_1 + x_2\}$. He has \$40 to spend on corn chips and french fries. If the price of

corn chips is \$3 per unit and the price of french fries is \$5 per unit, then Harry will

a. definitely spend all of his income on french fries.
b. consume at least as many corn chips as french fries but might consume both.
c. definitely spend all of his income on corn chips.
d. consume at least as many french fries as corn chips but might consume both.
e. consume equal amounts of french fries and corn chips.

Difficulty:
Correct Answer: e

23. In Problem 7, Harry Mazzola has the utility function $U(x_1, x_2) = \min\{x_1 + 2x_2, 2x_1 + x_2\}$. He has \$40 to spend on corn chips and french fries. If the price of corn chips is \$2 per unit and the price of french fries is \$2 per unit, then Harry will
   a. definitely spend all of his income on corn chips.
   b. consume at least as many french fries as corn chips but might consume both.
   c. consume at least as many corn chips as french fries but might consume both.
   d. definitely spend all of his income on french fries.
   e. consume equal amounts of french fries and corn chips.

Difficulty:
Correct Answer: d

24. In Problem 7, Harry Mazzola has the utility function $U(x_1, x_2) = \min\{x_1 + 2x_2, 2x_1 + x_2\}$. He has \$40 to spend on corn chips and french fries. If the price of corn chips is \$1 per unit and the price of french fries is \$4 per unit, then Harry will
   a. consume at least as many corn chips as french fries but might consume both.
   b. consume at least as many french fries as corn chips but might consume both.
   c. definitely spend all of his income on french fries.
   d. definitely spend all of his income on corn chips.
   e. consume equal amounts of french fries and corn chips.

Difficulty:
Correct Answer: e

25. In Problem 7, Harry Mazzola has the utility function $U(x_1, x_2) = \min\{x_1 + 2x_2, 2x_1 + x_2\}$. He has \$40 to spend on corn chips and french fries. If the price of corn chips is \$2 per unit and the price of french fries is \$2 per unit, then Harry will
   a. consume at least as many corn chips as french fries but might consume both.
   b. definitely spend all of his income on corn chips.
   c. consume at least as many french fries as corn chips but might consume both.
   d. definitely spend all of his income on french fries.
   e. consume equal amounts of french fries and corn chips.

Difficulty:
Correct Answer: c

26. Phil Rupp, from Problem 4, has a sister Ethel who has the utility function $U(x, y) = \min\{4x + y, 5y\}$. Where x is measured on the horizontal axis and y on the vertical axis, her indifference curves consist of a
   a. vertical line segment and a horizontal line segment that meet in a kink along the line $y = 4x$.
   b. vertical line segment and a horizontal line segment that meet in a kink along the line $x = 4y$.
   c. horizontal line segment and a negatively sloped line segment that meet in a kink along the line $x = y$.
   d. positively sloped line segment and a negatively sloped line segment that meet along the line $x = y$.
   e. horizontal line segment and a positively sloped line segment that meet in a kink along the line $x = 4y$.

Difficulty:
Correct Answer: c

27. Phil Rupp, from Problem 4, has a sister Ethel who has the utility function $U(x, y) = \min\{2x + y, 3y\}$. Where x is measured on the horizontal axis and y on the vertical axis, her indifference curves consist of a
   a. vertical line segment and a horizontal line segment that meet in a kink along the line $x = 2y$.
   b. positively sloped line segment and a negatively sloped line segment that meet along the line $x = y$.
   c. horizontal line segment and a negatively sloped line segment that meet in a kink along the line $x = y$.
   d. vertical line segment and a horizontal line segment that meet in a kink along the line $y = 2x$.
   e. horizontal line segment and a positively sloped line segment that meet in a kink along the line $x = 2y$.

Difficulty:
Correct Answer: c

28. Phil Rupp, from Problem 4, has a sister Ethel who has the utility function $U(x, y) = \min\{5x + y, 6y\}$. Where x is measured on the horizontal axis and y on the vertical axis, her indifference curves consist of a
   a. vertical line segment and a horizontal line segment that meet in a kink along the line $y = 5x$.
   b. positively sloped line segment and a negatively sloped line segment that meet along the line $x = y$.
   c. horizontal line segment and a negatively sloped line segment that meet in a kink along the line $x = y$.
   d. vertical line segment and a horizontal line segment that meet in a kink along the line $x = 5y$.
   e. horizontal line segment and a positively sloped line segment that meet in a kink along the line $x = 5y$.

Difficulty:
Correct Answer: c

29. Phil Rupp, from Problem 4, has a sister Ethel who has the utility function $U(x, y) = \min\{3x + y, 4y\}$. Where x is measured on the horizontal axis and y on the vertical axis, her indifference curves consist of a
    a. positively sloped line segment and a negatively sloped line segment that meet along the line $x = y$.
    b. vertical line segment and a horizontal line segment that meet in a kink along the line $y = 3x$.
    c. horizontal line segment and a negatively sloped line segment that meet in a kink along the line $x = y$.
    d. vertical line segment and a horizontal line segment that meet in a kink along the line $x = 3y$.
    e. horizontal line segment and a positively sloped line segment that meet in a kink along the line $x = 3y$.

Difficulty:
Correct Answer: d

30. Phil Rupp, from Problem 4, has a sister Ethel who has the utility function $U(x, y) = \min\{5x + y, 6y\}$. Where x is measured on the horizontal axis and y on the vertical axis, her indifference curves consist of a
    a. positively sloped line segment and a negatively sloped line segment that meet along the line $x = y$.
    b. vertical line segment and a horizontal line segment that meet in a kink along the line $y = 5x$.
    c. vertical line segment and a horizontal line segment that meet in a kink along the line $x = 5y$.
    d. horizontal line segment and a negatively sloped line segment that meet in a kink along the line $x = y$.
    e. horizontal line segment and a positively sloped line segment that meet in a kink along the line $x = 5y$.

CHAPTER 5 Choice

MULTIPLE CHOICE

Difficulty:
Correct Answer: a

1. In Problem 1, Charlie has a utility function $U(x_A, x_B) = x_A x_B$, the price of apples is \$1, and the price of bananas is \$2. If Charlie's income were \$320, how many units of bananas would he consume if he chose the bundle that maximized his utility subject to his budget constraint?
   a. 80
   b. 40
   c. 160
   d. 16
   e. 240

Difficulty:
Correct Answer: b

2. In Problem 1, Charlie has a utility function $U(x_A, x_B) = x_A x_B$, the price of apples is \$1, and the price of bananas is \$2. If Charlie's income were \$160, how many units of bananas would he consume if he chose the bundle that maximized his utility subject to his budget constraint?
   a. 8
   b. 40
   c. 20
   d. 80
   e. 120

Difficulty:
Correct Answer: d

3. In Problem 1, Charlie has a utility function $U(x_A, x_B) = x_A x_B$, the price of apples is \$1, and the price of bananas is \$2. If Charlie's income were \$200, how many units of bananas would he consume if he chose the bundle that maximized his utility subject to his budget constraint?
   a. 25
   b. 10
   c. 100
   d. 50
   e. 150

Difficulty:
Correct Answer: b

4. In Problem 1, Charlie has a utility function $U(x_A, x_B) = x_A x_B$, the price of apples is \$1, and the price of bananas is \$2. If Charlie's income were \$160, how many units of bananas would he consume if he chose the bundle that maximized his utility subject to his budget constraint?
   a. 80
   b. 40
   c. 8
   d. 20
   e. 120

Difficulty:
Correct Answer: a

5. In Problem 1, Charlie has a utility function $U(x_A, x_B) = x_A x_B$, the price of apples is \$1, and the price of bananas is \$2. If Charlie's income were \$400, how many units of bananas would he consume if he chose the bundle that maximized his utility subject to his budget constraint?
   a. 100
   b. 20
   c. 200
   d. 50
   e. 300

Difficulty:
Correct Answer: e

6. Charlie's utility function is $U(x_A, x_B) = x_A x_B$. If Charlie's income were \$40, the price of apples were \$2, and the price of bananas were \$5, how many apples would there be in the best bundle that Charlie could afford?
   a. 20
   b. 6

c. 4
d. 5
e. 10

Difficulty:
Correct Answer: e

7. Charlie's utility function is $U(x_A, x_B) = x_A x_B$. If Charlie's income were \$40, the price of apples were \$2, and the price of bananas were \$6, how many apples would there be in the best bundle that Charlie could afford?
   a. 4
   b. 20
   c. 5
   d. 6
   e. 10

Difficulty:
Correct Answer: e

8. Charlie's utility function is $U(x_A, x_B) = x_A x_B$. If Charlie's income were \$40, the price of apples were \$2, and the price of bananas were \$3, how many apples would there be in the best bundle that Charlie could afford?
   a. 6
   b. 20
   c. 4
   d. 5
   e. 10

Difficulty:
Correct Answer: e

9. Charlie's utility function is $U(x_A, x_B) = x_A x_B$. If Charlie's income were \$40, the price of apples were \$4, and the price of bananas were \$6, how many apples would there be in the best bundle that Charlie could afford?
   a. 8
   b. 10
   c. 12
   d. 9
   e. 5

Difficulty:
Correct Answer: e

10. Charlie's utility function is $U(x_A, x_B) = x_A x_B$. If Charlie's income were \$40, the price of apples were \$5, and the price of bananas were \$8, how many apples would there be in the best bundle that Charlie could afford?
   a. 8
   b. 11
   c. 10
   d. 15
   e. 4

Difficulty:
Correct Answer: d

11. In Problem 2, Clara's utility function is $U(X, Y) = (X + 2)(Y + 1)$. If Clara's marginal rate of substitution is -5 and she is consuming 15 units of good X, how many units of good Y is she consuming?
   a. 5
   b. 85
   c. 20
   d. 84
   e. 11

Difficulty:
Correct Answer: d

12. In Problem 2, Clara's utility function is $U(X, Y) = (X + 2)(Y + 1)$. If Clara's marginal rate of substitution is -2 and she is consuming 10 units of good X, how many units of good Y is she consuming?
   a. 2
   b. 24
   c. 12
   d. 23
   e. 5

Difficulty:
Correct Answer: c

13. In Problem 2, Clara's utility function is $U(X, Y) = (X + 2)(Y + 1)$. If Clara's marginal rate of substitution is -6 and she is consuming 8 units of good X, how many units of good Y is she consuming?
   a. 14
   b. 60
   c. 59
   d. 6
   e. 13

Difficulty:
Correct Answer: d

14. In Problem 2, Clara's utility function is $U(X, Y) = (X + 2)(Y + 1)$. If Clara's marginal rate of substitution is -4 and she is consuming 10 units of good X, how many units of good Y is she consuming?
   a. 48
   b. 14
   c. 4
   d. 47
   e. 9

Difficulty:
Correct Answer: a

15. In Problem 2, Clara's utility function is $U(X, Y) = (X + 2)(Y + 1)$. If Clara's marginal rate of substitution is -6 and she is consuming 8 units of good X, how many units of good Y is she consuming?
   a. 59

b. 6
c. 60
d. 14
e. 13

Difficulty:
Correct Answer: b

16. In Problem 3, Ambrose's utility is $U(x_1, x_2) = 4x^{1/2}{}_1 + x_2$. If the price of nuts (good 1) is \$1, the price of berries (good 2) is \$7, and his income is \$238, how many units of *nuts* will Ambrose choose?
a. 6
b. 196
c. 392
d. 199
e. 98

Difficulty:
Correct Answer: a

17. In Problem 3, Ambrose's utility is $U(x_1, x_2) = 4x^{1/2}{}_1 + x_2$. If the price of nuts (good 1) is \$1, the price of berries (good 2) is \$4, and his income is \$132, how many units of *nuts* will Ambrose choose?
a. 64
b. 17
c. 128
d. 67
e. 32

Difficulty:
Correct Answer: c

18. In Problem 3, Ambrose's utility is $U(x_1, x_2) = 4x^{1/2}{}_1 + x_2$. If the price of nuts (good 1) is \$1, the price of berries (good 2) is \$4, and his income is \$104, how many units of *nuts* will Ambrose choose?
a. 67
b. 128
c. 64
d. 10
e. 32

Difficulty:
Correct Answer: b

19. In Problem 3, Ambrose's utility is $U(x_1, x_2) = 4x^{1/2}{}_1 + x_2$. If the price of nuts (good 1) is \$1, the price of berries (good 2) is \$6, and his income is \$186, how many units of *nuts* will Ambrose choose?
a. 288
b. 144
c. 147
d. 7
e. 72

Difficulty:
Correct Answer: b

20. In Problem 3, Ambrose's utility is $U(x_1, x_2) = 4x^{1/2}{}_1 + x_2$. If the price of nuts (good 1) is \$1, the price of berries (good 2) is \$4, and his income is \$108, how many units of *nuts* will Ambrose choose?
a. 128
b. 64
c. 67
d. 11
e. 32

Difficulty:
Correct Answer: b

21. Ambrose's utility function is $4x^{1/2}{}_1 + x_2$. If the price of nuts (good 1) is \$1, the price of berries (good 2) is \$6, and his income is \$198, how many units of *berries* will Ambrose choose?
a. 145
b. 9
c. 18
d. 8
e. 12

Difficulty:
Correct Answer: c

22. Ambrose's utility function is $4x^{1/2}{}_1 + x_2$. If the price of nuts (good 1) is \$1, the price of berries (good 2) is \$10, and his income is \$460, how many units of *berries* will Ambrose choose?
a. 401
b. 5
c. 6
d. 12
e. 9

Difficulty:
Correct Answer: d

23. Ambrose's utility function is $4x^{1/2}{}_1 + x_2$. If the price of nuts (good 1) is \$1, the price of berries (good 2) is \$9, and his income is \$369, how many units of *berries* will Ambrose choose?
a. 10
b. 4
c. 325
d. 5
e. 8

Difficulty:
Correct Answer: c

24. Ambrose's utility function is $4x^{1/2}{}_1 + x_2$. If the price of nuts (good 1) is \$1, the price of berries (good 2) is \$5, and his income is \$190, how many units of *berries* will Ambrose choose?

a. 36
b. 101
c. 18
d. 17
e. 21

Difficulty:
Correct Answer: c

25. Ambrose's utility function is $4x^{1/2}{}_1 + x_2$. If the price of nuts (good 1) is \$1, the price of berries (good 2) is \$7, and his income is \$259, how many units of *berries* will Ambrose choose?
    a. 8
    b. 197
    c. 9
    d. 18
    e. 12

Difficulty:
Correct Answer: d

26. In Problem 6, Elmer's utility function is $U(x, y) = \min\{x, y^2\}$. If the price of x is \$20, the price of y is \$20, and Elmer chooses to consume 8 units of y, what must Elmer's income be?
    a. \$2,880
    b. \$320
    c. \$1,540
    d. \$1,440
    e. There is not enough information to tell.

Difficulty:
Correct Answer: c

27. In Problem 6, Elmer's utility function is $U(x, y) = \min\{x, y^2\}$. If the price of x is \$20, the price of y is \$30, and Elmer chooses to consume 4 units of y, what must Elmer's income be?
    a. \$540
    b. \$880
    c. \$440
    d. \$200
    e. There is not enough information to tell.

Difficulty:
Correct Answer: d

28. In Problem 6, Elmer's utility function is $U(x, y) = \min\{x, y^2\}$. If the price of x is \$25, the price of y is \$10, and Elmer chooses to consume 5 units of y, what must Elmer's income be?
    a. \$1,350
    b. \$175
    c. \$775
    d. \$675
    e. There is not enough information to tell.

Difficulty:
Correct Answer: d

29. In Problem 6, Elmer's utility function is $U(x, y) = \min\{x, y^2\}$. If the price of x is \$15, the price of y is \$30, and Elmer chooses to consume 2 units of y, what must Elmer's income be?
    a. \$240
    b. \$90
    c. \$220
    d. \$120
    e. There is not enough information to tell.

Difficulty:
Correct Answer: d

30. In Problem 6, Elmer's utility function is $U(x, y) = \min\{x, y^2\}$. If the price of x is \$15, the price of y is \$20, and Elmer chooses to consume 7 units of y, what must Elmer's income be?
    a. \$245
    b. \$1,750
    c. \$975
    d. \$875
    e. There is not enough information to tell.

Difficulty:
Correct Answer: a

31. In Problem 7, what bundle would Linus choose if the price of x is \$2, the price of y is \$4, and his income is \$24?
    a. (0, 6)
    b. (12, 0)
    c. (12, 6)
    d. (6, 3)
    e. (6, 6)

CHAPTER 6 Demand

MULTIPLE CHOICE

Difficulty:
Correct Answer: a

1. In Problem 1, if Charlie's utility function were $X^5{}_A X_B$, if apples cost 70 cents each, and if bananas cost 10 cents each, Charlie's budget line would be tangent to one of his indifference curves whenever
   a. $5X_B = 7X_A$.
   b. $X_B = X_A$.
   c. $X_A = 5X_B$.
   d. $X_B = 5X_A$.
   e. $70X_A + 10X_B = M$.

Difficulty:
Correct Answer: a

2. In Problem 1, if Charlie's utility function were $X^3{}_A X_B$, if apples cost 60 cents each, and if bananas cost 10 cents each, Charlie's budget line would be tangent to one of his indifference curves whenever
   a. $3X_B = 6X_A$.
   b. $X_B = 3X_A$.
   c. $X_B = X_A$.
   d. $X_A = 3X_B$.
   e. $60X_A + 10X_B = M$.

Difficulty:
Correct Answer: a

3. In Problem 1, if Charlie's utility function were $X^5{}_A X_B$, if apples cost 50 cents each, and if bananas cost 10 cents each, Charlie's budget line would be tangent to one of his indifference curves whenever
   a. $5X_B = 5X_A$.
   b. $X_B = 5X_A$.
   c. $X_B = X_A$.
   d. $X_A = 5X_B$.
   e. $50X_A + 10X_B = M$.

Difficulty:
Correct Answer: d

4. In Problem 1, if Charlie's utility function were $X^6{}_A X_B$, if apples cost 90 cents each, and if bananas cost 10 cents each, Charlie's budget line would be tangent to one of his indifference curves whenever
   a. $X_A = 6X_B$.
   b. $X_B = 6X_A$.
   c. $X_B = X_A$.
   d. $6X_B = 9X_A$.
   e. $90X_A + 10X_B = M$.

Difficulty:
Correct Answer: b

5. In Problem 1, if Charlie's utility function were $X^6{}_A X_B$, if apples cost 40 cents each, and if bananas cost 10 cents each, Charlie's budget line would be tangent to one of his indifference curves whenever
   a. $X_B = X_A$.
   b. $6X_B = 4X_A$.
   c. $X_B = 6X_A$.
   d. $X_A = 6X_B$.
   e. $40X_A + 10X_B = M$.

Difficulty:
Correct Answer: d

6. In Problem 1, if Charlie's utility function were $X^2{}_A X_B$, the price of apples were p_A, the price of bananas were p_B, and his income were m, then Charlie's demand for apples would be
   a. $m/(2p_A)$.
   b. $0.50p_A m$.
   c. $m/(p_A + p_B)$.
   d. $0.67m/p_A$.
   e. $1.50p_B m/p_A$.

Difficulty:
Correct Answer: c

7. In Problem 1, if Charlie's utility function were $X^3{}_A X_B$, the price of apples were p_A, the price of bananas were

p_B, and his income were m, then Charlie's demand for apples would be

a. $m/(p_A + p_B)$.
b. $0.33p_Am$.
c. $0.75m/p_A$.
d. $m/(2p_A)$.
e. $1.3p_Bm/p_A$.

Difficulty:
Correct Answer: a

8. In Problem 1, if Charlie's utility function were $X^2_AX_B$, the price of apples were p_A, the price of bananas were p_B, and his income were m, then Charlie's demand for apples would be
   a. $0.67m/p_A$.
   b. $0.50p_Am$.
   c. $m/(p_A + p_B)$.
   d. $m/(2p_A)$.
   e. $1.50p_Bm/p_A$.

Difficulty:
Correct Answer: d

9. In Problem 1, if Charlie's utility function were $X^5_AX_B$, the price of apples were p_A, the price of bananas were p_B, and his income were m, then Charlie's demand for apples would be
   a. $0.20p_Am$.
   b. $m/(2p_A)$.
   c. $m/(p_A + p_B)$.
   d. $0.83m/p_A$.
   e. $1.20p_Bm/p_A$.

Difficulty:
Correct Answer: a

10. In Problem 1, if Charlie's utility function were $X^5_AX_B$, the price of apples were p_A, the price of bananas were p_B, and his income were m, then Charlie's demand for apples would be
   a. $0.83m/p_A$.
   b. $m/(2p_A)$.
   c. $0.20p_Am$.
   d. $m/(p_A + p_B)$.
   e. $1.20p_Bm/p_A$.

Difficulty:
Correct Answer: d

11. Ambrose's brother Anthony has an income of \$75 and a utility function $U(x_1, x_2) = 20x^{1/2}{}_1 + x_2$. The price of good 1 (nuts) is \$2 and the price of good 2 (berries) is \$1. How many units of nuts will Anthony demand?
   a. 35
   b. 21
   c. 23
   d. 25
   e. 48

Difficulty:
Correct Answer: b

12. Ambrose's brother Augustine has an income of \$105 and a utility function $U(x_1, x_2) = 40x^{1/2}{}_1 + x_2$. The price of good 1 (nuts) is \$5 and the price of good 2 (berries) is \$1. How many units of nuts will Augustine demand?
   a. 12
   b. 16
   c. 14
   d. 26
   e. 30

Difficulty:
Correct Answer: c

13. Ambrose's brother Bartholomew has an income of \$114 and a utility function $U(x_1, x_2) = 32x^{1/2}{}_1 + x_2$. The price of good 1 (nuts) is \$4 and the price of good 2 (berries) is \$1. How many units of nuts will Bartholomew demand?
   a. 26
   b. 14
   c. 16
   d. 12
   e. 30

Difficulty:
Correct Answer: d

14. Ambrose's brother Bartholomew has an income of \$109 and a utility function $U(x_1, x_2) = 32x^{1/2}{}_1 + x_2$. The price of good 1 (nuts) is \$4 and the price of good 2 (berries) is \$1. How many units of nuts will Bartholomew demand?
   a. 12
   b. 26
   c. 14
   d. 16
   e. 30

Difficulty:
Correct Answer: d

15. Ambrose's brother Bartholomew has an income of \$133 and a utility function $U(x_1, x_2) = 28x^{1/2}{}_1 + x_2$. The price of good 1 (nuts) is \$2 and the price of good 2 (berries) is \$1. How many units of nuts will Bartholomew demand?
   a. 45
   b. 59
   c. 47
   d. 49
   e. 96

Difficulty:
Correct Answer: a

16. Ambrose's brother Augustine has an income of \$52 and a utility function $U(x_1, x_2) = 18x^{1/2}{}_1 + x_2$. The price of good 1(nuts) is \$3 and the price of good 2(berries) is \$1. How many units of berries will Augustine demand?
    a. 25
    b. 9
    c. 50
    d. 15
    e. There is not enough information to determine the answer.

Difficulty:
Correct Answer: d

17. Ambrose's brother Anthony has an income of \$205 and a utility function $U(x_1, x_2) = 60x^{1/2}{}_1 + x_2$. The price of good 1(nuts) is \$5 and the price of good 2(berries) is \$1. How many units of berries will Augustine demand?
    a. 36
    b. 42
    c. 50
    d. 25
    e. There is not enough information to determine the answer.

Difficulty:
Correct Answer: c

18. Ambrose's brother Anthony has an income of \$95 and a utility function $U(x_1, x_2) = 40x^{1/2}{}_1 + x_2$. The price of good 1(nuts) is \$5 and the price of good 2(berries) is \$1. How many units of berries will Augustine demand?
    a. 22
    b. 30
    c. 15
    d. 16
    e. There is not enough information to determine the answer.

Difficulty:
Correct Answer: c

19. Ambrose's brother Francis has an income of \$170 and a utility function $U(x_1, x_2) = 50x^{1/2}{}_1 + x_2$. The price of good 1(nuts) is \$5 and the price of good 2(berries) is \$1. How many units of berries will Augustine demand?
    a. 31
    b. 25
    c. 45
    d. 90
    e. There is not enough information to determine the answer.

Difficulty:
Correct Answer: d

20. Ambrose's brother Francis has an income of \$60 and a utility function $U(x_1, x_2) = 20x^{1/2}{}_1 + x_2$. The price of good 1(nuts) is \$5 and the price of good 2(berries) is \$1. How many units of berries will Augustine demand?
    a. 10
    b. 80
    c. 4
    d. 40
    e. There is not enough information to determine the answer.

Difficulty:
Correct Answer: e

21. In Problem 6, recall that Miss Muffett insists on consuming 2 units of whey per unit of curds. If the price of curds is \$5 and the price of whey is \$6, then if Miss Muffett's income is m, her demand for curds will be
    a. $m/5$.
    b. $6m/5$.
    c. $5C + 6W = m$.
    d. $5m$.
    e. $m/17$.

Difficulty:
Correct Answer: e

22. In Problem 6, recall that Miss Muffett insists on consuming 2 units of whey per unit of curds. If the price of curds is \$4 and the price of whey is \$4, then if Miss Muffett's income is m, her demand for curds will be
    a. $4m/4$.
    b. $m/4$.
    c. $4C + 4W = m$.
    d. $4m$.
    e. $m/12$.

Difficulty:
Correct Answer: e

23. In Problem 6, recall that Miss Muffett insists on consuming 2 units of whey per unit of curds. If the price of curds is \$5 and the price of whey is \$4, then if Miss Muffett's income is m, her demand for curds will be
    a. $5m$.
    b. $4m/5$.
    c. $5C + 4W = m$.
    d. $m/5$.
    e. $m/13$.

Difficulty:
Correct Answer: e

24. In Problem 6, recall that Miss Muffett insists on consuming 2 units of whey per unit of curds. If the price of curds is \$5 and the price of whey is \$2, then if Miss Muffett's income is m, her demand for curds will be
    a. $m/5$.
    b. $2m/5$.
    c. $5C + 2W = m$.
    d. $5m$.
    e. $m/9$.

Difficulty:
Correct Answer: e

25. In Problem 6, recall that Miss Muffett insists on consuming 2 units of whey per unit of curds. If the price of curds is \$3 and the price of whey is \$5, then if Miss Muffett's income is m, her demand for curds will be
    a. $5m/3$.
    b. $3m$.
    c. $3C + 5W = m$.
    d. $m/3$.
    e. $m/13$.

Difficulty:
Correct Answer: b

26. In Problem 8, recall that Casper's utility function is $3x + y$, where x is his consumption of cocoa and y is his consumption of cheese. If the total cost of x units of cocoa is x^2, the price of cheese is \$8, and Casper's income is \$184, how many units of cocoa will he consume?
    a. 9
    b. 12
    c. 23
    d. 11
    e. 24

Difficulty:
Correct Answer: d

27. In Problem 8, recall that Casper's utility function is $3x + y$, where x is his consumption of cocoa and y is his consumption of cheese. If the total cost of x units of cocoa is x^2, the price of cheese is \$2, and Casper's income is \$39, how many units of cocoa will he consume?
    a. 5
    b. 0
    c. 2
    d. 3
    e. 6

Difficulty:
Correct Answer: a

28. In Problem 8, recall that Casper's utility function is $3x + y$, where x is his consumption of cocoa and y is his consumption of cheese. If the total cost of x units of cocoa is x^2, the price of cheese is \$4, and Casper's income is \$56, how many units of cocoa will he consume?
    a. 6
    b. 5
    c. 11
    d. 3
    e. 12

Difficulty:
Correct Answer: d

29. In Problem 8, recall that Casper's utility function is $3x + y$, where x is his consumption of cocoa and y is his consumption of cheese. If the total cost of x units of cocoa is x^2, the price of cheese is \$4, and Casper's income is \$51, how many units of cocoa will he consume?
    a. 3
    b. 5
    c. 11
    d. 6
    e. 12

Difficulty:
Correct Answer: a

30. In Problem 8, recall that Casper's utility function is $3x + y$, where x is his consumption of cocoa and y is his consumption of cheese. If the total cost of x units of cocoa is x^2, the price of cheese is \$6, and Casper's income is \$101, how many units of cocoa will he consume?
    a. 9
    b. 17
    c. 8
    d. 6
    e. 18

Difficulty: 3
Correct Answer: d

31. In Problem 13, where x is whips and y is leather jackets, if Kinko's utility function were $U(x, y) = \min\{8x, 4x + 16y\}$, then if the price of whips were \$20 and the price of leather jackets were \$60, Kinko would demand
    a. 6 times as many whips as leather jackets.
    b. 5 times as many leather jackets as whips.
    c. 3 times as many leather jackets as whips.
    d. 4 times as many whips as leather jackets.
    e. only leather jackets.

Difficulty: 3
Correct Answer: b

32. In Problem 13, where x is whips and y is leather jackets, if Kinko's utility function were $U(x, y) = \min\{7x, 3x + 12y\}$, then if the price of whips were \$20 and the price of leather jackets were \$60, Kinko would demand
    a. 4 times as many leather jackets as whips.
    b. 3 times as many whips as leather jackets.
    c. 5 times as many whips as leather jackets.
    d. 2 times as many leather jackets as whips.
    e. only leather jackets.

Difficulty: 3
Correct Answer: b

33. In Problem 13, where x is whips and y is leather jackets, if Kinko's utility function were $U(x, y) = \min\{6x, 3x + 9y\}$, then if the price of whips were \$20 and the price of leather jackets were \$40, Kinko would demand
    a. 2 times as many leather jackets as whips.
    b. 3 times as many whips as leather jackets.
    c. 4 times as many leather jackets as whips.
    d. 5 times as many whips as leather jackets.
    e. only leather jackets.

Difficulty: 3
Correct Answer: d

34. In Problem 13, where x is whips and y is leather jackets, if Kinko's utility function were $U(x, y) = \min\{7x, 5x + 10y\}$, then if the price of whips were \$20 and the price of leather jackets were \$20, Kinko would demand
    a. 6 times as many leather jackets as whips.
    b. 4 times as many leather jackets as whips.
    c. 7 times as many whips as leather jackets.
    d. 5 times as many whips as leather jackets.
    e. only leather jackets.

Difficulty: 3
Correct Answer: a

35. In Problem 13, where x is whips and y is leather jackets, if Kinko's utility function were $U(x, y) = \min\{5x, 3x + 6y\}$, then if the price of whips were \$20 and the price of leather jackets were \$20, Kinko would demand
    a. 3 times as many whips as leather jackets.
    b. 4 times as many leather jackets as whips.
    c. 2 times as many leather jackets as whips.
    d. 5 times as many whips as leather jackets.
    e. only leather jackets.

Difficulty:
Correct Answer: b

36. In Problem 7, suppose that it takes 2 square feet to grow a cockleshell and 5 square feet to grow a silver bell in Mary's garden. If her space had initially been 90 square feet and were increased to 120 square feet,
    a. she would only increase her planting of silver bells.
    b. she would plant more silver bells and more cockleshells.
    c. she would only increase her planting of cockleshells.
    d. cockleshells would be an inferior good.
    e. she would increase her planting of cockleshells and decrease her planting of silver bells.

CHAPTER 7 Revealed Preference

MULTIPLE CHOICE

Difficulty: 3
Correct Answer: a

1. In Problem 1, if the only information we had about Goldie were that she chooses the bundle (6, 6) when prices are (6, 7) and she chooses the bundle (10, 0) when prices are (2, 5), then we could conclude that
   a. the bundle (6, 6) is revealed preferred to (10, 0) but there is no evidence that she violates WARP.
   b. neither bundle is revealed preferred to the other.
   c. Goldie violates WARP.
   d. the bundle (10, 0) is revealed preferred to (6, 6) and she violates WARP.
   e. the bundle (10, 0) is revealed preferred to (6, 6) but there is no evidence that she violates WARP.

Difficulty: 3
Correct Answer: c

2. In Problem 1, if the only information we had about Goldie were that she chooses the bundle (6, 6) when prices are (6, 7) and she chooses the bundle (10, 0) when prices are (1, 5), then we could conclude that
   a. Goldie violates WARP.
   b. neither bundle is revealed preferred to the other.
   c. the bundle (6, 6) is revealed preferred to (10, 0) but there is no evidence that she violates WARP.
   d. the bundle (10, 0) is revealed preferred to (6, 6) and she violates WARP.
   e. the bundle (10, 0) is revealed preferred to (6, 6) but there is no evidence that she violates WARP.

Difficulty: 3
Correct Answer: a

3. In Problem 1, if the only information we had about Goldie were that she chooses the bundle (6, 6) when prices are (6, 2) and she chooses the bundle (10, 0) when prices are (3, 5), then we could conclude that
   a. neither bundle is revealed preferred to the other.
   b. Goldie violates WARP.
   c. the bundle (6, 6) is revealed preferred to (10, 0) but there is no evidence that she violates WARP.
   d. the bundle (10, 0) is revealed preferred to (6, 6) and she violates WARP.
   e. the bundle (10, 0) is revealed preferred to (6, 6) but there is no evidence that she violates WARP.

Difficulty: 3
Correct Answer: b

4. In Problem 1, if the only information we had about Goldie were that she chooses the bundle (6, 6) when prices are (6, 7) and she chooses the bundle (10, 0) when prices are (2, 5), then we could conclude that
   a. Goldie violates WARP.
   b. the bundle (6, 6) is revealed preferred to (10, 0) but there is no evidence that she violates WARP.
   c. neither bundle is revealed preferred to the other.
   d. the bundle (10, 0) is revealed preferred to (6, 6) and she violates WARP.
   e. the bundle (10, 0) is revealed preferred to (6, 6) but there is no evidence that she violates WARP.

Difficulty: 3
Correct Answer: a

5. In Problem 1, if the only information we had about Goldie were that she chooses the bundle (6, 6) when prices are (6, 7) and she chooses the bundle (10, 0) when prices are (5, 5), then we could conclude that
   a. the bundle (6, 6) is revealed preferred to (10, 0) but there is no evidence that she violates WARP.
   b. Goldie violates WARP.
   c. the bundle (10, 0) is revealed preferred to (6, 6) and she violates WARP.
   d. neither bundle is revealed preferred to the other.
   e. the bundle (10, 0) is revealed preferred to (6, 6) but there is no evidence that she violates WARP.

Difficulty: 2
Correct Answer: a

6. In Problem 3, Pierre's friend Jean lives in a town where he has to pay 3 francs per glass of wine and 2 francs per loaf of bread. Jean consumes 7 glasses of wine and 4 loaves of bread per day. Recall that Bob has an income of $15 per day and pays $.50 per loaf of bread and $2 per glass of wine. If Bob has the same tastes as Jean and if the only thing that either of them cares about is the consumption of bread and wine,
   a. there is not enough information to determine whether one is better off than the other.
   b. Jean is better off than Bob.
   c. Bob is better off than Jean.
   d. both of them violate the weak axiom of revealed preferences.
   e. Bob and Jean are equally well off.

Difficulty: 2
Correct Answer: b

7. In Problem 3, Pierre's friend Marcel lives in a town where he has to pay 3 francs per glass of wine and 5 francs per loaf of bread. Marcel consumes 9 glasses of wine and 4 loaves of bread per day. Recall that Bob has an income of $15 per day and pays $.50 per loaf of bread and $2 per glass of wine. If Bob has the same tastes as Marcel and if the only thing that either of them cares about is the consumption of bread and wine,
   a. both of them violate the weak axiom of revealed preferences.
   b. there is not enough information to determine whether one is better off than the other.
   c. Bob is better off than Marcel.
   d. Marcel is better off than Bob.
   e. Bob and Marcel are equally well off.

Difficulty: 2
Correct Answer: c

8. In Problem 3, Pierre's friend Henri lives in a town where he has to pay 3 francs per glass of wine and 2 francs per loaf of bread. Henri consumes 10 glasses of wine and 4 loaves of bread per day. Recall that Bob has an income of $15 per day and pays $.50 per loaf of bread and $2 per glass of wine. If Bob has the same tastes as Henri and if the only thing that either of them cares about is the consumption of bread and wine,
   a. Henri is better off than Bob.
   b. both of them violate the weak axiom of revealed preferences.
   c. there is not enough information to determine whether one is better off than the other.
   d. Bob is better off than Henri.
   e. Bob and Henri are equally well off.

Difficulty: 2
Correct Answer: d

9. In Problem 3, Pierre's friend Henri lives in a town where he has to pay 3 francs per glass of wine and 7 francs per loaf of bread. Henri consumes 10 glasses of wine and 4 loaves of bread per day. Recall that Bob has an income of $15 per day and pays $.50 per loaf of bread and $2 per glass of wine. If Bob has the same tastes as Henri and if the only thing that either of them cares about is the consumption of bread and wine,
   a. both of them violate the weak axiom of revealed preferences.
   b. Bob is better off than Henri.
   c. Henri is better off than Bob.
   d. there is not enough information to determine whether one is better off than the other.
   e. Bob and Henri are equally well off.

Difficulty: 2
Correct Answer: a

10. In Problem 3, Pierre's friend Jacques lives in a town where he has to pay 3 francs per glass of wine and 3 francs per loaf of bread. Jacques consumes 8 glasses of wine and 4 loaves of bread per day. Recall that Bob has an income of $15 per day and pays $.50 per loaf of bread and $2 per glass of wine. If Bob has the same tastes as Jacques and if the only thing that either of them cares about is the consumption of bread and wine,
    a. there is not enough information to determine whether one is better off than the other.
    b. both of them violate the weak axiom of revealed preferences.
    c. Jacques is better off than Bob.
    d. Bob is better off than Jacques.
    e. Bob and Jacques are equally well off.

Difficulty: 2
Correct Answer: a

11. Let us reconsider the case of Ronald in Problem 4. Let the prices and consumptions in the base year be as in situation *D*, where $p_1 = \$3$, $p_2 = \$1$, $x_1 = 5$, and $x_2 = 15$. If in the current year, the price of good 1 is $1 and the price of good 2 is $2, and his current consumptions of good 1 and good 2 are 25 and 20 respectively, what is the Laspeyres price index of current prices relative to base year prices? (Pick the most nearly correct answer.)
    a. 1.17
    b. 2.17
    c. 0.75
    d. 0.50
    e. 1.75

Difficulty: 2
Correct Answer: b

12. Let us reconsider the case of Ronald in Problem 4. Let the prices and consumptions in the base year be as in situation *D*, where p_1 = \$3, p_2 = \$1, x_1 = 5, and x_2 = 15. If in the current year, the price of good 1 is \$1 and the price of good 2 is \$1, and his current consumptions of good 1 and good 2 are 25 and 20 respectively, what is the Laspeyres price index of current prices relative to base year prices? (Pick the most nearly correct answer.)
    a. 0.25
    b. 0.67
    c. 0.50
    d. 1.50
    e. 1

Difficulty: 2
Correct Answer: b

13. Let us reconsider the case of Ronald in Problem 4. Let the prices and consumptions in the base year be as in situation *D*, where p_1 = \$3, p_2 = \$1, x_1 = 5, and x_2 = 15. If in the current year, the price of good 1 is \$1 and the price of good 2 is \$3, and his current consumptions of good 1 and good 2 are 25 and 20 respectively, what is the Laspeyres price index of current prices relative to base year prices? (Pick the most nearly correct answer.)
    a. 1
    b. 1.67
    c. 0.75
    d. 2.83
    e. 2.50

Difficulty: 2
Correct Answer: d

14. Let us reconsider the case of Ronald in Problem 4. Let the prices and consumptions in the base year be as in situation *D*, where p_1 = \$3, p_2 = \$1, x_1 = 5, and x_2 = 15. If in the current year, the price of good 1 is \$1 and the price of good 2 is \$1, and his current consumptions of good 1 and good 2 are 25 and 10 respectively, what is the Laspeyres price index of current prices relative to base year prices? (Pick the most nearly correct answer.)
    a. 0.50
    b. 0.25
    c. 1.17
    d. 0.67
    e. 1

Difficulty: 2
Correct Answer: a

15. Let us reconsider the case of Ronald in Problem 4. Let the prices and consumptions in the base year be as in situation *D*, where p_1 = \$3, p_2 = \$1, x_1 = 5, and x_2 = 15. If in the current year, the price of good 1 is \$1 and the price of good 2 is \$1, and his current consumptions of good 1 and good 2 are 25 and 20 respectively, what is the Laspeyres price index of current prices relative to base year prices? (Pick the most nearly correct answer.)
    a. 0.67
    b. 1.50
    c. 0.25
    d. 0.50
    e. 1

Difficulty: 2
Correct Answer: a

16. On the planet Homogenia every consumer who has ever lived consumes only two goods, *x* and *y*, and has the utility function $U(x, y) = xy$. The currency in Homogenia is the fragel. In this country in 1900, the price of good 1 was 1 fragel and the price of good 2 was 2 fragels. Per capita income was 84 fragels. In 2000, the price of good 1 was 3 fragels and the price of good 2 was 4 fragels. The Laspeyres price index for the price level in 2000 relative to the price level in 1900 is
    a. 2.50.
    b. 3.50.
    c. 2.33.
    d. 4.
    e. not possible to determine from this information.

Difficulty: 2
Correct Answer: d

17. On the planet Homogenia every consumer who has ever lived consumes only two goods, *x* and *y*, and has the utility function $U(x, y) = xy$. The currency in Homogenia is the fragel. In this country in 1900, the price of good 1 was 1 fragel and the price of good 2 was 2 fragels. Per capita income was 108 fragels. In 2000, the price of good 1 was 3 fragels and the price of good 2 was 4 fragels. The Laspeyres price index for the price level in 2000 relative to the price level in 1900 is
    a. 2.33.
    b. 2.50.
    c. 4.
    d. 3.50.
    e. not possible to determine from this information.

Difficulty: 2
Correct Answer: d

18. On the planet Homogenia every consumer who has ever lived consumes only two goods, *x* and *y*, and has the utility function $U(x, y) = xy$. The currency in Homogenia is the fragel. In this country in 1900, the price of good 1 was 1 fragel and the price of good 2 was 2 fragels. Per capita income was 60 fragels. In 2000, the price of good 1 was 5 fragels and the price of good 2 was 3 fragels. The Laspeyres price index for the price level in 2000 relative to the price level in 1900 is
    a. 2.67.

b. 5.75.
c. 4.
d. 3.25.
e. not possible to determine from this information.

Difficulty: 2
Correct Answer: b

19. On the planet Homogenia every consumer who has ever lived consumes only two goods, x and y, and has the utility function $U(x, y) = xy$. The currency in Homogenia is the fragel. In this country in 1900, the price of good 1 was 1 fragel and the price of good 2 was 2 fragels. Per capita income was 84 fragels. In 2000, the price of good 1 was 4 fragels and the price of good 2 was 2 fragels. The Laspeyres price index for the price level in 2000 relative to the price level in 1900 is
a. 4.50.
b. 2.50.
c. 2.
d. 3.
e. not possible to determine from this information.

Difficulty: 2
Correct Answer: a

20. On the planet Homogenia every consumer who has ever lived consumes only two goods, x and y, and has the utility function $U(x, y) = xy$. The currency in Homogenia is the fragel. In this country in 1900, the price of good 1 was 1 fragel and the price of good 2 was 2 fragels. Per capita income was 84 fragels. In 2000, the price of good 1 was 1 fragels and the price of good 2 was 5 fragels. The Laspeyres price index for the price level in 2000 relative to the price level in 1900 is
a. 1.75.
b. 3.
c. 2.
d. 2.25.
e. not possible to determine from this information.

Difficulty: 2
Correct Answer: a

21. On the planet Hyperion every consumer who has ever lived has a utility function $U(x, y) = \min\{x, 2y\}$. The currency of Hyperion is the doggerel. In 1850 the price of x was 1 doggerel per unit and the price of y was 2 doggerels per unit. In 2000, the price of x was 11 doggerels per unit and the price of y was 4 doggerels per unit. The Paasche price index of prices in 2000 relative to prices in 1850 is
a. 6.50.
b. 5.
c. 2.75.
d. 3.75.
e. not possible to determine without further information.

Difficulty: 2
Correct Answer: b

22. On the planet Hyperion every consumer who has ever lived has a utility function $U(x, y) = \min\{x, 2y\}$. The currency of Hyperion is the doggerel. In 1850 the price of x was 1 doggerel per unit and the price of y was 2 doggerels per unit. In 2000, the price of x was 4 doggerels per unit and the price of y was 4 doggerels per unit. The Paasche price index of prices in 2000 relative to prices in 1850 is
a. 2.
b. 3.
c. 1.
d. 2.67.
e. not possible to determine without further information.

Difficulty: 2
Correct Answer: a

23. On the planet Hyperion every consumer who has ever lived has a utility function $U(x, y) = \min\{x, 2y\}$. The currency of Hyperion is the doggerel. In 1850 the price of x was 1 doggerel per unit and the price of y was 2 doggerels per unit. In 2000, the price of x was 10 doggerels per unit and the price of y was 4 doggerels per unit. The Paasche price index of prices in 2000 relative to prices in 1850 is
a. 6.
b. 4.67.
c. 2.50.
d. 3.50.
e. not possible to determine without further information.

Difficulty: 2
Correct Answer: d

24. On the planet Hyperion every consumer who has ever lived has a utility function $U(x, y) = \min\{x, 2y\}$. The currency of Hyperion is the doggerel. In 1850 the price of x was 1 doggerel per unit and the price of y was 2 doggerels per unit. In 2000, the price of x was 4 doggerels per unit and the price of y was 4 doggerels per unit. Paasche price index of prices in 2000 relative to prices in 1850 is
a. 1.
b. 2.67.
c. 2.
d. 3.
e. not possible to determine without further information.

Difficulty: 2
Correct Answer: b

25. On the planet Hyperion every consumer who has ever lived has a utility function $U(x, y) = \min\{x, 2y\}$. The

currency of Hyperion is the doggerel. In 1850 the price of x was 1 doggerel per unit and the price of y was 2 doggerels per unit. In 2000, the price of x was 10 doggerels per unit and the price of y was 4 doggerels per unit. Paasche price index of prices in 2000 relative to prices in 1850 is

a. 3.50.
b. 6.
c. 2.50.
d. 4.67.
e. not possible to determine without further information.

Difficulty:
Correct Answer: a

26. In Problem 4, if situation D is $p = (3, 1)$ and $x = (5, 10)$,
    a. Ronald's behavior is consistent with both the Weak and the Strong Axioms of Revealed Preference.
    b. Ronald's behavior is consistent with the Weak but not the Strong Axiom of Revealed Preference.
    c. Ronald's behavior violates both the Weak and the Strong Axioms of Revealed Preference.

CHAPTER 8 Slutsky Equation

MULTIPLE CHOICE

Difficulty:
Correct Answer: a

1. In Problem 1, Charlie's utility function is $x_A x_B$. The price of apples used to be $1 per unit, and the price of bananas $2 per unit. His income was $40 per day. If the price of apples increased to $2.25 and the price of bananas fell to $1.75, then in order to be able to just afford his old bundle, Charlie would have to have a daily income of
   a. $62.50.
   b. $126.
   c. $31.25.
   d. $93.75.
   e. $250.

Difficulty:
Correct Answer: d

2. In Problem 1, Charlie's utility function is $x_A x_B$. The price of apples used to be $1 per unit, and the price of bananas $2 per unit. His income was $40 per day. If the price of apples increased to $1.75 and the price of bananas fell to $.25, then in order to be able to just afford his old bundle, Charlie would have to have a daily income of
   a. $76.
   b. $18.75.
   c. $56.25.
   d. $37.50.
   e. $150.

Difficulty:
Correct Answer: c

3. In Problem 1, Charlie's utility function is $x_A x_B$. The price of apples used to be $1 per unit, and the price of bananas $2 per unit. His income was $40 per day. If the price of apples increased to $1.25 and the price of bananas fell to $.25, then in order to be able to just afford his old bundle, Charlie would have to have a daily income of
   a. $13.75.
   b. $41.25.
   c. $27.50.
   d. $56.
   e. $110.

Difficulty:
Correct Answer: a

4. In Problem 1, Charlie's utility function is $x_A x_B$. The price of apples used to be $1 per unit, and the price of bananas $2 per unit. His income was $40 per day. If the price of apples increased to $1.50 and the price of bananas fell to $1, then in order to be able to just afford his old bundle, Charlie would have to have a daily income of
   a. $40.
   b. $20.
   c. $60.
   d. $81.
   e. $160.

Difficulty:
Correct Answer: b

5. In Problem 1, Charlie's utility function is $x_A x_B$. The price of apples used to be $1 per unit, and the price of bananas $2 per unit. His income was $40 per day. If the price of apples increased to $1.50 and the price of bananas fell to $.75, then in order to be able to just afford his old bundle, Charlie would have to have a daily income of
   a. $56.25.
   b. $37.50.
   c. $76.
   d. $18.75.
   e. $150.

Difficulty:
Correct Answer: c

6. In Problem 1, Charlie's utility function is $x_A x_B$. The price of apples used to be \$1, the price of bananas used to be \$2, and his income used to be \$40. If the price of apples increased to \$4 and the price of bananas stayed constant, the substitution effect on Charlie's apple consumption would reduce his consumption by
   a. 15 apples.
   b. 3 apples.
   c. 7.50 apples.
   d. 12.50 apples.
   e. None of the above.

Difficulty:
Correct Answer: c

7. In Problem 1, Charlie's utility function is $x_A x_B$. The price of apples used to be \$1, the price of bananas used to be \$2, and his income used to be \$40. If the price of apples increased to \$7 and the price of bananas stayed constant, the substitution effect on Charlie's apple consumption would reduce his consumption by
   a. 6 apples.
   b. 13.57 apples.
   c. 8.57 apples.
   d. 17.14 apples.
   e. None of the above.

Difficulty:
Correct Answer: a

8. In Problem 1, Charlie's utility function is $x_A x_B$. The price of apples used to be \$1, the price of bananas used to be \$2, and his income used to be \$40. If the price of apples increased to \$5 and the price of bananas stayed constant, the substitution effect on Charlie's apple consumption would reduce his consumption by
   a. 8 apples.
   b. 16 apples.
   c. 13 apples.
   d. 4 apples.
   e. None of the above.

Difficulty:
Correct Answer: a

9. In Problem 1, Charlie's utility function is $x_A x_B$. The price of apples used to be \$1, the price of bananas used to be \$2, and his income used to be \$40. If the price of apples increased to \$5 and the price of bananas stayed constant, the substitution effect on Charlie's apple consumption would reduce his consumption by
   a. 8 apples.
   b. 13 apples.
   c. 16 apples.
   d. 4 apples.
   e. None of the above.

Difficulty:
Correct Answer: a

10. In Problem 1, Charlie's utility function is $x_A x_B$. The price of apples used to be \$1, the price of bananas used to be \$2, and his income used to be \$40. If the price of apples increased to \$6 and the price of bananas stayed constant, the substitution effect on Charlie's apple consumption would reduce his consumption by
    a. 8.33 apples.
    b. 13.33 apples.
    c. 5 apples.
    d. 16.67 apples.
    e. None of the above.

Difficulty: 2
Correct Answer: c

11. Neville, in Problem 2, has a friend named Marmaduke. Marmaduke has the same demand function for claret as Neville, namely $q = .02m - 2p$, where m is income and p is price. Marmaduke's income is \$8,000 and he initially had to pay a price of \$40 per bottle of claret. The price of claret rose to \$80. The substitution effect of the price change
    a. reduced his demand by 80.
    b. increased his demand by 80.
    c. reduced his demand by 16.
    d. reduced his demand by 144.
    e. reduced his demand by 26.

Difficulty: 2
Correct Answer: a

12. Neville, in Problem 2, has a friend named Oswald. Oswald has the same demand function for claret as Neville, namely $q = .02m - 2p$, where m is income and p is price. Oswald's income is \$5,500 and he initially had to pay a price of \$40 per bottle of claret. The price of claret rose to \$70. The substitution effect of the price change
    a. reduced his demand by 42.
    b. reduced his demand by 60.
    c. increased his demand by 60.
    d. reduced his demand by 78.
    e. reduced his demand by 52.

Difficulty: 2
Correct Answer: c

13. Neville, in Problem 2, has a friend named Edmund. Edmund has the same demand function for claret as Neville, namely $q = .02m - 2p$, where m is income and p is price. Edmund's income is \$9,000 and he initially had to pay a price of \$50 per bottle of claret. The price of claret rose to \$60. The substitution effect of the price change
    a. reduced his demand by 36.
    b. increased his demand by 20.

c. reduced his demand by 4.
d. reduced his demand by 20.
e. reduced his demand by 14.

Difficulty: 2
Correct Answer: b

14. Neville, in Problem 2, has a friend named Algernon. Algernon has the same demand function for claret as Neville, namely $q = .02m - 2p$, where m is income and p is price. Algernon's income is \$5,500 and he initially had to pay a price of \$20 per bottle of claret. The price of claret rose to \$50. The substitution effect of the price change
a. reduced his demand by 60.
b. reduced his demand by 18.
c. reduced his demand by 102.
d. increased his demand by 60.
e. reduced his demand by 28.

Difficulty: 2
Correct Answer: b

15. Neville, in Problem 2, has a friend named Colin. Colin has the same demand function for claret as Neville, namely $q = .02m - 2p$, where m is income and p is price. Colin's income is \$7,500 and he initially had to pay a price of \$40 per bottle of claret. The price of claret rose to \$80. The substitution effect of the price change
a. reduced his demand by 80.
b. reduced his demand by 24.
c. increased his demand by 80.
d. reduced his demand by 136.
e. reduced his demand by 34.

Difficulty: 1
Correct Answer: c

16. Goods 1 and 2 are perfect complements, and a consumer always consumes them in the ratio of 2 units of good 2 per unit of good 1. If a consumer has an income of \$720 and if the price of good 2 changes from \$8 to \$9, while the price of good 1 stays at \$1, then the income effect of the price change
a. is 9 times as strong as the substitution effect.
b. does not change demand for good 1.
c. accounts for the entire change in demand.
d. is exactly twice as strong as the substitution effect.
e. is 8 times as strong as the substitution effect.

Difficulty: 1
Correct Answer: b

17. Goods 1 and 2 are perfect complements, and a consumer always consumes them in the ratio of 2 units of good 2 per unit of good 1. If a consumer has an income of \$300 and if the price of good 2 changes from \$5 to \$6, while the price of good 1 stays at \$1, then the income effect of the price change
a. is exactly twice as strong as the substitution effect.
b. accounts for the entire change in demand.
c. does not change demand for good 1.
d. is 6 times as strong as the substitution effect.
e. is 5 times as strong as the substitution effect.

Difficulty: 1
Correct Answer: b

18. Goods 1 and 2 are perfect complements, and a consumer always consumes them in the ratio of 2 units of good 2 per unit of good 1. If a consumer has an income of \$420 and if the price of good 2 changes from \$6 to \$7, while the price of good 1 stays at \$1, then the income effect of the price change
a. does not change demand for good 1.
b. accounts for the entire change in demand.
c. is exactly twice as strong as the substitution effect.
d. is 7 times as strong as the substitution effect.
e. is 6 times as strong as the substitution effect.

Difficulty: 1
Correct Answer: d

19. Goods 1 and 2 are perfect complements, and a consumer always consumes them in the ratio of 2 units of good 2 per unit of good 1. If a consumer has an income of \$200 and if the price of good 2 changes from \$4 to \$5, while the price of good 1 stays at \$1, then the income effect of the price change
a. does not change demand for good 1.
b. is exactly twice as strong as the substitution effect.
c. is 5 times as strong as the substitution effect.
d. accounts for the entire change in demand.
e. is 4 times as strong as the substitution effect.

Difficulty: 1
Correct Answer: d

20. Goods 1 and 2 are perfect complements, and a consumer always consumes them in the ratio of 2 units of good 2 per unit of good 1. If a consumer has an income of \$120 and if the price of good 2 changes from \$3 to \$4, while the price of good 1 stays at \$1, then the income effect of the price change
a. is 4 times as strong as the substitution effect.
b. does not change demand for good 1.
c. is exactly twice as strong as the substitution effect.
d. accounts for the entire change in demand.
e. is 3 times as strong as the substitution effect.

Difficulty:
Correct Answer: a

21. Suppose that Agatha in Problem 10 had \$465 to spend on tickets for her trip. She needs to travel a total of 1,500 miles. Suppose that the price of first-class tickets

is \$.40 per mile and the price of second-class tickets is \$.10 per mile. How many miles will she travel by second class?

a. 450
b. 600
c. 225
d. 550
e. 150

Difficulty:
Correct Answer: d

22. Suppose that Agatha in Problem 10 had \$440 to spend on tickets for her trip. She needs to travel a total of 1,500 miles. Suppose that the price of first-class tickets is \$.40 per mile and the price of second-class tickets is \$.20 per mile. How many miles will she travel by second class?

a. 400
b. 950
c. 900
d. 800
e. 266.67

Difficulty:
Correct Answer: d

23. Suppose that Agatha in Problem 10 had \$270 to spend on tickets for her trip. She needs to travel a total of 1,500 miles. Suppose that the price of first-class tickets is \$.30 per mile and the price of second-class tickets is \$.10 per mile. How many miles will she travel by second class?

a. 1,000
b. 450
c. 1,050
d. 900
e. 300

Difficulty:
Correct Answer: b

24. Suppose that Agatha in Problem 10 had \$495 to spend on tickets for her trip. She needs to travel a total of 1,500 miles. Suppose that the price of first-class tickets is \$.40 per mile and the price of second-class tickets is \$.10 per mile. How many miles will she travel by second class?

a. 500
b. 350
c. 450
d. 175
e. 116.67

Difficulty:
Correct Answer: d

25. Suppose that Agatha in Problem 10 had \$360 to spend on tickets for her trip. She needs to travel a total of 1,500 miles. Suppose that the price of first-class tickets is \$.40 per mile and the price of second-class tickets is \$.10 per mile. How many miles will she travel by second class?

a. 400
b. 900
c. 950
d. 800
e. 266.67

Difficulty: 2
Correct Answer: c

26. In Problem 4, Maude thinks delphiniums and hollyhocks are perfect substitutes, one for one. If delphiniums currently cost \$3 per unit and hollyhocks cost \$4 per unit and if the price of delphiniums rises to \$6 per unit,

a. the income effect of the change in demand for delphiniums will be bigger than the substitution effect.
b. there will be no change in the demand for hollyhocks.
c. the entire change in demand for delphiniums will be due to the substitution effect.
d. 1/3 of the change in demand will be due to the income effect.
e. 2/3 of the change in demand will be due to the income effect.

Difficulty: 2
Correct Answer: c

27. In Problem 4, Maude thinks delphiniums and hollyhocks are perfect substitutes, one for one. If delphiniums currently cost \$4 per unit and hollyhocks cost \$5 per unit and if the price of delphiniums rises to \$9 per unit,

a. the income effect of the change in demand for delphiniums will be bigger than the substitution effect.
b. 1/5 of the change in demand will be due to the income effect.
c. the entire change in demand for delphiniums will be due to the substitution effect.
d. there will be no change in the demand for hollyhocks.
e. 4/5 of the change in demand will be due to the income effect.

Difficulty: 2
Correct Answer: a

28. In Problem 4, Maude thinks delphiniums and hollyhocks are perfect substitutes, one for one. If delphiniums currently cost \$4 per unit and hollyhocks cost \$5 per unit and if the price of delphiniums rises to \$7 per unit,
    a. the entire change in demand for delphiniums will be due to the substitution effect.
    b. 1/3 of the change in demand will be due to the income effect.
    c. the income effect of the change in demand for delphiniums will be bigger than the substitution effect.
    d. there will be no change in the demand for hollyhocks.
    e. 2/3 of the change in demand will be due to the income effect.

Difficulty: 2
Correct Answer: b

29. In Problem 4, Maude thinks delphiniums and hollyhocks are perfect substitutes, one for one. If delphiniums currently cost \$2 per unit and hollyhocks cost \$3 per unit and if the price of delphiniums rises to \$5 per unit,
    a. there will be no change in the demand for hollyhocks.
    b. the entire change in demand for delphiniums will be due to the substitution effect.
    c. 1/3 of the change in demand will be due to the income effect.
    d. the income effect of the change in demand for delphiniums will be bigger than the substitution effect.
    e. 2/3 of the change in demand will be due to the income effect.

Difficulty: 2
Correct Answer: d

30. In Problem 4, Maude thinks delphiniums and hollyhocks are perfect substitutes, one for one. If delphiniums currently cost \$5 per unit and hollyhocks cost \$6 per unit and if the price of delphiniums rises to \$9 per unit,
    a. the income effect of the change in demand for delphiniums will be bigger than the substitution effect.
    b. 1/4 of the change in demand will be due to the income effect.
    c. there will be no change in the demand for hollyhocks.
    d. the entire change in demand for delphiniums will be due to the substitution effect.
    e. 3/4 of the change in demand will be due to the income effect.

CHAPTER 9 Buying and Selling

MULTIPLE CHOICE

Difficulty:
Correct Answer: d

1. In Problem 1, if Abishag owned 12 quinces and 20 kumquats and if the price of kumquats is 3 times the price of quinces, how many kumquats could she afford if she spent all of her money on kumquats?
   a. 48
   b. 32
   c. 20
   d. 24
   e. 21

Difficulty:
Correct Answer: b

2. In Problem 1, if Abishag owned 10 quinces and 10 kumquats and if the price of kumquats is 2 times the price of quinces, how many kumquats could she afford if she spent all of her money on kumquats?
   a. 10
   b. 15
   c. 20
   d. 30
   e. 12

Difficulty:
Correct Answer: b

3. In Problem 1, if Abishag owned 20 quinces and 20 kumquats and if the price of kumquats is 4 times the price of quinces, how many kumquats could she afford if she spent all of her money on kumquats?
   a. 50
   b. 25
   c. 40
   d. 20
   e. 22

Difficulty:
Correct Answer: b

4. In Problem 1, if Abishag owned 8 quinces and 10 kumquats and if the price of kumquats is 2 times the price of quinces, how many kumquats could she afford if she spent all of her money on kumquats?
   a. 18
   b. 14
   c. 10
   d. 28
   e. 11

Difficulty:
Correct Answer: a

5. In Problem 1, if Abishag owned 6 quinces and 5 kumquats and if the price of kumquats is 3 times the price of quinces, how many kumquats could she afford if she spent all of her money on kumquats?
   a. 7
   b. 14
   c. 11
   d. 5
   e. 4

Difficulty: 2
Correct Answer: a

6. Suppose that Mario in Problem 2 consumes eggplants and tomatoes in the ratio of 1 bushel of eggplants per 1 bushel of tomatoes. His garden yields 30 bushels of eggplants and 10 bushels of tomatoes. He initially faced prices of $10 per bushel for each vegetable, but the price of eggplants rose to $20 per bushel, while the price of tomatoes stayed unchanged. After the price change, he would
   a. increase his eggplant consumption by 3.33 bushels.
   b. decrease his eggplant consumption by at least 3.33 bushels.
   c. increase his consumption of eggplants by 5.33 bushels.

d. decrease his consumption of eggplants by 5.33 bushels.
e. decrease his tomato consumption by at least 1 bushel.

Difficulty: 2
Correct Answer: d

7. Suppose that Mario in Problem 2 consumes eggplants and tomatoes in the ratio of 1 bushel of eggplants per 1 bushel of tomatoes. His garden yields 30 bushels of eggplants and 10 bushels of tomatoes. He initially faced prices of \$10 per bushel for each vegetable, but the price of eggplants rose to \$20 per bushel, while the price of tomatoes stayed unchanged. After the price change, he would
   a. decrease his eggplant consumption by at least 3.33 bushels.
   b. decrease his consumption of eggplants by 5.33 bushels.
   c. increase his consumption of eggplants by 5.33 bushels.
   d. increase his eggplant consumption by 3.33 bushels.
   e. decrease his tomato consumption by at least 1 bushel.

Difficulty: 2
Correct Answer: a

8. Suppose that Mario in Problem 2 consumes eggplants and tomatoes in the ratio of 1 bushel of eggplants per 1 bushel of tomatoes. His garden yields 30 bushels of eggplants and 10 bushels of tomatoes. He initially faced prices of \$10 per bushel for each vegetable, but the price of eggplants rose to \$40 per bushel, while the price of tomatoes stayed unchanged. After the price change, he would
   a. increase his eggplant consumption by 6 bushels.
   b. increase his consumption of eggplants by 8 bushels.
   c. decrease his consumption of eggplants by 8 bushels.
   d. decrease his eggplant consumption by at least 6 bushels.
   e. decrease his tomato consumption by at least 1 bushel.

Difficulty: 2
Correct Answer: a

9. Suppose that Mario in Problem 2 consumes eggplants and tomatoes in the ratio of 1 bushel of eggplants per 1 bushel of tomatoes. His garden yields 30 bushels of eggplants and 10 bushels of tomatoes. He initially faced prices of \$25 per bushel for each vegetable, but the price of eggplants rose to \$100 per bushel, while the price of tomatoes stayed unchanged. After the price change, he would
   a. increase his eggplant consumption by 6 bushels.
   b. increase his consumption of eggplants by 8 bushels.
   c. decrease his consumption of eggplants by 8 bushels.
   d. decrease his eggplant consumption by at least 6 bushels.
   e. decrease his tomato consumption by at least 1 bushel.

Difficulty: 2
Correct Answer: b

10. Suppose that Mario in Problem 2 consumes eggplants and tomatoes in the ratio of 1 bushel of eggplants per 1 bushel of tomatoes. His garden yields 30 bushels of eggplants and 10 bushels of tomatoes. He initially faced prices of \$25 per bushel for each vegetable, but the price of eggplants rose to \$50 per bushel, while the price of tomatoes stayed unchanged. After the price change, he would
    a. increase his consumption of eggplants by 5.33 bushels.
    b. increase his eggplant consumption by 3.33 bushels.
    c. decrease his eggplant consumption by at least 3.33 bushels.
    d. decrease his consumption of eggplants by 5.33 bushels.
    e. decrease his tomato consumption by at least 1 bushel.

Difficulty: 2
Correct Answer: b

11. Dr. J has 80 hours per week to divide between work and leisure. His wage rate if \$5 per hour. Dr. J receives a lump sum payment of \$100 per week. Suppose that the first \$50 per week of his labor income is untaxed, but all labor income above \$50 is taxed at a rate of 70%.
    a. Dr. J's budget line has a kink in it at the point where he takes 80 units of leisure.
    b. Dr. J's budget line has a kink where his income is \$150 and his leisure is 70 hours.
    c. The slope of Dr. J's budget line is everywhere -1.50.
    d. Dr. J's budget line has no kinks in the part of it that corresponds to a positive labor supply.
    e. Dr. J's budget line has a piece that is a horizontal straight line.

Difficulty: 2
Correct Answer: d

12. Dr. J has 80 hours per week to divide between work and leisure. His wage rate if \$5 per hour. Dr. J receives a lump sum payment of \$150 per week. Suppose that the first \$100 per week of his labor income is untaxed, but all labor income above \$100 is taxed at a rate of 70%.
    a. Dr. J's budget line has no kinks in the part of it that corresponds to a positive labor supply.

b. The slope of Dr. J's budget line is everywhere -1.50.
c. Dr. J's budget line has a kink in it at the point where he takes 70 units of leisure.
d. Dr. J's budget line has a kink where his income is $250 and his leisure is 60 hours.
e. Dr. J's budget line has a piece that is a horizontal straight line.

Difficulty: 2
Correct Answer: a

13. Dr. J has 80 hours per week to divide between work and leisure. His wage rate if $5 per hour. Dr. J receives a lump sum payment of $250 per week. Suppose that the first $150 per week of his labor income is untaxed, but all labor income above $150 is taxed at a rate of 70%.
a. Dr. J's budget line has a kink where his income is $400 and his leisure is 50 hours.
b. The slope of Dr. J's budget line is everywhere -1.50.
c. Dr. J's budget line has a kink in it at the point where he takes 60 units of leisure.
d. Dr. J's budget line has no kinks in the part of it that corresponds to a positive labor supply.
e. Dr. J's budget line has a piece that is a horizontal straight line.

Difficulty: 2
Correct Answer: b

14. Dr. J has 80 hours per week to divide between work and leisure. His wage rate if $5 per hour. Dr. J receives a lump sum payment of $250 per week. Suppose that the first $50 per week of his labor income is untaxed, but all labor income above $50 is taxed at a rate of 10%.
a. The slope of Dr. J's budget line is everywhere -4.50.
b. Dr. J's budget line has a kink where his income is $300 and his leisure is 70 hours.
c. Dr. J's budget line has no kinks in the part of it that corresponds to a positive labor supply.
d. Dr. J's budget line has a kink in it at the point where he takes 80 units of leisure.
e. Dr. J's budget line has a piece that is a horizontal straight line.

Difficulty: 2
Correct Answer: a

15. Dr. J has 80 hours per week to divide between work and leisure. His wage rate if $5 per hour. Dr. J receives a lump sum payment of $150 per week. Suppose that the first $100 per week of his labor income is untaxed, but all labor income above $100 is taxed at a rate of 70%.
a. Dr. J's budget line has a kink where his income is $250 and his leisure is 60 hours.
b. Dr. J's budget line has no kinks in the part of it that corresponds to a positive labor supply.
c. The slope of Dr. J's budget line is everywhere -1.50.
d. Dr. J's budget line has a kink in it at the point where he takes 70 units of leisure.
e. Dr. J's budget line has a piece that is a horizontal straight line.

Difficulty: 1
Correct Answer: e

16. Dudley, in Problem 15, has a utility function $U(C, R) = C - (12 - R)^2$, where R is leisure and C is consumption per day. He has 16 hours per day to divide between work and leisure. If Dudley has a nonlabor income of $15 per day and is paid a wage of $8 per hour, how many hours of leisure will he choose per day?
a. 5
b. 6
c. 7
d. 9
e. 8

Difficulty: 1
Correct Answer: e

17. Dudley, in Problem 15, has a utility function $U(C, R) = C - (12 - R)^2$, where R is leisure and C is consumption per day. He has 16 hours per day to divide between work and leisure. If Dudley has a nonlabor income of $30 per day and is paid a wage of $4 per hour, how many hours of leisure will he choose per day?
a. 9
b. 7
c. 8
d. 11
e. 10

Difficulty: 1
Correct Answer: e

18. Dudley, in Problem 15, has a utility function $U(C, R) = C - (12 - R)^2$, where R is leisure and C is consumption per day. He has 16 hours per day to divide between work and leisure. If Dudley has a nonlabor income of $35 per day and is paid a wage of $0 per hour, how many hours of leisure will he choose per day?
a. 11
b. 9
c. 10
d. 13
e. 12

Difficulty: 1
Correct Answer: e

19. Dudley, in Problem 15, has a utility function $U(C, R) = C - (12 - R)^2$, where R is leisure and C is consumption per day. He has 16 hours per day to divide between work and leisure. If Dudley has a nonlabor income of \$10 per day and is paid a wage of \$4 per hour, how many hours of leisure will he choose per day?
 a. 7
 b. 8
 c. 11
 d. 9
 e. 10

Difficulty: 1
Correct Answer: e

20. Dudley, in Problem 15, has a utility function $U(C, R) = C - (12 - R)^2$, where R is leisure and C is consumption per day. He has 16 hours per day to divide between work and leisure. If Dudley has a nonlabor income of \$20 per day and is paid a wage of \$8 per hour, how many hours of leisure will he choose per day?
 a. 7
 b. 6
 c. 9
 d. 5
 e. 8

Difficulty: 1
Correct Answer: b

21. Mr. Cog in Problem 7 has 18 hours a day to divide between labor and leisure. If he has 13 dollars of nonlabor income per day and gets a wage rate of 17 dollars per hour when he works, his budget equation, expressing combinations of consumption and leisure that he can afford to have, can be written as
 a. $17R + C = 13$.
 b. $17R + C = 319$.
 c. $R + C/17 = 421$.
 d. $C = 319 + 17R$.
 e. $C = 358 + 17R$.

Difficulty: 1
Correct Answer: c

22. Mr. Cog in Problem 7 has 18 hours a day to divide between labor and leisure. If he has 9 dollars of nonlabor income per day and gets a wage rate of 15 dollars per hour when he works, his budget equation, expressing combinations of consumption and leisure that he can afford to have, can be written as
 a. $C = 279 + 15R$.
 b. $15R + C = 9$.
 c. $15R + C = 279$.
 d. $R + C/15 = 369$.
 e. $C = 306 + 15R$.

Difficulty: 1
Correct Answer: a

23. Mr. Cog in Problem 7 has 18 hours a day to divide between labor and leisure. If he has 16 dollars of nonlabor income per day and gets a wage rate of 7 dollars per hour when he works, his budget equation, expressing combinations of consumption and leisure that he can afford to have, can be written as
 a. $7R + C = 142$.
 b. $C = 142 + 7R$.
 c. $7R + C = 16$.
 d. $R + C/7 = 184$.
 e. $C = 190 + 7R$.

Difficulty: 1
Correct Answer: a

24. Mr. Cog in Problem 7 has 18 hours a day to divide between labor and leisure. If he has 8 dollars of nonlabor income per day and gets a wage rate of 5 dollars per hour when he works, his budget equation, expressing combinations of consumption and leisure that he can afford to have, can be written as
 a. $5R + C = 98$.
 b. $R + C/5 = 128$.
 c. $C = 98 + 5R$.
 d. $5R + C = 8$.
 e. $C = 122 + 5R$.

Difficulty: 1
Correct Answer: d

25. Mr. Cog in Problem 7 has 18 hours a day to divide between labor and leisure. If he has 17 dollars of nonlabor income per day and gets a wage rate of 13 dollars per hour when he works, his budget equation, expressing combinations of consumption and leisure that he can afford to have, can be written as
 a. $R + C/13 = 329$.
 b. $13R + C = 17$.
 c. $C = 251 + 13R$.
 d. $13R + C = 251$.
 e. $C = 302 + 13R$.

Difficulty:
Correct Answer: d

26. Mr. Cog in Problem 7 has 18 hours per day to divide between labor and leisure. If he has a nonlabor income of 44 dollars per day and a wage rate of 14 dollars per hour, he will choose a combination of labor and leisure that allows him to spend
 a. 296 dollars per day on consumption.

b. 138 dollars per day on consumption.
c. 170 dollars per day on consumption.
d. 148 dollars per day on consumption.
e. 222 dollars per day on consumption.

Difficulty:
Correct Answer: b

27. Mr. Cog in Problem 7 has 18 hours per day to divide between labor and leisure. If he has a nonlabor income of 40 dollars per day and a wage rate of 6 dollars per hour, he will choose a combination of labor and leisure that allows him to spend
 a. 148 dollars per day on consumption.
 b. 74 dollars per day on consumption.
 c. 94 dollars per day on consumption.
 d. 64 dollars per day on consumption.
 e. 111 dollars per day on consumption.

Difficulty:
Correct Answer: c

28. Mr. Cog in Problem 7 has 18 hours per day to divide between labor and leisure. If he has a nonlabor income of 38 dollars per day and a wage rate of 9 dollars per hour, he will choose a combination of labor and leisure that allows him to spend
 a. 90 dollars per day on consumption.
 b. 200 dollars per day on consumption.
 c. 100 dollars per day on consumption.
 d. 119 dollars per day on consumption.
 e. 150 dollars per day on consumption.

Difficulty:
Correct Answer: d

29. Mr. Cog in Problem 7 has 18 hours per day to divide between labor and leisure. If he has a nonlabor income of 34 dollars per day and a wage rate of 17 dollars per hour, he will choose a combination of labor and leisure that allows him to spend
 a. 160 dollars per day on consumption.
 b. 340 dollars per day on consumption.
 c. 187 dollars per day on consumption.
 d. 170 dollars per day on consumption.
 e. 255 dollars per day on consumption.

Difficulty:
Correct Answer: c

30. Mr. Cog in Problem 7 has 18 hours per day to divide between labor and leisure. If he has a nonlabor income of 48 dollars per day and a wage rate of 15 dollars per hour, he will choose a combination of labor and leisure that allows him to spend
 a. 318 dollars per day on consumption.
 b. 149 dollars per day on consumption.
 c. 159 dollars per day on consumption.
 d. 183 dollars per day on consumption.
 e. 238.50 dollars per day on consumption.

CHAPTER 10 Intertemporal Choice

MULTIPLE CHOICE

Difficulty:
Correct Answer: b

1. If Peregrine in Problem 1 consumes (1, 400, 1, 210) and earns (900, 1, 760) and if the interest rate is 10%, the present value of his endowment is
   a. $2,660.
   b. $2,500.
   c. $2,610.
   d. $5,250.
   e. $6,150.

Difficulty:
Correct Answer: b

2. If Peregrine in Problem 1 consumes (1, 400, 1, 440) and earns (900, 2, 040) and if the interest rate is 20%, the present value of his endowment is
   a. $2,940.
   b. $2,600.
   c. $5,720.
   d. $2,840.
   e. $6,620.

Difficulty:
Correct Answer: c

3. If Peregrine in Problem 1 consumes (1, 500, 1, 080) and earns (1, 000, 1, 680) and if the interest rate is 20%, the present value of his endowment is
   a. $2,680.
   b. $5,280.
   c. $2,400.
   d. $2,580.
   e. $6,280.

Difficulty:
Correct Answer: a

4. If Peregrine in Problem 1 consumes (900, 805) and earns (600, 1, 150) and if the interest rate is 15%, the present value of his endowment is
   a. $1,600.
   b. $3,440.
   c. $1,705.
   d. $1,750.
   e. $4,040.

Difficulty:
Correct Answer: c

5. If Peregrine in Problem 1 consumes (1, 500, 880) and earns (1, 300, 1, 100) and if the interest rate is 10%, the present value of his endowment is
   a. $4,830.
   b. $2,400.
   c. $2,300.
   d. $2,380.
   e. $6,130.

Difficulty:
Correct Answer: b

6. Suppose that Molly from Problem 2 had an income of \$500 in period 1 and an income of \$250 in period 2. Suppose that her utility function were $c^a{}_1c^{1-a}{}_2$, where $a = 0.60$ and the interest rate were 25%. If her income in period 1 doubled and her income in period 2 stayed the same, her consumption in period 1 would
   a. double.
   b. increase by $300.
   c. increase by $150.
   d. stay constant.
   e. increase by $500.

Difficulty:
Correct Answer: b

7. Suppose that Molly from Problem 2 had an income of \$400 in period 1 and an income of \$690 in period 2. Suppose that her utility function were $c^a{}_1c^{1-a}{}_2$, where $a = 0.80$ and the interest rate were 15%. If her income in period 1 doubled and her income in period 2 stayed the same, her consumption in period 1 would
   a. stay constant.
   b. increase by $320.
   c. increase by $160.
   d. double.
   e. increase by $400.

Difficulty:
Correct Answer: b

8. Suppose that Molly from Problem 2 had an income of \$500 in period 1 and an income of \$880 in period 2. Suppose that her utility function were $c^a{}_1 c^{1-a}{}_2$, where $a = 0.60$ and the interest rate were 10%. If her income in period 1 doubled and her income in period 2 stayed the same, her consumption in period 1 would
   a. stay constant.
   b. increase by \$300.
   c. double.
   d. increase by \$150.
   e. increase by \$500.

Difficulty:
Correct Answer: a

9. Suppose that Molly from Problem 2 had an income of \$200 in period 1 and an income of \$460 in period 2. Suppose that her utility function were $c^a{}_1 c^{1-a}{}_2$, where $a = 0.40$ and the interest rate were 15%. If her income in period 1 doubled and her income in period 2 stayed the same, her consumption in period 1 would
   a. increase by \$80.
   b. increase by \$40.
   c. double.
   d. stay constant.
   e. increase by \$200.

Difficulty:
Correct Answer: d

10. Suppose that Molly from Problem 2 had an income of \$600 in period 1 and an income of \$880 in period 2. Suppose that her utility function were $c^a{}_1 c^{1-a}{}_2$, where $a = 0.80$ and the interest rate were 10%. If her income in period 1 doubled and her income in period 2 stayed the same, her consumption in period 1 would
    a. increase by \$240.
    b. stay constant.
    c. double.
    d. increase by \$480.
    e. increase by \$600.

Difficulty:
Correct Answer: b

11. Mr. O. B. Kandle, of Problem 8, has a utility function c_1c_2, where c_1 is his consumption in period 1 and c_2 is his consumption in period 2. He has no income in period 2. If he had an income of \$50,000 in period 1 and the interest rate increased from 10 to 15%,
    a. his savings would increase by 5% and his consumption in period 2 would also increase.
    b. his savings would not change but his consumption in period 2 would increase by 1,250.
    c. his consumption in both periods would increase.
    d. his consumption in both periods would decrease.
    e. his consumption in period 1 would decrease by 15% and his consumption in period 2 would also decrease.

Difficulty:
Correct Answer: c

12. Mr. O. B. Kandle, of Problem 8, has a utility function c_1c_2, where c_1 is his consumption in period 1 and c_2 is his consumption in period 2. He has no income in period 2. If he had an income of \$70,000 in period 1 and the interest rate increased from 10 to 16%,
    a. his savings would increase by 6% and his consumption in period 2 would also increase.
    b. his consumption in both periods would decrease.
    c. his savings would not change but his consumption in period 2 would increase by 2,100.
    d. his consumption in both periods would increase.
    e. his consumption in period 1 would decrease by 16% and his consumption in period 2 would also decrease.

Difficulty:
Correct Answer: d

13. Mr. O. B. Kandle, of Problem 8, has a utility function c_1c_2, where c_1 is his consumption in period 1 and c_2 is his consumption in period 2. He has no income in period 2. If he had an income of \$40,000 in period 1 and the interest rate increased from 10 to 12%,
    a. his consumption in both periods would increase.
    b. his savings would increase by 2% and his consumption in period 2 would also increase.
    c. his consumption in both periods would decrease.
    d. his savings would not change but his consumption in period 2 would increase by 400.
    e. his consumption in period 1 would decrease by 12% and his consumption in period 2 would also decrease.

Difficulty:
Correct Answer: b

14. Mr. O. B. Kandle, of Problem 8, has a utility function c_1c_2, where c_1 is his consumption in period 1 and c_2 is his consumption in period 2. He has no income in period 2. If he had an income of \$60,000 in period 1 and the interest rate increased from 10 to 17%,
    a. his savings would increase by 7% and his consumption in period 2 would also increase.
    b. his savings would not change but his consumption in period 2 would increase by 2,100.
    c. his consumption in both periods would increase.
    d. his consumption in both periods would decrease.
    e. his consumption in period 1 would decrease by 17% and his consumption in period 2 would also decrease.

Difficulty:
Correct Answer: a

15. Mr. O. B. Kandle, of Problem 8, has a utility function c_1c_2, where c_1 is his consumption in period 1 and c_2 is his consumption in period 2. He has no income in period 2. If he had an income of \$40,000 in period 1 and the interest rate increased from 10 to 19%,
    a. his savings would not change but his consumption in period 2 would increase by 1,800.
    b. his savings would increase by 9% and his consumption in period 2 would also increase.
    c. his consumption in both periods would decrease.
    d. his consumption in both periods would increase.
    e. his consumption in period 1 would decrease by 19% and his consumption in period 2 would also decrease.

Difficulty:
Correct Answer: e

16. Harvey Habit in Problem 9 has a utility function $U(c_1, c_2) = \min\{c_1, c_2\}$. If he had an income of \$430 in period 1 and \$860 in period 2 and if the interest rate were 15%, how much would Harvey choose to spend on bread in period 1?
    a. \$945
    b. \$210
    c. \$315
    d. \$1,260
    e. \$630

Difficulty:
Correct Answer: e

17. Harvey Habit in Problem 9 has a utility function $U(c_1, c_2) = \min\{c_1, c_2\}$. If he had an income of \$1,290 in period 1 and \$860 in period 2 and if the interest rate were 15%, how much would Harvey choose to spend on bread in period 1?
    a. \$1,635
    b. \$363.33
    c. \$545
    d. \$2,180
    e. \$1,090

Difficulty:
Correct Answer: e

18. Harvey Habit in Problem 9 has a utility function $U(c_1, c_2) = \min\{c_1, c_2\}$. If he had an income of \$420 in period 1 and \$1,050 in period 2 and if the interest rate were 10%, how much would Harvey choose to spend on bread in period 1?
    a. \$240
    b. \$360
    c. \$1,440
    d. \$1,080
    e. \$720

Difficulty:
Correct Answer: e

19. Harvey Habit in Problem 9 has a utility function $U(c_1, c_2) = \min\{c_1, c_2\}$. If he had an income of \$645 in period 1 and \$1,290 in period 2 and if the interest rate were 15%, how much would Harvey choose to spend on bread in period 1?
    a. \$1,417.50
    b. \$315
    c. \$1,890
    d. \$472.50
    e. \$945

Difficulty:
Correct Answer: e

20. Harvey Habit in Problem 9 has a utility function $U(c_1, c_2) = \min\{c_1, c_2\}$. If he had an income of \$440 in period 1 and \$880 in period 2 and if the interest rate were 20%, how much would Harvey choose to spend on bread in period 1?
    a. \$1,280
    b. \$320
    c. \$213.33
    d. \$960
    e. \$640

Difficulty:
Correct Answer: a

21. In the village in Problem 10, if the harvest this year is 6,000 bushels of grain and the harvest next year will be 1,100 bushels and if rats eat 10% of any grain that is stored for a year, how many bushels of grain could the villagers consume next year if they consume 1,000 bushels of grain this year?
    a. 5,600
    b. 4,500
    c. 7,100
    d. 8,400
    e. 1,200

Difficulty:
Correct Answer: b

22. In the village in Problem 10, if the harvest this year is 6,000 bushels of grain and the harvest next year will be 900 bushels and if rats eat 10% of any grain that is stored for a year, how many bushels of grain could the villagers consume next year if they consume 1,000 bushels of grain this year?
    a. 6,900
    b. 5,400
    c. 8,100
    d. 4,500
    e. 1,000

Difficulty:
Correct Answer: c

23. In the village in Problem 10, if the harvest this year is 4,000 bushels of grain and the harvest next year will be 1,200 bushels and if rats eat 50% of any grain that is stored for a year, how many bushels of grain could the villagers consume next year if they consume 1,000 bushels of grain this year?
 a. 4,050
 b. 5,200
 c. 2,700
 d. 1,500
 e. 1,300

Difficulty:
Correct Answer: c

24. In the village in Problem 10, if the harvest this year is 4,000 bushels of grain and the harvest next year will be 1,200 bushels and if rats eat 10% of any grain that is stored for a year, how many bushels of grain could the villagers consume next year if they consume 1,000 bushels of grain this year?
 a. 2,700
 b. 5,850
 c. 3,900
 d. 5,200
 e. 1,300

Difficulty:
Correct Answer: a

25. In the village in Problem 10, if the harvest this year is 4,000 bushels of grain and the harvest next year will be 700 bushels and if rats eat 30% of any grain that is stored for a year, how many bushels of grain could the villagers consume next year if they consume 1,000 bushels of grain this year?
 a. 2,800
 b. 2,100
 c. 4,700
 d. 4,200
 e. 800

Difficulty:
Correct Answer: c

26. Patience has a utility function $U(c_1, c_2) = c^{1/2}{}_1 + 0.80c^{1/2}{}_2$, where c_1 is her consumption in period 1 and c_2 is her consumption in period 2. Her income in period 1 is 3 times as large as her income in period 2. At what interest rate will she choose to consume the same amount in period 1 as in period 2?
 a. 0.75
 b. 0.13
 c. 0.25
 d. 0
 e. 0.38

Difficulty:
Correct Answer: a

27. Patience has a utility function $U(c_1, c_2) = c^{1/2}{}_1 + 0.83c^{1/2}{}_2$, where c_1 is her consumption in period 1 and c_2 is her consumption in period 2. Her income in period 1 is 3 times as large as her income in period 2. At what interest rate will she choose to consume the same amount in period 1 as in period 2?
 a. 0.20
 b. 0
 c. 0.10
 d. 0.60
 e. 0.30

Difficulty:
Correct Answer: d

28. Patience has a utility function $U(c_1, c_2) = c^{1/2}{}_1 + 0.87c^{1/2}{}_2$, where c_1 is her consumption in period 1 and c_2 is her consumption in period 2. Her income in period 1 is 5 times as large as her income in period 2. At what interest rate will she choose to consume the same amount in period 1 as in period 2?
 a. 0.75
 b. 0
 c. 0.08
 d. 0.15
 e. 0.23

Difficulty:
Correct Answer: d

29. Patience has a utility function $U(c_1, c_2) = c^{1/2}{}_1 + 0.83c^{1/2}{}_2$, where c_1 is her consumption in period 1 and c_2 is her consumption in period 2. Her income in period 1 is 5 times as large as her income in period 2. At what interest rate will she choose to consume the same amount in period 1 as in period 2?
 a. 0.10
 b. 0
 c. 1
 d. 0.20
 e. 0.30

Difficulty:
Correct Answer: d

30. Patience has a utility function $U(c_1, c_2) = c^{1/2}{}_1 + 0.87c^{1/2}{}_2$, where c_1 is her consumption in period 1 and c_2 is her consumption in period 2. Her income in period 1 is 2 times as large as her income in period 2. At what interest rate will she choose to consume the same amount in period 1 as in period 2?
 a. 0
 b. 0.08
 c. 0.30
 d. 0.15
 e. 0.23

Difficulty:
Correct Answer: a

31. Let i be the rate of inflation and r the nominal interest rate. (We use pi to denote the rate of inflation in the book.) The (exact) real rate of interest is given by
    a. $(r - i)/(i + 1)$.
    b. $(r + i)/(i + 1)$.
    c. $(r + i)/(i - 1)$.
    d. $(r - i)/(i - 1)$.
    e. $r - i/r$.

CHAPTER 11 Asset Markets

MULTIPLE CHOICE

Difficulty: 2
Correct Answer: a

1. Ashley, in Problem 6, has discovered another wine, wine *D*. Wine drinkers are willing to pay 45 dollars to drink it right now. The amount that wine drinkers are willing to pay will rise by 15 dollars each year that the wine ages. The interest rate is 10%. How much would Ashley be willing to pay for the wine if he buys it as an investment? (Pick the closest answer.)
   a. 76 dollars
   b. 45 dollars
   c. 150 dollars
   d. 495 dollars
   e. 71 dollars

Difficulty: 2
Correct Answer: d

2. Ashley, in Problem 6, has discovered another wine, wine *D*. Wine drinkers are willing to pay 70 dollars to drink it right now. The amount that wine drinkers are willing to pay will rise by 10 dollars each year that the wine ages. The interest rate is 10%. How much would Ashley be willing to pay for the wine if he buys it as an investment? (Pick the closest answer.)
   a. 770 dollars
   b. 100 dollars
   c. 70 dollars
   d. 75 dollars
   e. 91 dollars

Difficulty: 2
Correct Answer: c

3. Ashley, in Problem 6, has discovered another wine, wine *D*. Wine drinkers are willing to pay 30 dollars to drink it right now. The amount that wine drinkers are willing to pay will rise by 15 dollars each year that the wine ages. The interest rate is 10%. How much would Ashley be willing to pay for the wine if he buys it as an investment? (Pick the closest answer.)
   a. 330 dollars
   b. 150 dollars
   c. 69 dollars
   d. 30 dollars
   e. 56 dollars

Difficulty: 2
Correct Answer: a

4. Ashley, in Problem 6, has discovered another wine, wine *D*. Wine drinkers are willing to pay 60 dollars to drink it right now. The amount that wine drinkers are willing to pay will rise by 15 dollars each year that the wine ages. The interest rate is 10%. How much would Ashley be willing to pay for the wine if he buys it as an investment? (Pick the closest answer.)
   a. 84 dollars
   b. 150 dollars
   c. 60 dollars
   d. 660 dollars
   e. 86 dollars

Difficulty: 2
Correct Answer: c

5. Ashley, in Problem 6, has discovered another wine, wine *D*. Wine drinkers are willing to pay 40 dollars to drink it right now. The amount that wine drinkers are willing to pay will rise by 20 dollars each year that the wine ages. The interest rate is 10%. How much would Ashley be willing to pay for the wine if he buys it as an investment? (Pick the closest answer.)
   a. 200 dollars
   b. 40 dollars
   c. 93 dollars
   d. 440 dollars
   e. 71 dollars

Difficulty: 2
Correct Answer: b

6. Chillingsworth from Problem 10 has a neighbor, Shivers, who faces the same options for insulating his house as Chillingsworth. But Shivers has a larger house. Shivers's annual fuel bill for home heating is 1,200 dollars per year. Plan *A* will reduce his annual fuel bill by 15%, plan *B* will reduce it by 20%, and plan *C* will eliminate his need for heating fuel altogether. The plan *A* insulation job would cost Shivers 1,200 dollars, plan *B* would cost him 1,700 dollars, and plan *C* would cost him 13,200 dollars. If the interest rate is 10% and his house and the insulation job last forever, which plan is the best for Shivers?
   a. Plan *A*.
   b. Plan *B*.
   c. Plan *C*.
   d. Plans *A* and *B* are equally good.
   e. He is best off using none of the plans.

Difficulty: 2
Correct Answer: a

7. Chillingsworth from Problem 10 has a neighbor, Shivers, who faces the same options for insulating his house as Chillingsworth. But Shivers has a larger house. Shivers's annual fuel bill for home heating is 1,100 dollars per year. Plan *A* will reduce his annual fuel bill by 15%, plan *B* will reduce it by 20%, and plan *C* will eliminate his need for heating fuel altogether. The plan *A* insulation job would cost Shivers 1,100 dollars, plan *B* would cost him 2,000 dollars, and plan *C* would cost him 12,100 dollars. If the interest rate is 10% and his house and the insulation job last forever, which plan is the best for Shivers?
   a. Plan *A*.
   b. Plans *A* and *B* are equally good.
   c. Plan *B*.
   d. Plan *C*.
   e. He is best off using none of the plans.

Difficulty: 2
Correct Answer: c

8. Chillingsworth from Problem 10 has a neighbor, Shivers, who faces the same options for insulating his house as Chillingsworth. But Shivers has a larger house. Shivers's annual fuel bill for home heating is 1,200 dollars per year. Plan *A* will reduce his annual fuel bill by 15%, plan *B* will reduce it by 20%, and plan *C* will eliminate his need for heating fuel altogether. The plan *A* insulation job would cost Shivers 1,200 dollars, plan *B* would cost him 1,900 dollars, and plan *C* would cost him 13,200 dollars. If the interest rate is 10% and his house and the insulation job last forever, which plan is the best for Shivers?
   a. Plan *B*.
   b. Plans *A* and *B* are equally good.
   c. Plan *A*.
   d. Plan *C*.
   e. He is best off using none of the plans.

Difficulty: 2
Correct Answer: a

9. Chillingsworth from Problem 10 has a neighbor, Shivers, who faces the same options for insulating his house as Chillingsworth. But Shivers has a larger house. Shivers's annual fuel bill for home heating is 700 dollars per year. Plan *A* will reduce his annual fuel bill by 15%, plan *B* will reduce it by 20%, and plan *C* will eliminate his need for heating fuel altogether. The plan *A* insulation job would cost Shivers 700 dollars, plan *B* would cost him 1,200 dollars, and plan *C* would cost him 7,700 dollars. If the interest rate is 10% and his house and the insulation job last forever, which plan is the best for Shivers?
   a. Plan *A*.
   b. Plan *B*.
   c. Plans *A* and *B* are equally good.
   d. Plan *C*.
   e. He is best off using none of the plans.

Difficulty: 2
Correct Answer: c

10. Chillingsworth from Problem 10 has a neighbor, Shivers, who faces the same options for insulating his house as Chillingsworth. But Shivers has a larger house. Shivers's annual fuel bill for home heating is 900 dollars per year. Plan *A* will reduce his annual fuel bill by 15%, plan *B* will reduce it by 20%, and plan *C* will eliminate his need for heating fuel altogether. The plan *A* insulation job would cost Shivers 900 dollars, plan *B* would cost him 1,700 dollars, and plan *C* would cost him 9,900 dollars. If the interest rate is 10% and his house and the insulation job last forever, which plan is the best for Shivers?
    a. Plans *A* and *B* are equally good.
    b. Plan *B*.
    c. Plan *A*.
    d. Plan *C*.
    e. He is best off using none of the plans.

Difficulty: 2
Correct Answer: d

11. The price of an antique is expected to rise by 9% during the next year. The interest rate is 11%. You are thinking of buying an antique and selling it a year from now. You would be willing to pay a total of 900 dollars for the pleasure of owning the antique for a year. How

much would you be willing to pay to buy this antique? (See Problem 5.)

a. 8,181.82 dollars
b. 18,900 dollars
c. 900 dollars
d. 45,000 dollars
e. 9,000 dollars

Difficulty: 2
Correct Answer: b

12. The price of an antique is expected to rise by 6% during the next year. The interest rate is 7%. You are thinking of buying an antique and selling it a year from now. You would be willing to pay a total of 600 dollars for the pleasure of owning the antique for a year. How much would you be willing to pay to buy this antique? (See Problem 5.)
a. 12,600 dollars
b. 60,000 dollars
c. 600 dollars
d. 8,571.43 dollars
e. 6,000 dollars

Difficulty: 2
Correct Answer: d

13. The price of an antique is expected to rise by 4% during the next year. The interest rate is 9%. You are thinking of buying an antique and selling it a year from now. You would be willing to pay a total of 400 dollars for the pleasure of owning the antique for a year. How much would you be willing to pay to buy this antique? (See Problem 5.)
a. 400 dollars
b. 8,400 dollars
c. 4,444.44 dollars
d. 8,000 dollars
e. 4,000 dollars

Difficulty: 2
Correct Answer: b

14. The price of an antique is expected to rise by 5% during the next year. The interest rate is 10%. You are thinking of buying an antique and selling it a year from now. You would be willing to pay a total of 500 dollars for the pleasure of owning the antique for a year. How much would you be willing to pay to buy this antique? (See Problem 5.)
a. 5,000 dollars
b. 10,000 dollars
c. 10,500 dollars
d. 500 dollars
e. 5,000 dollars

Difficulty: 2
Correct Answer: a

15. The price of an antique is expected to rise by 8% during the next year. The interest rate is 10%. You are thinking of buying an antique and selling it a year from now. You would be willing to pay a total of 800 dollars for the pleasure of owning the antique for a year. How much would you be willing to pay to buy this antique? (See Problem 5.)
a. 40,000 dollars
b. 800 dollars
c. 8,000 dollars
d. 16,800 dollars
e. 8,000 dollars

Difficulty: 2
Correct Answer: a

16. A bond has a face value of 1,000 dollars. It will pay 100 dollars in interest at the end of every year for the next 42 years. At the time of the final interest payment, 42 years from now, the company that issued the bond will redeem the bond at face value. That is, the company will buy back the bond from its owner at a price equal to the face value of the bond. If the interest rate is 10% and is expected to remain at 10%, how much would a rational investor pay for this bond right now?
a. 1,000 dollars
b. 5,200 dollars
c. 4,200 dollars
d. More than any of the above amounts.
e. Less than any of the above amounts.

Difficulty: 2
Correct Answer: d

17. A bond has a face value of 4,000 dollars. It will pay 400 dollars in interest at the end of every year for the next 40 years. At the time of the final interest payment, 40 years from now, the company that issued the bond will redeem the bond at face value. That is, the company will buy back the bond from its owner at a price equal to the face value of the bond. If the interest rate is 10% and is expected to remain at 10%, how much would a rational investor pay for this bond right now?
a. More than any of the amounts below.
b. 20,000 dollars
c. 16,000 dollars
d. 4,000 dollars
e. Less than any of the above amounts.

Difficulty: 2
Correct Answer: b

18. A bond has a face value of 10,000 dollars. It will pay 1,000 dollars in interest at the end of every year for the next 48 years. At the time of the final interest payment, 48 years from now, the company that issued the bond will redeem the bond at face value. That is, the company will buy back the bond from its owner at a price equal to the face value of the bond. If the interest rate is 10% and is expected to remain at 10%, how much would a rational investor pay for this bond right now?
    a. 58,000 dollars
    b. 10,000 dollars
    c. 48,000 dollars
    d. More than any of the above amounts.
    e. Less than any of the above amounts.

Difficulty: 2
Correct Answer: b

19. A bond has a face value of 2,000 dollars. It will pay 200 dollars in interest at the end of every year for the next 42 years. At the time of the final interest payment, 42 years from now, the company that issued the bond will redeem the bond at face value. That is, the company will buy back the bond from its owner at a price equal to the face value of the bond. If the interest rate is 10% and is expected to remain at 10%, how much would a rational investor pay for this bond right now?
    a. 8,400 dollars
    b. 2,000 dollars
    c. 10,400 dollars
    d. More than any of the above amounts.
    e. Less than any of the above amounts.

Difficulty: 2
Correct Answer: a

20. A bond has a face value of 1,000 dollars. It will pay 100 dollars in interest at the end of every year for the next 44 years. At the time of the final interest payment, 44 years from now, the company that issued the bond will redeem the bond at face value. That is, the company will buy back the bond from its owner at a price equal to the face value of the bond. If the interest rate is 10% and is expected to remain at 10%, how much would a rational investor pay for this bond right now?
    a. 1,000 dollars
    b. 5,400 dollars
    c. 4,400 dollars
    d. More than any of the above amounts.
    e. Less than any of the above amounts.

Difficulty: 2
Correct Answer: c

21. The sum of the terms of the infinite geometric series 1, 0.83, 0.83^2, 0.83^3, . . . is closest to
    a. infinity.
    b. 1.83.
    c. 5.88.
    d. 0.55.
    e. 120.48.

Difficulty: 2
Correct Answer: d

22. The sum of the terms of the infinite geometric series 1, 0.78, 0.78^2, 0.78^3, . . . is closest to
    a. infinity.
    b. 1.78.
    c. 0.56.
    d. 4.55.
    e. 128.21.

Difficulty: 2
Correct Answer: d

23. The sum of the terms of the infinite geometric series 1, 0.93, 0.93^2, 0.93^3, . . . is closest to
    a. 1.93.
    b. infinity.
    c. 0.52.
    d. 14.29.
    e. 107.53.

Difficulty: 2
Correct Answer: c

24. The sum of the terms of the infinite geometric series 1, 0.95, 0.95^2, 0.95^3, . . . is closest to
    a. 1.95.
    b. 0.51.
    c. 20.
    d. infinity.
    e. 105.26.

Difficulty: 2
Correct Answer: c

25. The sum of the terms of the infinite geometric series 1, 0.78, 0.78^2, 0.78^3, . . . is closest to
    a. 0.56.
    b. infinity.
    c. 4.55.
    d. 1.78.
    e. 128.21.

Difficulty:
Correct Answer: a

26. If the interest rate is 5% and will remain 5% forever, how much would a rational investor be willing to pay for an asset that will pay him 6,300 dollars 1 year from

now, 1,102 dollars 2 years from now, and nothing at any other time?
a. 7,000 dollars
b. 6,000 dollars
c. 140,000 dollars
d. 42,000 dollars
e. 8,000 dollars

Difficulty:
Correct Answer: d

27. If the interest rate is 13% and will remain 13% forever, how much would a rational investor be willing to pay for an asset that will pay him 6,780 dollars 1 year from now, 1,276 dollars 2 years from now, and nothing at any other time?
a. 53,846.15 dollars
b. 6,000 dollars
c. 98,000 dollars
d. 7,000 dollars
e. 8,000 dollars

Difficulty:
Correct Answer: a

28. If the interest rate is 6% and will remain 6% forever, how much would a rational investor be willing to pay for an asset that will pay him 8,480 dollars 1 year from now, 1,123 dollars 2 years from now, and nothing at any other time?
a. 9,000 dollars
b. 63,000 dollars
c. 150,000 dollars
d. 8,000 dollars
e. 10,000 dollars

Difficulty:
Correct Answer: a

29. If the interest rate is 15% and will remain 15% forever, how much would a rational investor be willing to pay for an asset that will pay him 3,450 dollars 1 year from now, 1,322 dollars 2 years from now, and nothing at any other time?
a. 4,000 dollars
b. 26,666.67 dollars
c. 64,000 dollars
d. 3,000 dollars
e. 5,000 dollars

Difficulty:
Correct Answer: b

30. If the interest rate is 19% and will remain 19% forever, how much would a rational investor be willing to pay for an asset that will pay him 2,380 dollars 1 year from now, 1,416 dollars 2 years from now, and nothing at any other time?
a. 2,000 dollars
b. 3,000 dollars
c. 15,789.47 dollars
d. 60,000 dollars
e. 4,000 dollars

CHAPTER 12 Uncertainty

MULTIPLE CHOICE

Difficulty:
Correct Answer: a

1. In Problem 9, Billy has a von Neumann-Morgenstern utility function $U(c) = c^{1/2}$. If Billy is not injured this season, he will receive an income of 25 million dollars. If he is injured, his income will be only 10,000 dollars. The probability that he will be injured is .1 and the probability that he will not be injured is .9. His expected utility is
   a. 4,510 dollars.
   b. between 24 and 25 million dollars.
   c. 100,000 dollars.
   d. 9,020 dollars.
   e. 18,040 dollars.

Difficulty:
Correct Answer: b

2. In Problem 9, Billy has a von Neumann-Morgenstern utility function $U(c) = c^{1/2}$. If Billy is not injured this season, he will receive an income of 4 million dollars. If he is injured, his income will be only 10,000 dollars. The probability that he will be injured is .1 and the probability that he will not be injured is .9. His expected utility is
   a. 3,620 dollars.
   b. 1,810 dollars.
   c. between 3 and 4 million dollars.
   d. 100,000 dollars.
   e. 7,240 dollars.

Difficulty:
Correct Answer: b

3. In Problem 9, Billy has a von Neumann-Morgenstern utility function $U(c) = c^{1/2}$. If Billy is not injured this season, he will receive an income of 4 million dollars. If he is injured, his income will be only 10,000 dollars. The probability that he will be injured is .1 and the probability that he will not be injured is .9. His expected utility is
   a. 100,000 dollars.
   b. 1,810 dollars.
   c. 3,620 dollars.
   d. between 3 and 4 million dollars.
   e. 7,240 dollars.

Difficulty:
Correct Answer: a

4. In Problem 9, Billy has a von Neumann-Morgenstern utility function $U(c) = c^{1/2}$. If Billy is not injured this season, he will receive an income of 16 million dollars. If he is injured, his income will be only 10,000 dollars. The probability that he will be injured is .1 and the probability that he will not be injured is .9. His expected utility is
   a. 3,610 dollars.
   b. 7,220 dollars.
   c. 100,000 dollars.
   d. between 15 and 16 million dollars.
   e. 14,440 dollars.

Difficulty:
Correct Answer: b

5. In Problem 9, Billy has a von Neumann-Morgenstern utility function $U(c) = c^{1/2}$. If Billy is not injured this season, he will receive an income of 4 million dollars. If he is injured, his income will be only 10,000 dollars. The probability that he will be injured is .1 and the probability that he will not be injured is .9. His expected utility is
   a. 3,620 dollars.
   b. 1,810 dollars.
   c. 100,000 dollars.
   d. between 3 and 4 million dollars.
   e. 7,240 dollars.

Difficulty:
Correct Answer: b

6. (See Problem 2.) Willy's only source of wealth is his chocolate factory. He has the utility function $pc^{1/2}_f + (1 - p)c^{1/2}_{nf}$, where p is the probability of a flood, $1 - p$ is the probability of no flood, and c_f and c_{nf} are his wealth contingent on a flood and on no flood, respectively. The probability of a flood is $p = 1/13$. The value of Willy's factory is $500,000 if there is no flood and 0 if there is a flood. Willy can buy insurance where if he buys $\$x$ worth of insurance, he must pay the insurance company $\$3x/15$ whether there is a flood or not, but he gets back $\$x$ from the company if there is a flood. Willy should buy
   a. no insurance since the cost per dollar of insurance exceeds the probability of a flood.
   b. enough insurance so that if there is a flood, after he collects his insurance, his wealth will be 1/9 of what it would be if there is no flood.
   c. enough insurance so that if there is a flood, after he collects his insurance, his wealth will be the same whether there is a flood or not.
   d. enough insurance so that if there is a flood, after he collects his insurance, his wealth will be 1/4 of what it would be if there is no flood.
   e. enough insurance so that if there is a flood, after he collects his insurance, his wealth will be 1/7 of what it would be if there is no flood.

Difficulty:
Correct Answer: b

7. (See Problem 2.) Willy's only source of wealth is his chocolate factory. He has the utility function $pc^{1/2}_f + (1 - p)c^{1/2}_{nf}$, where p is the probability of a flood, $1 - p$ is the probability of no flood, and c_f and c_{nf} are his wealth contingent on a flood and on no flood, respectively. The probability of a flood is $p = 1/14$. The value of Willy's factory is $500,000 if there is no flood and 0 if there is a flood. Willy can buy insurance where if he buys $\$x$ worth of insurance, he must pay the insurance company $\$4x/17$ whether there is a flood or not, but he gets back $\$x$ from the company if there is a flood. Willy should buy
   a. enough insurance so that if there is a flood, after he collects his insurance, his wealth will be the same whether there is a flood or not.
   b. enough insurance so that if there is a flood, after he collects his insurance, his wealth will be 1/16 of what it would be if there is no flood.
   c. no insurance since the cost per dollar of insurance exceeds the probability of a flood.
   d. enough insurance so that if there is a flood, after he collects his insurance, his wealth will be 1/5 of what it would be if there is no flood.
   e. enough insurance so that if there is a flood, after he collects his insurance, his wealth will be 1/9 of what it would be if there is no flood.

Difficulty:
Correct Answer: b

8. (See Problem 2.) Willy's only source of wealth is his chocolate factory. He has the utility function $pc^{1/2}_f + (1 - p)c^{1/2}_{nf}$, where p is the probability of a flood, $1 - p$ is the probability of no flood, and c_f and c_{nf} are his wealth contingent on a flood and on no flood, respectively. The probability of a flood is $p = 1/20$. The value of Willy's factory is $300,000 if there is no flood and 0 if there is a flood. Willy can buy insurance where if he buys $\$x$ worth of insurance, he must pay the insurance company $\$4x/23$ whether there is a flood or not, but he gets back $\$x$ from the company if there is a flood. Willy should buy
   a. enough insurance so that if there is a flood, after he collects his insurance, his wealth will be 1/5 of what it would be if there is no flood.
   b. enough insurance so that if there is a flood, after he collects his insurance, his wealth will be 1/16 of what it would be if there is no flood.
   c. no insurance since the cost per dollar of insurance exceeds the probability of a flood.
   d. enough insurance so that if there is a flood, after he collects his insurance, his wealth will be the same whether there is a flood or not.
   e. enough insurance so that if there is a flood, after he collects his insurance, his wealth will be 1/9 of what it would be if there is no flood.

Difficulty:
Correct Answer: c

9. (See Problem 2.) Willy's only source of wealth is his chocolate factory. He has the utility function $pc^{1/2}_f + (1 - p)c^{1/2}_{nf}$, where p is the probability of a flood, $1 - p$ is the probability of no flood, and c_f and c_{nf} are his wealth contingent on a flood and on no flood, respectively. The probability of a flood is $p = 1/11$. The value of Willy's factory is $800,000 if there is no flood and 0 if there is a flood. Willy can buy insurance where if he buys $\$x$ worth of insurance, he must pay the insurance company $\$4x/14$ whether there is a flood or not, but he gets back $\$x$ from the company if there is a flood. Willy should buy
   a. enough insurance so that if there is a flood, after he collects his insurance, his wealth will be the same whether there is a flood or not.
   b. no insurance since the cost per dollar of insurance exceeds the probability of a flood.

c. enough insurance so that if there is a flood, after he collects his insurance, his wealth will be 1/16 of what it would be if there is no flood.
d. enough insurance so that if there is a flood, after he collects his insurance, his wealth will be 1/5 of what it would be if there is no flood.
e. enough insurance so that if there is a flood, after he collects his insurance, his wealth will be 1/9 of what it would be if there is no flood.

Difficulty:
Correct Answer: d

10. (See Problem 2.) Willy's only source of wealth is his chocolate factory. He has the utility function $pc^{1/2}_f + (1 - p)c^{1/2}_{nf}$, where p is the probability of a flood, $1 - p$ is the probability of no flood, and c_f and c_{nf} are his wealth contingent on a flood and on no flood, respectively. The probability of a flood is $p = 1/14$. The value of Willy's factory is $400,000 if there is no flood and 0 if there is a flood. Willy can buy insurance where if he buys $\$x$ worth of insurance, he must pay the insurance company $\$5x/18$ whether there is a flood or not, but he gets back $\$x$ from the company if there is a flood. Willy should buy
   a. enough insurance so that if there is a flood, after he collects his insurance, his wealth will be the same whether there is a flood or not.
   b. enough insurance so that if there is a flood, after he collects his insurance, his wealth will be 1/6 of what it would be if there is no flood.
   c. no insurance since the cost per dollar of insurance exceeds the probability of a flood.
   d. enough insurance so that if there is a flood, after he collects his insurance, his wealth will be 1/25 of what it would be if there is no flood.
   e. enough insurance so that if there is a flood, after he collects his insurance, his wealth will be 1/11 of what it would be if there is no flood.

Difficulty:
Correct Answer: c

11. Sally Kink is an expected utility maximizer with utility function $pu(c_1) + (1 - p)u(c_2)$, where for any $x <$ 6,000, $u(x) = 2x$, and for x greater than or equal to 6,000, $u(x) = 12{,}000 + x$.
   a. Sally will be risk averse if her income is less than $6,000 but risk loving if her income is more than $6,000.
   b. Sally will be risk neutral if her income is less than $6,000 and risk averse if her income is more than $6,000.
   c. For bets that involve no chance of her wealth exceeding $6,000, Sally will take any bet that has a positive expected net payoff.
   d. Sally will never take a bet if there is a chance that it leaves her with wealth less than $12,000.
   e. None of the above.

Difficulty:
Correct Answer: c

12. Sally Kink is an expected utility maximizer with utility function $pu(c_1) + (1 - p)u(c_2)$, where for any $x <$ 6,000, $u(x) = 2x$, and for x greater than or equal to 6,000, $u(x) = 12{,}000 + x$.
   a. Sally will be risk neutral if her income is less than $6,000 and risk averse if her income is more than $6,000.
   b. Sally will be risk averse if her income is less than $6,000 but risk loving if her income is more than $6,000.
   c. For bets that involve no chance of her wealth exceeding $6,000, Sally will take any bet that has a positive expected net payoff.
   d. Sally will never take a bet if there is a chance that it leaves her with wealth less than $12,000.
   e. None of the above.

Difficulty:
Correct Answer: d

13. Sally Kink is an expected utility maximizer with utility function $pu(c_1) + (1 - p)u(c_2)$, where for any $x <$ 8,000, $u(x) = 2x$, and for x greater than or equal to 8,000, $u(x) = 16{,}000 + x$.
   a. Sally will never take a bet if there is a chance that it leaves her with wealth less than $16,000.
   b. Sally will be risk neutral if her income is less than $8,000 and risk averse if her income is more than $8,000.
   c. Sally will be risk averse if her income is less than $8,000 but risk loving if her income is more than $8,000.
   d. For bets that involve no chance of her wealth exceeding $8,000, Sally will take any bet that has a positive expected net payoff.
   e. None of the above.

Difficulty:
Correct Answer: d

14. Sally Kink is an expected utility maximizer with utility function $pu(c_1) + (1 - p)u(c_2)$, where for any $x <$ 7,000, $u(x) = 2x$, and for x greater than or equal to 7,000, $u(x) = 14{,}000 + x$.
   a. Sally will be risk averse if her income is less than $7,000 but risk loving if her income is more than $7,000.
   b. Sally will be risk neutral if her income is less than $7,000 and risk averse if her income is more than $7,000.

c. Sally will never take a bet if there is a chance that it leaves her with wealth less than \$14,000.
d. For bets that involve no chance of her wealth exceeding \$7,000, Sally will take any bet that has a positive expected net payoff.
e. None of the above.

Difficulty:
Correct Answer: d

15. Sally Kink is an expected utility maximizer with utility function $pu(c_1) + (1 - p)u(c_2)$, where for any $x <$ 1,000, $u(x) = 2x$, and for x greater than or equal to 1,000, $u(x) = 2{,}000 + x$.
a. Sally will be risk averse if her income is less than \$1,000 but risk loving if her income is more than \$1,000.
b. Sally will never take a bet if there is a chance that it leaves her with wealth less than \$2,000.
c. Sally will be risk neutral if her income is less than \$1,000 and risk averse if her income is more than \$1,000.
d. For bets that involve no chance of her wealth exceeding \$1,000, Sally will take any bet that has a positive expected net payoff.
e. None of the above.

Difficulty:
Correct Answer: a

16. (See Problem 11.) Jonas's expected utility function is $pc^{1/2}{}_1 + (1 - p)c^{1/2}{}_2$, where p is the probability that he consumes c_1 and $1 - p$ is the probability that he consumes c_2. Jonas is offered a choice between getting a sure payment of \$Z or a lottery in which he receives \$3,600 with probability .10 or \$6,400 with probability .90. Jonas will choose the sure payment if
a. $Z > 6{,}084$ and the lottery if $Z < 6{,}084$.
b. $Z > 4{,}842$ and the lottery if $Z < 4{,}842$.
c. $Z > 6{,}400$ and the lottery if $Z < 6{,}400$.
d. $Z > 6{,}242$ and the lottery if $Z < 6{,}242$.
e. $Z > 6{,}120$ and the lottery if $Z < 6{,}120$.

Difficulty:
Correct Answer: d

17. (See Problem 11.) Albert's expected utility function is $pc^{1/2}{}_1 + (1 - p)c^{1/2}{}_2$, where p is the probability that he consumes c_1 and $1 - p$ is the probability that he consumes c_2. Albert is offered a choice between getting a sure payment of \$Z or a lottery in which he receives \$400 with probability .30 or \$2,500 with probability .70. Albert will choose the sure payment if
a. $Z > 2{,}090.50$ and the lottery if $Z < 2{,}090.50$.
b. $Z > 1{,}040.50$ and the lottery if $Z < 1{,}040.50$.
c. $Z > 2{,}500$ and the lottery if $Z < 2{,}500$.
d. $Z > 1{,}681$ and the lottery if $Z < 1{,}681$.
e. $Z > 1{,}870$ and the lottery if $Z < 1{,}870$.

Difficulty:
Correct Answer: a

18. (See Problem 11.) Pete's expected utility function is $pc^{1/2}{}_1 + (1 - p)c^{1/2}{}_2$, where p is the probability that he consumes c_1 and $1 - p$ is the probability that he consumes c_2. Pete is offered a choice between getting a sure payment of \$Z or a lottery in which he receives \$1,600 with probability .80 or \$14,400 with probability .20. Pete will choose the sure payment if
a. $Z > 3{,}136$ and the lottery if $Z < 3{,}136$.
b. $Z > 8{,}768$ and the lottery if $Z < 8{,}768$.
c. $Z > 14{,}400$ and the lottery if $Z < 14{,}400$.
d. $Z > 2{,}368$ and the lottery if $Z < 2{,}368$.
e. $Z > 4{,}160$ and the lottery if $Z < 4{,}160$.

Difficulty:
Correct Answer: d

19. (See Problem 11.) Lawrence's expected utility function is $pc^{1/2}{}_1 + (1 - p)c^{1/2}{}_2$, where p is the probability that he consumes c_1 and $1 - p$ is the probability that he consumes c_2. Lawrence is offered a choice between getting a sure payment of \$Z or a lottery in which he receives \$400 with probability .30 or \$2,500 with probability .70. Lawrence will choose the sure payment if
a. $Z > 1{,}040.50$ and the lottery if $Z < 1{,}040.50$.
b. $Z > 2{,}500$ and the lottery if $Z < 2{,}500$.
c. $Z > 2{,}090.50$ and the lottery if $Z < 2{,}090.50$.
d. $Z > 1{,}681$ and the lottery if $Z < 1{,}681$.
e. $Z > 1{,}870$ and the lottery if $Z < 1{,}870$.

Difficulty:
Correct Answer: a

20. (See Problem 11.) Wilfred's expected utility function is $pc^{1/2}{}_1 + (1 - p)c^{1/2}{}_2$, where p is the probability that he consumes c_1 and $1 - p$ is the probability that he consumes c_2. Wilfred is offered a choice between getting a sure payment of \$Z or a lottery in which he receives \$2,500 with probability .40 or \$6,400 with probability .60. Wilfred will choose the sure payment if
a. $Z > 4{,}624$ and the lottery if $Z < 4{,}624$.
b. $Z > 3{,}562$ and the lottery if $Z < 3{,}562$.
c. $Z > 5{,}512$ and the lottery if $Z < 5{,}512$.
d. $Z > 6{,}400$ and the lottery if $Z < 6{,}400$.
e. $Z > 4{,}840$ and the lottery if $Z < 4{,}840$.

Difficulty:
Correct Answer: b

21. Clancy has \$1,800. He plans to bet on a boxing match between Sullivan and Flanagan. He finds that he can buy coupons for \$9 each that will pay off \$10 each if Sullivan wins. He also finds in another store some coupons that will pay off \$10 if Flanagan wins. The Flanagan tickets cost \$1 each. Clancy believes that the two fighters each have a probability of 1/2 of winning. Clancy is a risk averter who tries to maximize the

expected value of the natural log of his wealth. Which of the following strategies would maximize his expected utility?

a. Don't gamble at all.
b. Buy 100 Sullivan tickets and 900 Flanagan tickets.
c. Buy exactly as many Flanagan tickets as Sullivan tickets.
d. Buy 50 Sullivan tickets and 450 Flanagan tickets.
e. Buy 50 Sullivan tickets and 900 Flanagan tickets.

Difficulty:
Correct Answer: d

22. Clancy has $1,800. He plans to bet on a boxing match between Sullivan and Flanagan. He finds that he can buy coupons for $1 each that will pay off $10 each if Sullivan wins. He also finds in another store some coupons that will pay off $10 if Flanagan wins. The Flanagan tickets cost $9 each. Clancy believes that the two fighters each have a probability of 1/2 of winning. Clancy is a risk averter who tries to maximize the expected value of the natural log of his wealth. Which of the following strategies would maximize his expected utility?

a. Don't gamble at all.
b. Buy 450 Sullivan tickets and 50 Flanagan tickets.
c. Buy exactly as many Flanagan tickets as Sullivan tickets.
d. Buy 900 Sullivan tickets and 100 Flanagan tickets.
e. Buy 450 Sullivan tickets and 100 Flanagan tickets.

Difficulty:
Correct Answer: c

23. Clancy has $4,800. He plans to bet on a boxing match between Sullivan and Flanagan. He finds that he can buy coupons for $4 each that will pay off $10 each if Sullivan wins. He also finds in another store some coupons that will pay off $10 if Flanagan wins. The Flanagan tickets cost $6 each. Clancy believes that the two fighters each have a probability of 1/2 of winning. Clancy is a risk averter who tries to maximize the expected value of the natural log of his wealth. Which of the following strategies would maximize his expected utility?

a. Don't gamble at all.
b. Buy exactly as many Flanagan tickets as Sullivan tickets.
c. Buy 600 Sullivan tickets and 400 Flanagan tickets.
d. Buy 300 Sullivan tickets and 200 Flanagan tickets.
e. Buy 300 Sullivan tickets and 400 Flanagan tickets.

Difficulty:
Correct Answer: d

24. Clancy has $4,800. He plans to bet on a boxing match between Sullivan and Flanagan. He finds that he can buy coupons for $4 each that will pay off $10 each if Sullivan wins. He also finds in another store some coupons that will pay off $10 if Flanagan wins. The Flanagan tickets cost $6 each. Clancy believes that the two fighters each have a probability of 1/2 of winning. Clancy is a risk averter who tries to maximize the expected value of the natural log of his wealth. Which of the following strategies would maximize his expected utility?

a. Don't gamble at all.
b. Buy 300 Sullivan tickets and 200 Flanagan tickets.
c. Buy exactly as many Flanagan tickets as Sullivan tickets.
d. Buy 600 Sullivan tickets and 400 Flanagan tickets.
e. Buy 300 Sullivan tickets and 400 Flanagan tickets.

Difficulty:
Correct Answer: c

25. Clancy has $4,200. He plans to bet on a boxing match between Sullivan and Flanagan. He finds that he can buy coupons for $7 each that will pay off $10 each if Sullivan wins. He also finds in another store some coupons that will pay off $10 if Flanagan wins. The Flanagan tickets cost $3 each. Clancy believes that the two fighters each have a probability of 1/2 of winning. Clancy is a risk averter who tries to maximize the expected value of the natural log of his wealth. Which of the following strategies would maximize his expected utility?

a. Don't gamble at all.
b. Buy 150 Sullivan tickets and 350 Flanagan tickets.
c. Buy 300 Sullivan tickets and 700 Flanagan tickets.
d. Buy exactly as many Flanagan tickets as Sullivan tickets.
e. Buy 150 Sullivan tickets and 700 Flanagan tickets.

CHAPTER 13 Risky Assets

MULTIPLE CHOICE

Difficulty:
Correct Answer: c

1. Suppose that Ms. Lynch in Problem 1 can make up her portfolio using a risk-free asset that offers a surefire rate of return of 10% and a risky asset with an expected rate of return of 20%, with standard deviation 5. If she chooses a portfolio with an expected rate of return of 20%, then the standard deviation of her return on this portfolio will be
   a. 2.50%.
   b. 8%.
   c. 5%.
   d. 10%.
   e. None of the above.

Difficulty:
Correct Answer: a

2. Suppose that Ms. Lynch in Problem 1 can make up her portfolio using a risk-free asset that offers a surefire rate of return of 15% and a risky asset with an expected rate of return of 25%, with standard deviation 5. If she chooses a portfolio with an expected rate of return of 20%, then the standard deviation of her return on this portfolio will be
   a. 2.50%.
   b. 5%.
   c. 5.50%.
   d. 1.25%.
   e. None of the above.

Difficulty:
Correct Answer: a

3. Suppose that Ms. Lynch in Problem 1 can make up her portfolio using a risk-free asset that offers a surefire rate of return of 10% and a risky asset with an expected rate of return of 20%, with standard deviation 5. If she chooses a portfolio with an expected rate of return of 17.50%, then the standard deviation of her return on this portfolio will be
   a. 3.75%.
   b. 7.50%.
   c. 6.75%.
   d. 1.88%.
   e. None of the above.

Difficulty:
Correct Answer: c

4. Suppose that Ms. Lynch in Problem 1 can make up her portfolio using a risk-free asset that offers a surefire rate of return of 10% and a risky asset with an expected rate of return of 15%, with standard deviation 5. If she chooses a portfolio with an expected rate of return of 15%, then the standard deviation of her return on this portfolio will be
   a. 2.50%.
   b. 8%.
   c. 5%.
   d. 10%.
   e. None of the above.

Difficulty:
Correct Answer: b

5. Suppose that Ms. Lynch in Problem 1 can make up her portfolio using a risk-free asset that offers a surefire rate of return of 5% and a risky asset with an expected rate of return of 10%, with standard deviation 5. If she chooses a portfolio with an expected rate of return of 8.75%, then the standard deviation of her return on this portfolio will be
   a. 7.50%.
   b. 3.75%.
   c. 1.88%.
   d. 6.75%.
   e. None of the above.

Difficulty:
Correct Answer: a

6. Suppose that Fenner Smith of Problem 2 must divide his portfolio between two assets, one of which gives him an expected rate of return of 15% with zero standard deviation and one of which gives him an expected rate of return of 25% and has a standard deviation of 10. He can alter the expected rate of return and the variance of his portfolio by changing the proportions in which he holds the two assets. If we draw a "budget line" with expected return on the vertical axis and standard deviation on the horizontal axis, depicting the combinations that Smith can obtain, the slope of this budget line is
   a. 1.
   b. −1.
   c. 0.50.
   d. −0.50.
   e. 1.50.

Difficulty:
Correct Answer: a

7. Suppose that Fenner Smith of Problem 2 must divide his portfolio between two assets, one of which gives him an expected rate of return of 15% with zero standard deviation and one of which gives him an expected rate of return of 75% and has a standard deviation of 15. He can alter the expected rate of return and the variance of his portfolio by changing the proportions in which he holds the two assets. If we draw a "budget line" with expected return on the vertical axis and standard deviation on the horizontal axis, depicting the combinations that Smith can obtain, the slope of this budget line is
   a. 4.
   b. −2.
   c. 2.
   d. −4.
   e. 6.

Difficulty:
Correct Answer: d

8. Suppose that Fenner Smith of Problem 2 must divide his portfolio between two assets, one of which gives him an expected rate of return of 15% with zero standard deviation and one of which gives him an expected rate of return of 30% and has a standard deviation of 15. He can alter the expected rate of return and the variance of his portfolio by changing the proportions in which he holds the two assets. If we draw a "budget line" with expected return on the vertical axis and standard deviation on the horizontal axis, depicting the combinations that Smith can obtain, the slope of this budget line is
   a. 0.50.
   b. −1.
   c. −0.50.
   d. 1.
   e. 1.50.

Difficulty:
Correct Answer: a

9. Suppose that Fenner Smith of Problem 2 must divide his portfolio between two assets, one of which gives him an expected rate of return of 15% with zero standard deviation and one of which gives him an expected rate of return of 45% and has a standard deviation of 15. He can alter the expected rate of return and the variance of his portfolio by changing the proportions in which he holds the two assets. If we draw a "budget line" with expected return on the vertical axis and standard deviation on the horizontal axis, depicting the combinations that Smith can obtain, the slope of this budget line is
   a. 2.
   b. 1.
   c. −1.
   d. −2.
   e. 3.

Difficulty:
Correct Answer: d

10. Suppose that Fenner Smith of Problem 2 must divide his portfolio between two assets, one of which gives him an expected rate of return of 15% with zero standard deviation and one of which gives him an expected rate of return of 45% and has a standard deviation of 10. He can alter the expected rate of return and the variance of his portfolio by changing the proportions in which he holds the two assets. If we draw a "budget line" with expected return on the vertical axis and standard deviation on the horizontal axis, depicting the combination that Smith can obtain, the slope of this budget line is
   a. 1.50.
   b. −1.50.
   c. −3.
   d. 3.
   e. 4.50.

CHAPTER 14 Consumer's Surplus

MULTIPLE CHOICE

Difficulty: 1
Correct Answer: a

1. In Problem 1, Sir Plus has a demand function for mead that is given by the equation $D(p) = 100 - p$. If the price of mead is \$85, how much is Sir Plus's net consumer's surplus?
   a. 112.50
   b. 15
   c. 225
   d. 56.25
   e. 7,650

Difficulty: 1
Correct Answer: d

2. In Problem 1, Sir Plus has a demand function for mead that is given by the equation $D(p) = 100 - p$. If the price of mead is \$85, how much is Sir Plus's net consumer's surplus?
   a. 15
   b. 225
   c. 56.25
   d. 112.50
   e. 7,650

Difficulty: 1
Correct Answer: a

3. In Problem 1, Sir Plus has a demand function for mead that is given by the equation $D(p) = 100 - p$. If the price of mead is \$95, how much is Sir Plus's net consumer's surplus?
   a. 12.50
   b. 6.25
   c. 25
   d. 5
   e. 9,500

Difficulty: 1
Correct Answer: b

4. In Problem 1, Sir Plus has a demand function for mead that is given by the equation $D(p) = 100 - p$. If the price of mead is \$85, how much is Sir Plus's net consumer's surplus?
   a. 15
   b. 112.50
   c. 56.25
   d. 225
   e. 7,650

Difficulty: 1
Correct Answer: d

5. In Problem 1, Sir Plus has a demand function for mead that is given by the equation $D(p) = 100 - p$. If the price of mead is \$95, how much is Sir Plus's net consumer's surplus?
   a. 25
   b. 6.25
   c. 5
   d. 12.50
   e. 9,500

Difficulty: 2
Correct Answer: a

6. Ms. Quasimodo in Problem 3 has the utility function $U(x, m) = 100x - x^2/2 + m$, where x is her consumption of earplugs and m is money left over to spend on other stuff. If she has \$10,000 to spend on earplugs and other stuff and if the price of earplugs rises from \$50 to \$85, then her net consumer's surplus
   a. falls by 1,137.50.
   b. falls by 3,137.50.
   c. falls by 525.
   d. increases by 568.75.
   e. increases by 2,275.

Difficulty: 2
Correct Answer: c

7. Ms. Quasimodo in Problem 3 has the utility function $U(x, m) = 100x - x^2/2 + m$, where x is her consumption of earplugs and m is money left over to spend on other stuff. If she has \$10,000 to spend on earplugs and other stuff and if the price of earplugs rises from \$50 to \$65, then her net consumer's surplus
   a. falls by 2,637.50.
   b. falls by 525.
   c. falls by 637.50.
   d. increases by 318.75.
   e. increases by 1,275.

Difficulty: 2
Correct Answer: d

8. Ms. Quasimodo in Problem 3 has the utility function $U(x, m) = 100x - x^2/2 + m$, where x is her consumption of earplugs and m is money left over to spend on other stuff. If she has \$10,000 to spend on earplugs and other stuff and if the price of earplugs rises from \$50 to \$70, then her net consumer's surplus
   a. increases by 400.
   b. falls by 2,800.
   c. falls by 600.
   d. falls by 800.
   e. increases by 1,600.

Difficulty: 2
Correct Answer: a

9. Ms. Quasimodo in Problem 3 has the utility function $U(x, m) = 100x - x^2/2 + m$, where x is her consumption of earplugs and m is money left over to spend on other stuff. If she has \$10,000 to spend on earplugs and other stuff and if the price of earplugs rises from \$50 to \$75, then her net consumer's surplus
   a. falls by 937.50.
   b. falls by 625.
   c. falls by 2,937.50.
   d. increases by 468.75.
   e. increases by 1,875.

Difficulty: 2
Correct Answer: a

10. Ms. Quasimodo in Problem 3 has the utility function $U(x, m) = 100x - x^2/2 + m$, where x is her consumption of earplugs and m is money left over to spend on other stuff. If she has \$10,000 to spend on earplugs and other stuff and if the price of earplugs rises from \$50 to \$70, then her net consumer's surplus
   a. falls by 800.
   b. increases by 400.
   c. falls by 600.
   d. falls by 2,800.
   e. increases by 1,600.

Difficulty: 2
Correct Answer: b

11. Bernice in Problem 5 has the utility function $u(x, y) = \min\{x, y\}$, where x is the number of pairs of earrings she buys per week and y is the number of dollars per week she has left to spend on other things. (We allow the possibility that she buys fractional numbers of pairs of earrings per week.) If she originally had an income of \$17 per week and was paying a price of \$3 per pair of earrings, then if the price of earrings rose to \$7, the compensating variation of that price change (measured in dollars per week) would be closest to
   a. \$8.50.
   b. \$17.
   c. \$35.
   d. \$34.
   e. \$33.

Difficulty: 2
Correct Answer: a

12. Bernice in Problem 5 has the utility function $u(x, y) = \min\{x, y\}$, where x is the number of pairs of earrings she buys per week and y is the number of dollars per week she has left to spend on other things. (We allow the possibility that she buys fractional numbers of pairs of earrings per week.) If she originally had an income of \$20 per week and was paying a price of \$2 per pair of earrings, then if the price of earrings rose to \$5, the compensating variation of that price change (measured in dollars per week) would be closest to
   a. \$20.
   b. \$41.
   c. \$40.
   d. \$10.
   e. \$39.

Difficulty: 2
Correct Answer: a

13. Bernice in Problem 5 has the utility function $u(x, y) = \min\{x, y\}$, where x is the number of pairs of earrings she buys per week and y is the number of dollars per week she has left to spend on other things. (We allow the possibility that she buys fractional numbers of pairs of earrings per week.) If she originally had an income of \$18 per week and was paying a price of \$8 per pair of earrings, then if the price of earrings rose to \$14, the compensating variation of that price change (measured in dollars per week) would be closest to
   a. \$12.
   b. \$25.
   c. \$7.20.
   d. \$24.
   e. \$23.

Difficulty: 2
Correct Answer: d

14. Bernice in Problem 5 has the utility function $u(x, y) = \min\{x, y\}$, where x is the number of pairs of earrings she buys per week and y is the number of dollars per week she has left to spend on other things. (We allow the possibility that she buys fractional numbers of pairs of earrings per week.) If she originally had an income of \$11 per week and was paying a price of \$4 per pair of earrings, then if the price of earrings rose to \$8, the compensating variation of that price change (measured in dollars per week) would be closest to
    a. \$4.89.
    b. \$17.60.
    c. \$18.60.
    d. \$8.80.
    e. \$16.60.

Difficulty: 2
Correct Answer: a

15. Bernice in Problem 5 has the utility function $u(x, y) = \min\{x, y\}$, where x is the number of pairs of earrings she buys per week and y is the number of dollars per week she has left to spend on other things. (We allow the possibility that she buys fractional numbers of pairs of earrings per week.) If she originally had an income of \$19 per week and was paying a price of \$8 per pair of earrings, then if the price of earrings rose to \$10, the compensating variation of that price change (measured in dollars per week) would be closest to
    a. \$4.22.
    b. \$9.44.
    c. \$3.45.
    d. \$8.44.
    e. \$7.44.

Difficulty: 2
Correct Answer: a

16. If Bernice (whose utility function is $\min\{x, y\}$, where x is her consumption of earrings and y is money left for other stuff) had an income of \$13 and was paying a price of \$2 for earrings when the price of earrings went up to \$3, then the equivalent variation of the price change was
    a. \$3.25.
    b. \$4.33.
    c. \$8.67.
    d. \$1.63.
    e. \$3.79.

Difficulty: 2
Correct Answer: c

17. If Bernice (whose utility function is $\min\{x, y\}$, where x is her consumption of earrings and y is money left for other stuff) had an income of \$16 and was paying a price of \$8 for earrings when the price of earrings went up to \$10, then the equivalent variation of the price change was
    a. \$3.56.
    b. \$1.45.
    c. \$2.91.
    d. \$7.11.
    e. \$3.23.

Difficulty: 2
Correct Answer: c

18. If Bernice (whose utility function is $\min\{x, y\}$, where x is her consumption of earrings and y is money left for other stuff) had an income of \$19 and was paying a price of \$5 for earrings when the price of earrings went up to \$11, then the equivalent variation of the price change was
    a. \$19.
    b. \$38.
    c. \$9.50.
    d. \$4.75.
    e. \$14.25.

Difficulty: 2
Correct Answer: a

19. If Bernice (whose utility function is $\min\{x, y\}$, where x is her consumption of earrings and y is money left for other stuff) had an income of \$10 and was paying a price of \$3 for earrings when the price of earrings went up to \$4, then the equivalent variation of the price change was
    a. \$2.
    b. \$2.50.
    c. \$5.
    d. \$1.
    e. \$2.25.

Difficulty: 2
Correct Answer: b

20. If Bernice (whose utility function is $\min\{x, y\}$, where x is her consumption of earrings and y is money left for other stuff) had an income of \$20 and was paying a price of \$1 for earrings when the price of earrings went up to \$6, then the equivalent variation of the price change was
    a. \$50.
    b. \$14.29.
    c. \$7.14.
    d. \$100.
    e. \$32.14.

Difficulty: 2
Correct Answer: a

21. In Problem 7, Lolita's utility function is $U(x, y) = x - x^2/2 + y$, where x is her consumption of cow feed and y is her consumption of hay. If the price of cow feed is \$.30, the price of hay is \$1, and her income is \$2 and if Lolita chooses the combination of hay and cow feed that she likes best from among those combinations she can afford, her utility will be
    a. 2.24.
    b. 1.70.
    c. 0.24.
    d. 3.24.
    e. 1.24.

Difficulty: 2
Correct Answer: a

22. In Problem 7, Lolita's utility function is $U(x, y) = x - x^2/2 + y$, where x is her consumption of cow feed and y is her consumption of hay. If the price of cow feed is \$.10, the price of hay is \$1, and her income is \$2 and if Lolita chooses the combination of hay and cow feed that she likes best from among those combinations she can afford, her utility will be
    a. 2.40.
    b. 3.40.
    c. 0.40.
    d. 1.90.
    e. 1.40.

Difficulty: 2
Correct Answer: c

23. In Problem 7, Lolita's utility function is $U(x, y) = x - x^2/2 + y$, where x is her consumption of cow feed and y is her consumption of hay. If the price of cow feed is \$.10, the price of hay is \$1, and her income is \$2 and if Lolita chooses the combination of hay and cow feed that she likes best from among those combinations she can afford, her utility will be
    a. 0.40.
    b. 3.40.
    c. 2.40.
    d. 1.90.
    e. 1.40.

Difficulty: 2
Correct Answer: a

24. In Problem 7, Lolita's utility function is $U(x, y) = x - x^2/2 + y$, where x is her consumption of cow feed and y is her consumption of hay. If the price of cow feed is \$.60, the price of hay is \$1, and her income is \$4 and if Lolita chooses the combination of hay and cow feed that she likes best from among those combinations she can afford, her utility will be
    a. 4.08.
    b. 3.40.
    c. 0.08.
    d. 6.08.
    e. 2.08.

Difficulty: 2
Correct Answer: d

25. In Problem 7, Lolita's utility function is $U(x, y) = x - x^2/2 + y$, where x is her consumption of cow feed and y is her consumption of hay. If the price of cow feed is \$.10, the price of hay is \$1, and her income is \$2 and if Lolita chooses the combination of hay and cow feed that she likes best from among those combinations she can afford, her utility will be
    a. 0.40.
    b. 3.40.
    c. 1.90.
    d. 2.40.
    e. 1.40.

Difficulty:
Correct Answer: a

26. Cindy's utility function for BMWs and money is given by $19{,}000x + y$, where x is the number of BMWs she has and y is the amount of money she has. Her income is \$24,000. Her reservation price for one BMW is
    a. \$19,000.
    b. $\$19{,}000 - y$.
    c. \$5,000.
    d. $\$19{,}000 - p$.
    e. \$43,000.

Difficulty:
Correct Answer: b

27. Desiree's utility function for BMWs and money is given by $9{,}000x + y$, where x is the number of BMWs she has and y is the amount of money she has. Her income is \$22,000. Her reservation price for one BMW is
    a. $\$9{,}000 - p$.
    b. \$9,000.
    c. \$13,000.
    d. $\$9{,}000 - y$.
    e. \$31,000.

Difficulty:
Correct Answer: a

28. Betsy's utility function for BMWs and money is given by $24{,}000x + y$, where x is the number of BMWs she has and y is the amount of money she has. Her income is \$32,000. Her reservation price for one BMW is
    a. \$24,000.
    b. $\$24{,}000 - p$.
    c. $\$24{,}000 - y$.
    d. \$8,000.
    e. \$56,000.

Difficulty:
Correct Answer: d

29. Betsy's utility function for BMWs and money is given by $8{,}000x + y$, where x is the number of BMWs she has and y is the amount of money she has. Her income is \$22,000. Her reservation price for one BMW is
   a. \$14,000.
   b. \$8,000 − y.
   c. \$8,000 − p.
   d. \$8,000.
   e. \$30,000.

Difficulty:
Correct Answer: c

30. Kitty's utility function for BMWs and money is given by $16{,}000x + y$, where x is the number of BMWs she has and y is the amount of money she has. Her income is \$23,000. Her reservation price for one BMW is
   a. \$16,000 − y.
   b. \$16,000 − p.
   c. \$16,000.
   d. \$7,000.
   e. \$39,000.

CHAPTER 15 Market Demand

MULTIPLE CHOICE

Difficulty:
Correct Answer: d

1. In Problem 1, suppose every Buick owner's demand for gasoline is $20 - 5p$ for p less than or equal to 4 and 0 for $p > 4$. Every Dodge owner's demand is $15 - 3p$ for p less than or equal to 5 and 0 for $p > 5$. Suppose that Gas Pump, South Dakota, has 100 Buick owners and 200 Dodge owners. If the price of gasoline is \$3.50, what is the total amount of gasoline demanded in Gas Pump?
   a. 2,300 gallons
   b. 575 gallons
   c. 1,725 gallons
   d. 1,150 gallons
   e. None of the above.

Difficulty:
Correct Answer: d

2. In Problem 1, suppose every Buick owner's demand for gasoline is $20 - 5p$ for p less than or equal to 4 and 0 for $p > 4$. Every Dodge owner's demand is $15 - 3p$ for p less than or equal to 5 and 0 for $p > 5$. Suppose that Gas Pump, South Dakota, has 100 Buick owners and 150 Dodge owners. If the price of gasoline is \$3.50, what is the total amount of gasoline demanded in Gas Pump?
   a. 1,850 gallons
   b. 1,387.50 gallons
   c. 462.50 gallons
   d. 925 gallons
   e. None of the above.

Difficulty:
Correct Answer: b

3. In Problem 1, suppose every Buick owner's demand for gasoline is $20 - 5p$ for p less than or equal to 4 and 0 for $p > 4$. Every Dodge owner's demand is $15 - 3p$ for p less than or equal to 5 and 0 for $p > 5$. Suppose that Gas Pump, South Dakota, has 100 Buick owners and 100 Dodge owners. If the price of gasoline is \$3, what is the total amount of gasoline demanded in Gas Pump?
   a. 550 gallons
   b. 1,100 gallons
   c. 2,200 gallons
   d. 1,650 gallons
   e. None of the above.

Difficulty:
Correct Answer: c

4. In Problem 1, suppose every Buick owner's demand for gasoline is $20 - 5p$ for p less than or equal to 4 and 0 for $p > 4$. Every Dodge owner's demand is $15 - 3p$ for p less than or equal to 5 and 0 for $p > 5$. Suppose that Gas Pump, South Dakota, has 100 Buick owners and 200 Dodge owners. If the price of gasoline is \$4.25, what is the total amount of gasoline demanded in Gas Pump?
   a. 225 gallons
   b. 675 gallons
   c. 450 gallons
   d. 900 gallons
   e. None of the above.

Difficulty:
Correct Answer: d

5. In Problem 1, suppose every Buick owner's demand for gasoline is $20 - 5p$ for p less than or equal to 4 and 0 for $p > 4$. Every Dodge owner's demand is $15 - 3p$ for p less than or equal to 5 and 0 for $p > 5$. Suppose that Gas Pump, South Dakota, has 100 Buick owners and 250 Dodge owners. If the price of gasoline is \$4, what is the total amount of gasoline demanded in Gas Pump?
   a. 1,500 gallons
   b. 375 gallons
   c. 1,125 gallons
   d. 750 gallons
   e. None of the above.

Difficulty:
Correct Answer: e

6. In Problem 5, the demand function for drangles is given by $D(p) = (p + 1)^{-2}$. If the price of drangles is \$11, then the price elasticity of demand is
   a. -7.33.
   b. -3.67.
   c. -5.50.
   d. -0.92.
   e. -1.83.

Difficulty:
Correct Answer: e

7. In Problem 5, the demand function for drangles is given by $D(p) = (p + 1)^{-2}$. If the price of drangles is \$8, then the price elasticity of demand is
   a. -3.56.
   b. -5.33.
   c. -0.89.
   d. -7.11.
   e. -1.78.

Difficulty:
Correct Answer: e

8. In Problem 5, the demand function for drangles is given by $D(p) = (p + 1)^{-2}$. If the price of drangles is \$3, then the price elasticity of demand is
   a. -0.75.
   b. -3.
   c. -4.50.
   d. -6.
   e. -1.50.

Difficulty:
Correct Answer: e

9. In Problem 5, the demand function for drangles is given by $D(p) = (p + 1)^{-2}$. If the price of drangles is \$20, then the price elasticity of demand is
   a. -0.95.
   b. -7.62.
   c. -5.71.
   d. -3.81.
   e. -1.90.

Difficulty:
Correct Answer: e

10. In Problem 5, the demand function for drangles is given by $D(p) = (p + 1)^{-2}$. If the price of drangles is \$4, then the price elasticity of demand is
   a. -0.80.
   b. -6.40.
   c. -3.20.
   d. -4.80.
   e. -1.60.

Difficulty:
Correct Answer: c

11. In Problem 6, the only quantities of good 1 that Barbie can buy are 1 unit or zero units. For x_1 equal to zero or 1 and for all positive values of x_2, suppose that Barbie's preferences were represented by the utility function $(x_1 + 10)(x_2 + 12)$. Then if her income were \$4, her reservation price for good 1 would be
   a. \$2.91.
   b. \$6.50.
   c. \$1.45.
   d. \$.83.
   e. \$1.10.

Difficulty:
Correct Answer: a

12. In Problem 6, the only quantities of good 1 that Barbie can buy are 1 unit or zero units. For x_1 equal to zero or 1 and for all positive values of x_2, suppose that Barbie's preferences were represented by the utility function $(x_1 + 6)(x_2 + 4)$. Then if her income were \$16, her reservation price for good 1 would be
   a. \$2.86.
   b. \$2.50.
   c. \$5.71.
   d. \$1.50.
   e. \$.57.

Difficulty:
Correct Answer: d

13. In Problem 6, the only quantities of good 1 that Barbie can buy are 1 unit or zero units. For x_1 equal to zero or 1 and for all positive values of x_2, suppose that Barbie's preferences were represented by the utility function $(x_1 + 6)(x_2 + 8)$. Then if her income were \$20, her reservation price for good 1 would be
   a. \$4.50.
   b. \$.75.
   c. \$8.
   d. \$4.
   e. \$1.23.

Difficulty:
Correct Answer: a

14. In Problem 6, the only quantities of good 1 that Barbie can buy are 1 unit or zero units. For x_1 equal to zero or 1 and for all positive values of x_2, suppose that Barbie's preferences were represented by the utility function $(x_1 + 12)(x_2 + 8)$. Then if her income were \$36, her reservation price for good 1 would be
   a. \$3.38.
   b. \$6.77.
   c. \$1.50.
   d. \$4.50.
   e. \$.57.

Difficulty:
Correct Answer: b

15. In Problem 6, the only quantities of good 1 that Barbie can buy are 1 unit or zero units. For x_1 equal to zero or 1 and for all positive values of x_2, suppose that Barbie's preferences were represented by the utility function $(x_1 + 10)(x_2 + 4)$. Then if her income were \$12, her reservation price for good 1 would be
    a. \$2.50.
    b. \$1.45.
    c. \$2.91.
    d. \$2.50.
    e. \$.30.

Difficulty:
Correct Answer: a

16. In the same football conference as the university in Problem 9 is another university where the demand for football tickets at each game is $100{,}000 - 8{,}000p$. If the capacity of the stadium at that university is 60,000 seats, what is the revenue-maximizing price for this university to charge per ticket?
    a. \$6.25
    b. \$5
    c. \$12.50
    d. \$3.13
    e. \$18.75

Difficulty:
Correct Answer: a

17. In the same football conference as the university in Problem 9 is another university where the demand for football tickets at each game is $60{,}000 - 8{,}000p$. If the capacity of the stadium at that university is 40,000 seats, what is the revenue-maximizing price for this university to charge per ticket?
    a. \$3.75
    b. \$1.88
    c. \$7.50
    d. \$2.50
    e. \$11.25

Difficulty:
Correct Answer: b

18. In the same football conference as the university in Problem 9 is another university where the demand for football tickets at each game is $180{,}000 - 10{,}000p$. If the capacity of the stadium at that university is 100,000 seats, what is the revenue-maximizing price for this university to charge per ticket?
    a. \$4.50
    b. \$9
    c. \$8
    d. \$18
    e. \$27

Difficulty:
Correct Answer: a

19. In the same football conference as the university in Problem 9 is another university where the demand for football tickets at each game is $80{,}000 - 4{,}000p$. If the capacity of the stadium at that university is 50,000 seats, what is the revenue-maximizing price for this university to charge per ticket?
    a. \$10
    b. \$5
    c. \$7.50
    d. \$20
    e. \$30

Difficulty:
Correct Answer: a

20. In the same football conference as the university in Problem 9 is another university where the demand for football tickets at each game is $160{,}000 - 12{,}000p$. If the capacity of the stadium at that university is 90,000 seats, what is the revenue-maximizing price for this university to charge per ticket?
    a. \$6.67
    b. \$13.33
    c. \$5.83
    d. \$3.33
    e. \$20

Difficulty:
Correct Answer: e

21. In Problem 9, the demand for tickets is given by $D(p) = 200{,}000 - 10{,}000p$, where p is the price of tickets. If the price of tickets is \$10, then the price elasticity of demand for tickets is
    a. -2.
    b. -1.50.
    c. -3.
    d. -0.50.
    e. -1.

Difficulty:
Correct Answer: e

22. In Problem 9, the demand for tickets is given by $D(p) = 200{,}000 - 10{,}000p$, where p is the price of tickets. If the price of tickets is \$8, then the price elasticity of demand for tickets is
    a. -0.33.
    b. -1.33.
    c. -1.
    d. -2.
    e. -0.67.

Difficulty:
Correct Answer: e

23. In Problem 9, the demand for tickets is given by $D(p) = 200{,}000 - 10{,}000p$, where p is the price of tickets. If the price of tickets is \$8, then the price elasticity of demand for tickets is
    a. -1.33.
    b. -2.
    c. -0.33.
    d. -1.
    e. -0.67.

Difficulty:
Correct Answer: e

24. In Problem 9, the demand for tickets is given by $D(p) = 200{,}000 - 10{,}000p$, where p is the price of tickets. If the price of tickets is \$18, then the price elasticity of demand for tickets is
    a. -27.
    b. -18.
    c. -13.50.
    d. -4.50.
    e. -9.

Difficulty:
Correct Answer: e

25. In Problem 9, the demand for tickets is given by $D(p) = 200{,}000 - 10{,}000p$, where p is the price of tickets. If the price of tickets is \$15, then the price elasticity of demand for tickets is
    a. -6.
    b. -9.
    c. -4.50.
    d. -1.50.
    e. -3.

CHAPTER 16 | Equilibrium

MULTIPLE CHOICE

Difficulty:
Correct Answer: d

1. This problem will be easier if you have done Problem 3. The inverse demand function for grapefruit is defined by the equation $p = 282 - 9q$, where q is the number of units sold. The inverse supply function is defined by $p = 7 + 2q$. A tax of \$22 is imposed on suppliers for each unit of grapefruit that they sell. When the tax is imposed, the quantity of grapefruit sold falls to
   a. 25.
   b. 14.
   c. 21.
   d. 23.
   e. 24.

Difficulty:
Correct Answer: d

2. This problem will be easier if you have done Problem 3. The inverse demand function for grapefruit is defined by the equation $p = 145 - 6q$, where q is the number of units sold. The inverse supply function is defined by $p = 5 + 4q$. A tax of \$20 is imposed on suppliers for each unit of grapefruit that they sell. When the tax is imposed, the quantity of grapefruit sold falls to
   a. 9.
   b. 10.
   c. 14.
   d. 12.
   e. 13.

Difficulty:
Correct Answer: c

3. This problem will be easier if you have done Problem 3. The inverse demand function for grapefruit is defined by the equation $p = 317 - 6q$, where q is the number of units sold. The inverse supply function is defined by $p = 5 + 6q$. A tax of \$48 is imposed on suppliers for each unit of grapefruit that they sell. When the tax is imposed, the quantity of grapefruit sold falls to
   a. 20.
   b. 18.
   c. 22.
   d. 26.
   e. 24.

Difficulty:
Correct Answer: a

4. This problem will be easier if you have done Problem 3. The inverse demand function for grapefruit is defined by the equation $p = 136 - 4q$, where q is the number of units sold. The inverse supply function is defined by $p = 16 + 4q$. A tax of \$16 is imposed on suppliers for each unit of grapefruit that they sell. When the tax is imposed, the quantity of grapefruit sold falls to
   a. 13.
   b. 11.
   c. 11.
   d. 15.
   e. 14.

Difficulty:
Correct Answer: d

5. This problem will be easier if you have done Problem 3. The inverse demand function for grapefruit is defined by the equation $p = 122 - 4q$, where q is the number of units sold. The inverse supply function is defined by $p = 8 + 2q$. A tax of \$12 is imposed on suppliers for each unit of grapefruit that they sell. When the tax is imposed, the quantity of grapefruit sold falls to
   a. 15.
   b. 13.
   c. 19.
   d. 17.
   e. 18.

Difficulty:
Correct Answer: c

6. In a crowded city far away, the civic authorities decided that rents were too high. The long-run supply function of two-room rental apartments was given by $q = 17 + 4p$ and the long-run demand function was given by $q = 304 - 5p$, where p is the rental rate in crowns per week. The authorities made it illegal to rent an apartment for more than 27 crowns per week. To avoid a housing shortage, the authorities agreed to pay landlords enough of a subsidy to make supply equal to demand. How much would the weekly subsidy per apartment have to be to eliminate excess demand at the ceiling price?
   a. 5.50 crowns
   b. 8 crowns
   c. 11 crowns
   d. 22 crowns
   e. 16.50 crowns

Difficulty:
Correct Answer: a

7. In a crowded city far away, the civic authorities decided that rents were too high. The long-run supply function of two-room rental apartments was given by $q = 15 + 3p$ and the long-run demand function was given by $q = 237 - 3p$, where p is the rental rate in crowns per week. The authorities made it illegal to rent an apartment for more than 30 crowns per week. To avoid a housing shortage, the authorities agreed to pay landlords enough of a subsidy to make supply equal to demand. How much would the weekly subsidy per apartment have to be to eliminate excess demand at the ceiling price?
   a. 14 crowns
   b. 7 crowns
   c. 11 crowns
   d. 28 crowns
   e. 21 crowns

Difficulty:
Correct Answer: d

8. In a crowded city far away, the civic authorities decided that rents were too high. The long-run supply function of two-room rental apartments was given by $q = 18 + 3p$ and the long-run demand function was given by $q = 267 - 4p$, where p is the rental rate in crowns per week. The authorities made it illegal to rent an apartment for more than 27 crowns per week. To avoid a housing shortage, the authorities agreed to pay landlords enough of a subsidy to make supply equal to demand. How much would the weekly subsidy per apartment have to be to eliminate excess demand at the ceiling price?
   a. 40 crowns
   b. 10 crowns
   c. 17 crowns
   d. 20 crowns
   e. 30 crowns

Difficulty:
Correct Answer: c

9. In a crowded city far away, the civic authorities decided that rents were too high. The long-run supply function of two-room rental apartments was given by $q = 14 + 3p$ and the long-run demand function was given by $q = 260 - 4p$, where p is the rental rate in crowns per week. The authorities made it illegal to rent an apartment for more than 30 crowns per week. To avoid a housing shortage, the authorities agreed to pay landlords enough of a subsidy to make supply equal to demand. How much would the weekly subsidy per apartment have to be to eliminate excess demand at the ceiling price?
   a. 9 crowns
   b. 24 crowns
   c. 12 crowns
   d. 6 crowns
   e. 18 crowns

Difficulty:
Correct Answer: b

10. In a crowded city far away, the civic authorities decided that rents were too high. The long-run supply function of two-room rental apartments was given by $q = 20 + 5p$ and the long-run demand function was given by $q = 271 - 2p$, where p is the rental rate in crowns per week. The authorities made it illegal to rent an apartment for more than 23 crowns per week. To avoid a housing shortage, the authorities agreed to pay landlords enough of a subsidy to make supply equal to demand. How much would the weekly subsidy per apartment have to be to eliminate excess demand at the ceiling price?
   a. 9 crowns
   b. 18 crowns
   c. 36 crowns
   d. 15 crowns
   e. 27 crowns

Difficulty:
Correct Answer: a

11. Suppose that King Kanuta from Problem 11 demands that each of his subjects give him 2 coconuts for every coconut that they consume. The king puts all of the coconuts that he collects in a large pile and burns them. The supply of coconuts is given by $S(p_s) = 100p_s$, where p_s is the price received by suppliers. The demand for coconuts by the king's subjects is given by $D(p_d) = 2{,}666.67 - 100p_d$, where p_d is the price paid by

consumers. In equilibrium, the price received by suppliers will be
a. \$8.
b. \$12.
c. \$13.33.
d. \$40.
e. None of the above.

Difficulty:
Correct Answer: a

12. Suppose that King Kanuta from Problem 11 demands that each of his subjects give him 4 coconuts for every coconut that they consume. The king puts all of the coconuts that he collects in a large pile and burns them. The supply of coconuts is given by $S(p_s) = 100p_s$, where p_s is the price received by suppliers. The demand for coconuts by the king's subjects is given by $D(p_d) = 2{,}080 - 100p_d$, where p_d is the price paid by consumers. In equilibrium, the price received by suppliers will be
a. \$4.
b. \$10.40.
c. \$52.
d. \$6.
e. None of the above.

Difficulty:
Correct Answer: d

13. Suppose that King Kanuta from Problem 11 demands that each of his subjects give him 1 coconuts for every coconut that they consume. The king puts all of the coconuts that he collects in a large pile and burns them. The supply of coconuts is given by $S(p_s) = 100p_s$, where p_s is the price received by suppliers. The demand for coconuts by the king's subjects is given by $D(p_d) = 4{,}000 - 100p_d$, where p_d is the price paid by consumers. In equilibrium, the price received by suppliers will be
a. \$24.
b. \$20.
c. \$40.
d. \$16.
e. None of the above.

Difficulty:
Correct Answer: a

14. Suppose that King Kanuta from Problem 11 demands that each of his subjects give him 4 coconuts for every coconut that they consume. The king puts all of the coconuts that he collects in a large pile and burns them. The supply of coconuts is given by $S(p_s) = 100p_s$, where p_s is the price received by suppliers. The demand for coconuts by the king's subjects is given by $D(p_d) = 10{,}400 - 100p_d$, where p_d is the price paid by consumers. In equilibrium, the price received by suppliers will be
a. \$20.
b. \$52.
c. \$30.
d. \$260.
e. None of the above.

Difficulty:
Correct Answer: b

15. Suppose that King Kanuta from Problem 11 demands that each of his subjects give him 3 coconuts for every coconut that they consume. The king puts all of the coconuts that he collects in a large pile and burns them. The supply of coconuts is given by $S(p_s) = 100p_s$, where p_s is the price received by suppliers. The demand for coconuts by the king's subjects is given by $D(p_d) = 7{,}650 - 100p_d$, where p_d is the price paid by consumers. In equilibrium, the price received by suppliers will be
a. \$153.
b. \$18.
c. \$27.
d. \$38.25.
e. None of the above.

Difficulty:
Correct Answer: a

16. In Problem 6, the demand function for Schrecklichs is $200 - 4P_S - 2P_L$ and the demand function for LaMerdes is $200 - 3P_L - P_S$, where P_S and P_L are respectively the price of Schrecklichs and LaMerdes. If the world supply of Schrecklichs is 130 and the world supply of LaMerdes is 120, then the equilibrium price of Schrecklichs is
a. \$5.
b. \$17.50.
c. \$30.
d. \$25.
e. \$10.

Difficulty:
Correct Answer: b

17. In Problem 6, the demand function for Schrecklichs is $200 - 4P_S - 2P_L$ and the demand function for LaMerdes is $200 - 3P_L - P_S$, where P_S and P_L are respectively the price of Schrecklichs and LaMerdes. If the world supply of Schrecklichs is 140 and the world supply of LaMerdes is 180, then the equilibrium price of Schrecklichs is
a. \$15.
b. \$14.
c. \$2.
d. \$16.
e. \$28.

Difficulty:
Correct Answer: a

18. In Problem 6, the demand function for Schrecklichs is $200 - 4P_S - 2P_L$ and the demand function for LaMerdes is $200 - 3P_L - P_S$, where P_S and P_L are respectively the price of Schrecklichs and LaMerdes. If the world supply of Schrecklichs is 140 and the world supply of LaMerdes is 120, then the equilibrium price of Schrecklichs is
   a. \$2.
   b. \$28.
   c. \$26.
   d. \$15.
   e. \$4.

Difficulty:
Correct Answer: a

19. In Problem 6, the demand function for Schrecklichs is $200 - 4P_S - 2P_L$ and the demand function for LaMerdes is $200 - 3P_L - P_S$, where P_S and P_L are respectively the price of Schrecklichs and LaMerdes. If the world supply of Schrecklichs is 150 and the world supply of LaMerdes is 150, then the equilibrium price of Schrecklichs is
   a. \$5.
   b. \$20.
   c. \$15.
   d. \$12.50.
   e. \$10.

Difficulty:
Correct Answer: c

20. In Problem 6, the demand function for Schrecklichs is $200 - 4P_S - 2P_L$ and the demand function for LaMerdes is $200 - 3P_L - P_S$, where P_S and P_L are respectively the price of Schrecklichs and LaMerdes. If the world supply of Schrecklichs is 110 and the world supply of LaMerdes is 110, then the equilibrium price of Schrecklichs is
   a. \$27.
   b. \$22.50.
   c. \$9.
   d. \$36.
   e. \$18.

CHAPTER 17 | Auctions

MULTIPLE CHOICE

Difficulty:
Correct Answer: c

1. First Fiddler's Bank has foreclosed on a home mortgage and is selling the house at auction. There are three bidders for the house, Jesse, Shelia, and Elsie. First Fiddler's does not know the willingness to pay of any of these bidders but on the basis of its previous experience believes that each of them has a probability of 1/3 of valuing the house at $600,000, a probability of 1/3 of valuing it at $500,000, and a probability of 1/3 of valuing it at $200,000. First Fiddler's believes that these probabilities are independent between buyers. If First Fiddler's sells the house by means of a second-bidder, sealed-bid auction (Vickrey auction), what will be the bank's expected revenue from the sale? (Choose the closest answer.)
   a. $500,000
   b. $550,000
   c. $433,333.33
   d. $350,000
   e. $366,666.67

Difficulty:
Correct Answer: d

2. First Fiddler's Bank has foreclosed on a home mortgage and is selling the house at auction. There are three bidders for the house, Jesse, Shelia, and Elsie. First Fiddler's does not know the willingness to pay of any of these bidders but on the basis of its previous experience believes that each of them has a probability of 1/3 of valuing the house at $800,000, a probability of 1/3 of valuing it at $300,000, and a probability of 1/3 of valuing it at $100,000. First Fiddler's believes that these probabilities are independent between buyers. If First Fiddler's sells the house by means of a second-bidder, sealed-bid auction (Vickrey auction), what will be the bank's expected revenue from the sale? (Choose the closest answer.)
   a. $300,000
   b. $200,000
   c. $550,000
   d. $400,000
   e. $366,666.67

Difficulty:
Correct Answer: d

3. First Fiddler's Bank has foreclosed on a home mortgage and is selling the house at auction. There are three bidders for the house, Jesse, Shelia, and Elsie. First Fiddler's does not know the willingness to pay of any of these bidders but on the basis of its previous experience believes that each of them has a probability of 1/3 of valuing the house at $900,000, a probability of 1/3 of valuing it at $700,000, and a probability of 1/3 of valuing it at $200,000. First Fiddler's believes that these probabilities are independent between buyers. If First Fiddler's sells the house by means of a second-bidder, sealed-bid auction (Vickrey auction), what will be the bank's expected revenue from the sale? (Choose the closest answer.)
   a. $700,000
   b. $800,000
   c. $450,000
   d. $600,000
   e. $533,333.33

Difficulty:
Correct Answer: b

4. First Fiddler's Bank has foreclosed on a home mortgage and is selling the house at auction. There are three bidders for the house, Jesse, Shelia, and Elsie. First Fiddler's does not know the willingness to pay of any of these bidders but on the basis of its previous experience believes that each of them has a probability of 1/3 of valuing the house at $800,000, a probability of 1/3 of valuing it at $500,000, and a probability of 1/3 of valuing it at $300,000. First Fiddler's believes that these probabilities are independent between

buyers. If First Fiddler's sells the house by means of a second-bidder, sealed-bid auction (Vickrey auction), what will be the bank's expected revenue from the sale? (Choose the closest answer.)

a. $400,000
b. $533,333.33
c. $650,000
d. $500,000
e. $433,333.33

Difficulty:
Correct Answer: c

5. First Fiddler's Bank has foreclosed on a home mortgage and is selling the house at auction. There are three bidders for the house, Jesse, Shelia, and Elsie. First Fiddler's does not know the willingness to pay of any of these bidders but on the basis of its previous experience believes that each of them has a probability of 1/3 of valuing the house at $900,000, a probability of 1/3 of valuing it at $700,000, and a probability of 1/3 of valuing it at $400,000. First Fiddler's believes that these probabilities are independent between buyers. If First Fiddler's sells the house by means of a second-bidder, sealed-bid auction (Vickrey auction), what will be the bank's expected revenue from the sale? (Choose the closest answer.)
   a. $800,000
   b. $700,000
   c. $666,666.67
   d. $550,000
   e. $533,333.33

Difficulty:
Correct Answer: d

6. An antique cabinet is being sold by means of an English auction. There are four bidders, Kitty, Gloria, Judy, and Cindy. These bidders are unacquainted with each other and do not collude. Kitty values the cabinet at $800, Gloria values it at $500, Judy values it at $1,700, and Cindy values it at $700. If the bidders bid in their rational self-interest, the cabinet will be sold to
   a. Judy for about $1,700.
   b. Kitty for about $800.
   c. either Judy or Kitty for about $800. Which of these two buyers gets it is randomly determined.
   d. Judy for slightly more than $800.
   e. either Judy or Kitty for about $500. Which of these two buyers gets it is randomly determined.

Difficulty:
Correct Answer: a

7. An antique cabinet is being sold by means of an English auction. There are four bidders, Arabella, Gloria, Desiree, and Cindy. These bidders are unacquainted with each other and do not collude. Arabella values the cabinet at $1,000, Gloria values it at $800, Desiree values it at $1,300, and Cindy values it at $700. If the bidders bid in their rational self-interest, the cabinet will be sold to
   a. Desiree for slightly more than $1,000.
   b. Desiree for about $1,300.
   c. Arabella for about $1,000.
   d. either Desiree or Arabella for about $1,000. Which of these two buyers gets it is randomly determined.
   e. either Desiree or Arabella for about $800. Which of these two buyers gets it is randomly determined.

Difficulty:
Correct Answer: c

8. An antique cabinet is being sold by means of an English auction. There are four bidders, Gloria, Elise, Judy, and Arabella. These bidders are unacquainted with each other and do not collude. Gloria values the cabinet at $800, Elise values it at $500, Judy values it at $1,800, and Arabella values it at $600. If the bidders bid in their rational self-interest, the cabinet will be sold to
   a. Gloria for about $800.
   b. either Judy or Gloria for about $800. Which of these two buyers gets it is randomly determined.
   c. Judy for slightly more than $800.
   d. Judy for about $1,800.
   e. either Judy or Gloria for about $500. Which of these two buyers gets it is randomly determined.

Difficulty:
Correct Answer: a

9. An antique cabinet is being sold by means of an English auction. There are four bidders, Arabella, Desiree, Gloria, and Flora. These bidders are unacquainted with each other and do not collude. Arabella values the cabinet at $1,100, Desiree values it at $600, Gloria values it at $1,700, and Flora values it at $700. If the bidders bid in their rational self-interest, the cabinet will be sold to
   a. Gloria for slightly more than $1,100.
   b. either Gloria or Arabella for about $1,100. Which of these two buyers gets it is randomly determined.
   c. Arabella for about $1,100.
   d. Gloria for about $1,700.
   e. either Gloria or Arabella for about $600. Which of these two buyers gets it is randomly determined.

Difficulty:
Correct Answer: a

10. An antique cabinet is being sold by means of an English auction. There are four bidders, Arabella, Lana, Hester, and Betsy. These bidders are unacquainted with each other and do not collude. Arabella values the cabinet at $1,000, Lana values it at $500, Hester values

it at $1,300, and Betsy values it at $800. If the bidders bid in their rational self-interest, the cabinet will be sold to

a. Hester for slightly more than $1,000.
b. Hester for about $1,300.
c. Arabella for about $1,000.
d. either Hester or Arabella for about $1,000. Which of these two buyers gets it is randomly determined.
e. either Hester or Arabella for about $500. Which of these two buyers gets it is randomly determined.

Difficulty:
Correct Answer: b

11. A dealer decides to sell an antique automobile by means of an English auction with a reservation price of $900. There are two bidders. The dealer believes that there are only three possible values that each bidder's willingness to pay might take, $6,500, $3,600, and $900. Each bidder has a probability of 1/3 of having each of these willingnesses to pay, and the probabilities of the two bidders are independent of the other's valuation. Assuming that the two bidders bid rationally and do not collude, the dealer's expected revenue from selling the automobile is
    a. $5,050.
    b. $3,666.67.
    c. $3,600.
    d. $3,100.
    e. $6,500.

Difficulty:
Correct Answer: c

12. A dealer decides to sell an antique automobile by means of an English auction with a reservation price of $200. There are two bidders. The dealer believes that there are only three possible values that each bidder's willingness to pay might take, $7,700, $3,100, and $200. Each bidder has a probability of 1/3 of having each of these willingnesses to pay, and the probabilities of the two bidders are independent of the other's valuation. Assuming that the two bidders bid rationally and do not collude, the dealer's expected revenue from selling the automobile is
    a. $2,600.
    b. $5,400.
    c. $3,666.67.
    d. $3,100.
    e. $7,700.

Difficulty:
Correct Answer: a

13. A dealer decides to sell an antique automobile by means of an English auction with a reservation price of $100. There are two bidders. The dealer believes that there are only three possible values that each bidder's willingness to pay might take, $7,300, $2,600, and $100. Each bidder has a probability of 1/3 of having each of these willingnesses to pay, and the probabilities of the two bidders are independent of the other's valuation. Assuming that the two bidders bid rationally and do not collude, the dealer's expected revenue from selling the automobile is
    a. $3,333.33.
    b. $2,100.
    c. $2,600.
    d. $4,950.
    e. $7,300.

Difficulty:
Correct Answer: d

14. A dealer decides to sell an antique automobile by means of an English auction with a reservation price of $900. There are two bidders. The dealer believes that there are only three possible values that each bidder's willingness to pay might take, $6,700, $3,400, and $900. Each bidder has a probability of 1/3 of having each of these willingnesses to pay, and the probabilities of the two bidders are independent of the other's valuation. Assuming that the two bidders bid rationally and do not collude, the dealer's expected revenue from selling the automobile is
    a. $5,050.
    b. $3,400.
    c. $2,900.
    d. $3,666.67.
    e. $6,700.

Difficulty:
Correct Answer: c

15. A dealer decides to sell an antique automobile by means of an English auction with a reservation price of $600. There are two bidders. The dealer believes that there are only three possible values that each bidder's willingness to pay might take, $6,400, $3,000, and $600. Each bidder has a probability of 1/3 of having each of these willingnesses to pay, and the probabilities of the two bidders are independent of the other's valuation. Assuming that the two bidders bid rationally and do not collude, the dealer's expected revenue from selling the automobile is
    a. $2,500.
    b. $4,700.
    c. $3,333.33.
    d. $3,000.
    e. $6,400.

Difficulty:
Correct Answer: b

16. A dealer decides to sell an oil painting by means of an English auction with a reservation price of slightly below $100,000. If she fails to get a bid as high as her reservation price, she will burn the painting. There are two bidders. The dealer believes that each bidder's willingness to pay will take one of the three following values: $110,000, $100,000, and $25,000. The dealer believes that each bidder has a probability of 1/3 of having each of these three values. The probability distribution of each buyer's value is independent of that of the other's. Assuming that the two bidders bid rationally and do not collude, the dealer's expected revenue from selling the painting is slightly less than
    a. $89,000.
    b. $100,000.
    c. $105,000.
    d. $80,000.
    e. $78,333.33.

Difficulty:
Correct Answer: a

17. A dealer decides to sell an oil painting by means of an English auction with a reservation price of slightly below $75,000. If she fails to get a bid as high as her reservation price, she will burn the painting. There are two bidders. The dealer believes that each bidder's willingness to pay will take one of the three following values: $90,000, $75,000, and $30,000. The dealer believes that each bidder has a probability of 1/3 of having each of these three values. The probability distribution of each buyer's value is independent of that of the other's. Assuming that the two bidders bid rationally and do not collude, the dealer's expected revenue from selling the painting is slightly less than
    a. $75,000.
    b. $69,000.
    c. $60,000.
    d. $82,500.
    e. $65,000.

Difficulty:
Correct Answer: c

18. A dealer decides to sell an oil painting by means of an English auction with a reservation price of slightly below $85,000. If she fails to get a bid as high as her reservation price, she will burn the painting. There are two bidders. The dealer believes that each bidder's willingness to pay will take one of the three following values: $100,000, $85,000, and $25,000. The dealer believes that each bidder has a probability of 1/3 of having each of these three values. The probability distribution of each buyer's value is independent of that of the other's. Assuming that the two bidders bid rationally and do not collude, the dealer's expected revenue from selling the painting is slightly less than
    a. $79,000.
    b. $92,500.
    c. $85,000.
    d. $70,000.
    e. $70,000.

Difficulty:
Correct Answer: b

19. A dealer decides to sell an oil painting by means of an English auction with a reservation price of slightly below $100,000. If she fails to get a bid as high as her reservation price, she will burn the painting. There are two bidders. The dealer believes that each bidder's willingness to pay will take one of the three following values: $120,000, $100,000, and $25,000. The dealer believes that each bidder has a probability of 1/3 of having each of these three values. The probability distribution of each buyer's value is independent of that of the other's. Assuming that the two bidders bid rationally and do not collude, the dealer's expected revenue from selling the painting is slightly less than
    a. $110,000.
    b. $100,000.
    c. $89,000.
    d. $80,000.
    e. $81,666.67.

Difficulty:
Correct Answer: a

20. A dealer decides to sell an oil painting by means of an English auction with a reservation price of slightly below $70,000. If she fails to get a bid as high as her reservation price, she will burn the painting. There are two bidders. The dealer believes that each bidder's willingness to pay will take one of the three following values: $80,000, $70,000, and $45,000. The dealer believes that each bidder has a probability of 1/3 of having each of these three values. The probability distribution of each buyer's value is independent of that of the other's. Assuming that the two bidders bid rationally and do not collude, the dealer's expected revenue from selling the painting is slightly less than
    a. $70,000.
    b. $59,000.
    c. $75,000.
    d. $50,000.
    e. $65,000.

Difficulty:
Correct Answer: a

21. Jerry's Auction House in Purloined Hubcap, Oregon, holds sealed-bid used-car auctions every Wednesday. Each car is sold to the highest bidder at the second-highest bidder's bid. On average, 2/3 of the cars that are auctioned are lemons and 1/3 are good used cars. A good used car is worth $1,200 to any buyer. A lemon is worth $270 to any buyer. Most buyers can do no better than picking at random from among these used cars. The only exception is Al Crankcase. Recall that Al can sometimes detect lemons by tasting the oil on the car's dipstick. A good car never fails Al's test, but half of the lemons fail his test. Al attends every auction, licks every dipstick, and bids his expected value of every car given the results of his test. Al will bid
    a. $735 for cars that pass his test and $270 for cars that fail his test. Normal bidders will get only lemons.
    b. $600 for cars that pass his test and $400 for cars that fail his test. Normal bidders will get only lemons.
    c. $400 for cars that pass his test and $270 for cars that fail his test. Normal bidders will get good cars only 1/6 of the time.
    d. $580 for cars that pass his test and $370 for cars that fail his test. Normal bidders will get good cars only 1/6 of the time.
    e. $540 for cars that pass his test and $270 for cars that fail his test. Normal bidders will get good cars only 1/12 of the time.

Difficulty:
Correct Answer: c

22. Jerry's Auction House in Purloined Hubcap, Oregon, holds sealed-bid used-car auctions every Wednesday. Each car is sold to the highest bidder at the second-highest bidder's bid. On average, 2/3 of the cars that are auctioned are lemons and 1/3 are good used cars. A good used car is worth $1,800 to any buyer. A lemon is worth $270 to any buyer. Most buyers can do no better than picking at random from among these used cars. The only exception is Al Crankcase. Recall that Al can sometimes detect lemons by tasting the oil on the car's dipstick. A good car never fails Al's test, but half of the lemons fail his test. Al attends every auction, licks every dipstick, and bids his expected value of every car given the results of his test. Al will bid
    a. $900 for cars that pass his test and $600 for cars that fail his test. Normal bidders will get only lemons.
    b. $780 for cars that pass his test and $370 for cars that fail his test. Normal bidders will get good cars only 1/6 of the time.
    c. $1,035 for cars that pass his test and $270 for cars that fail his test. Normal bidders will get only lemons.
    d. $600 for cars that pass his test and $270 for cars that fail his test. Normal bidders will get good cars only 1/6 of the time.
    e. $540 for cars that pass his test and $270 for cars that fail his test. Normal bidders will get good cars only 1/12 of the time.

Difficulty:
Correct Answer: a

23. Jerry's Auction House in Purloined Hubcap, Oregon, holds sealed-bid used-car auctions every Wednesday. Each car is sold to the highest bidder at the second-highest bidder's bid. On average, 2/3 of the cars that are auctioned are lemons and 1/3 are good used cars. A good used car is worth $2,700 to any buyer. A lemon is worth $240 to any buyer. Most buyers can do no better than picking at random from among these used cars. The only exception is Al Crankcase. Recall that Al can sometimes detect lemons by tasting the oil on the car's dipstick. A good car never fails Al's test, but half of the lemons fail his test. Al attends every auction, licks every dipstick, and bids his expected value of every car given the results of his test. Al will bid
    a. $1,470 for cars that pass his test and $240 for cars that fail his test. Normal bidders will get only lemons.
    b. $1,060 for cars that pass his test and $340 for cars that fail his test. Normal bidders will get good cars only 1/6 of the time.
    c. $1,350 for cars that pass his test and $900 for cars that fail his test. Normal bidders will get only lemons.
    d. $900 for cars that pass his test and $240 for cars that fail his test. Normal bidders will get good cars only 1/6 of the time.
    e. $480 for cars that pass his test and $240 for cars that fail his test. Normal bidders will get good cars only 1/12 of the time.

Difficulty:
Correct Answer: c

24. Jerry's Auction House in Purloined Hubcap, Oregon, holds sealed-bid used-car auctions every Wednesday. Each car is sold to the highest bidder at the second-highest bidder's bid. On average, 2/3 of the cars that are auctioned are lemons and 1/3 are good used cars. A good used car is worth $3,000 to any buyer. A lemon is worth $150 to any buyer. Most buyers can do no better than picking at random from among these used cars. The only exception is Al Crankcase. Recall that Al can sometimes detect lemons by tasting the oil on the car's dipstick. A good car never fails Al's test, but half of the

lemons fail his test. Al attends every auction, licks every dipstick, and bids his expected value of every car given the results of his test. Al will bid

a. \$1,500 for cars that pass his test and \$1,000 for cars that fail his test. Normal bidders will get only lemons.
b. \$1,100 for cars that pass his test and \$250 for cars that fail his test. Normal bidders will get good cars only 1/6 of the time.
c. \$1,575 for cars that pass his test and \$150 for cars that fail his test. Normal bidders will get only lemons.
d. \$1,000 for cars that pass his test and \$150 for cars that fail his test. Normal bidders will get good cars only 1/6 of the time.
e. \$300 for cars that pass his test and \$150 for cars that fail his test. Normal bidders will get good cars only 1/12 of the time.

Difficulty:
Correct Answer: a

25. Jerry's Auction House in Purloined Hubcap, Oregon, holds sealed-bid used-car auctions every Wednesday. Each car is sold to the highest bidder at the second-highest bidder's bid. On average, 2/3 of the cars that are auctioned are lemons and 1/3 are good used cars. A good used car is worth \$1,800 to any buyer. A lemon is worth \$240 to any buyer. Most buyers can do no better than picking at random from among these used cars. The only exception is Al Crankcase. Recall that Al can sometimes detect lemons by tasting the oil on the car's dipstick. A good car never fails Al's test, but half of the lemons fail his test. Al attends every auction, licks every dipstick, and bids his expected value of every car given the results of his test. Al will bid

a. \$1,020 for cars that pass his test and \$240 for cars that fail his test. Normal bidders will get only lemons.
b. \$900 for cars that pass his test and \$600 for cars that fail his test. Normal bidders will get only lemons.
c. \$760 for cars that pass his test and \$340 for cars that fail his test. Normal bidders will get good cars only 1/6 of the time.
d. \$600 for cars that pass his test and \$240 for cars that fail his test. Normal bidders will get good cars only 1/6 of the time.
e. \$480 for cars that pass his test and \$240 for cars that fail his test. Normal bidders will get good cars only 1/12 of the time.

CHAPTER 18 Technology

MULTIPLE CHOICE

Difficulty:
Correct Answer: a

1. This problem will be easier if you have done Problem 1. A firm has the production function $\$f(x_1, x_2) = x^{2.50}{}_1 x^{0.50}{}_2$. The isoquant on which output is $50^{5/10}$ has the equation
   a. $x_2 = 50x^{-5}{}_1$.
   b. $x_2 = 50x^2{}_1$.
   c. $x_1/x_2 = 5$.
   d. $x_2 = 50x^{-0.50}{}_1$.
   e. $x_1 = 0.50x^{-0.50}{}_2$.

Difficulty:
Correct Answer: d

2. This problem will be easier if you have done Problem 1. A firm has the production function $\$f(x_1, x_2) = x^{0.40}{}_1 x^{0.20}{}_2$. The isoquant on which output is $50^{2/10}$ has the equation
   a. $x_2 = 50x^5{}_1$.
   b. $x_2 = 50x^{-0.20}{}_1$.
   c. $x_1/x_2 = 2$.
   d. $x_2 = 50x^{-2}{}_1$
   e. $x_1 = 0.20x^{-0.80}{}_2$.

Difficulty:
Correct Answer: c

3. This problem will be easier if you have done Problem 1. A firm has the production function $\$f(x_1, x_2) = x^{0.50}{}_1 x^{0.10}{}_2$. The isoquant on which output is $40^{1/10}$ has the equation
   a. $x_1/x_2 = 5$.
   b. $x_2 = 40x^{10}{}_1$.
   c. $x_2 = 40x^{-5}{}_1$.
   d. $x_2 = 40x^{-0.10}{}_1$.
   e. $x_1 = 0.10x^{-0.90}{}_2$.

Difficulty:
Correct Answer: b

4. This problem will be easier if you have done Problem 1. A firm has the production function $\$f(x_1, x_2) = x^{0.90}{}_1 x^{0.30}{}_2$. The isoquant on which output is $80^{3/10}$ has the equation
   a. $x_2 = 80x^{3.33}{}_1$.
   b. $x_2 = 80x^{-3}{}_1$.
   c. $x_1/x_2 = 3$.
   d. $x_2 = 80x^{-0.30}{}_1$.
   e. $x_1 = 0.30x^{-0.70}{}_2$.

Difficulty:
Correct Answer: c

5. This problem will be easier if you have done Problem 1. A firm has the production function $\$f(x_1, x_2) = x^1{}_1 x^{0.50}{}_2$. The isoquant on which output is $80^{5/10}$ has the equation
   a. $x_1/x_2 = 2$.
   b. $x_2 = 80x^{-0.50}{}_1$.
   c. $x_2 = 80x^{-2}{}_1$.
   d. $x_2 = 80x^2{}_1$.
   e. $x_1 = 0.50x^{-0.50}{}_2$.

Difficulty: 1
Correct Answer: e

6. A firm has the production function $f(x, y) = x^{1.40}y^{1.90}$. This firm has
   a. decreasing returns to scale and diminishing marginal product for factor x.
   b. increasing returns to scale and decreasing marginal product for factor x.
   c. decreasing returns to scale and increasing marginal product for factor x.
   d. constant returns to scale.
   e. None of the above.

Difficulty: 1
Correct Answer: e

7. A firm has the production function $f(x, y) = x^{1.20}y^2$. This firm has
   a. constant returns to scale.
   b. decreasing returns to scale and increasing marginal product for factor x.
   c. increasing returns to scale and decreasing marginal product for factor x.
   d. decreasing returns to scale and diminishing marginal product for factor x.
   e. None of the above.

Difficulty: 1
Correct Answer: e

8. A firm has the production function $f(x, y) = x^{1.40}y^{1.40}$. This firm has
   a. constant returns to scale.
   b. decreasing returns to scale and increasing marginal product for factor x.
   c. decreasing returns to scale and diminishing marginal product for factor x.
   d. increasing returns to scale and decreasing marginal product for factor x.
   e. None of the above.

Difficulty: 1
Correct Answer: e

9. A firm has the production function $f(x, y) = x^{1.10}y^{1.30}$. This firm has
   a. decreasing returns to scale and diminishing marginal product for factor x.
   b. increasing returns to scale and decreasing marginal product for factor x.
   c. constant returns to scale.
   d. decreasing returns to scale and increasing marginal product for factor x.
   e. None of the above.

Difficulty: 1
Correct Answer: e

10. A firm has the production function $f(x, y) = x^{1.10}y^1$. This firm has
    a. constant returns to scale.
    b. decreasing returns to scale and diminishing marginal product for factor x.
    c. increasing returns to scale and decreasing marginal product for factor x.
    d. decreasing returns to scale and increasing marginal product for factor x.
    e. None of the above.

Difficulty: 1
Correct Answer: b

11. A firm uses 3 factors of production. Its production function is $f(x, y, z) = \min\{x^3/y, y^2, (z^4 - x^4)/y^2\}$. If the amount of each input is multiplied by 6, its output will be multiplied by
    a. 216.
    b. 36.
    c. 6.
    d. 0.16.
    e. The answer depends on the original choice of x, y, and z.

Difficulty: 1
Correct Answer: b

12. A firm uses 3 factors of production. Its production function is $f(x, y, z) = \min\{x^3/y, y^2, (z^4 - x^4)/y^2\}$. If the amount of each input is multiplied by 6, its output will be multiplied by
    a. 6.
    b. 36.
    c. 0.16.
    d. 216.
    e. The answer depends on the original choice of x, y, and z.

Difficulty: 1
Correct Answer: b

13. A firm uses 3 factors of production. Its production function is $f(x, y, z) = \min\{x^4/y, y^3, (z^5 - x^5)/y^2\}$. If the amount of each input is multiplied by 5, its output will be multiplied by
    a. 0.04.
    b. 125.
    c. 625.
    d. 25.
    e. The answer depends on the original choice of x, y, and z.

Difficulty: 1
Correct Answer: a

14. A firm uses 3 factors of production. Its production function is $f(x, y, z) = \min\{x^5/y, y^4, (z^6 - x^6)/y^2\}$. If the amount of each input is multiplied by 3, its output will be multiplied by
    a. 81.
    b. 27.
    c. 243.
    d. 0.04.
    e. The answer depends on the original choice of x, y, and z.

Difficulty: 1
Correct Answer: a

15. A firm uses 3 factors of production. Its production function is $f(x, y, z) = \min\{x^4/y, y^3, (z^5 - x^5)/y^2\}$. If the amount of each input is multiplied by 2, its output will be multiplied by
   a. 8.
   b. 4.
   c. 16.
   d. 0.22.
   e. The answer depends on the original choice of x, y, and z.

Difficulty: 2
Correct Answer: b

16. A firm has a production function $f(x, y) = 1.80(x^{0.10} + y^{0.10})^2$ whenever $x > 0$ and $y > 0$. When the amounts of both inputs are positive, this firm has
   a. increasing returns to scale.
   b. decreasing returns to scale.
   c. constant returns to scale.
   d. increasing returns to scale if $x + y > 1$ and decreasing returns to scale otherwise.
   e. increasing returns to scale if output is less than 1 and decreasing returns to scale if output is greater than 1.

Difficulty: 2
Correct Answer: b

17. A firm has a production function $f(x, y) = 0.70(x^{0.80} + y^{0.80})^2$ whenever $x > 0$ and $y > 0$. When the amounts of both inputs are positive, this firm has
   a. increasing returns to scale if $x + y > 1$ and decreasing returns to scale otherwise.
   b. increasing returns to scale.
   c. decreasing returns to scale.
   d. constant returns to scale.
   e. increasing returns to scale if output is less than 1 and decreasing returns to scale if output is greater than 1.

Difficulty: 2
Correct Answer: c

18. A firm has a production function $f(x, y) = 1.80(x^{0.80} + y^{0.80})^1$ whenever $x > 0$ and $y > 0$. When the amounts of both inputs are positive, this firm has
   a. increasing returns to scale.
   b. constant returns to scale.
   c. decreasing returns to scale.
   d. increasing returns to scale if $x + y > 1$ and decreasing returns to scale otherwise.
   e. increasing returns to scale if output is less than 1 and decreasing returns to scale if output is greater than 1.

Difficulty: 2
Correct Answer: b

19. A firm has a production function $f(x, y) = 2(x^{0.90} + y^{0.90})^5$ whenever $x > 0$ and $y > 0$. When the amounts of both inputs are positive, this firm has
   a. increasing returns to scale if $x + y > 1$ and decreasing returns to scale otherwise.
   b. increasing returns to scale.
   c. decreasing returns to scale.
   d. constant returns to scale.
   e. increasing returns to scale if output is less than 1 and decreasing returns to scale if output is greater than 1.

Difficulty: 2
Correct Answer: b

20. A firm has a production function $f(x, y) = 0.70(x^{0.20} + y^{0.20})^4$ whenever $x > 0$ and $y > 0$. When the amounts of both inputs are positive, this firm has
   a. increasing returns to scale.
   b. decreasing returns to scale.
   c. constant returns to scale.
   d. increasing returns to scale if $x + y > 1$ and decreasing returns to scale otherwise.
   e. increasing returns to scale if output is less than 1 and decreasing returns to scale if output is greater than 1.

Difficulty:
Correct Answer: e

21. In Problem 3, if the exponents in the production function were 0.30 for x_1 and 0.30 for x_2, this production function would exhibit (constant, increasing, decreasing) returns to scale and (would, would not) have diminishing technical rate of substitution.
   a. constant, would
   b. constant, would not
   c. decreasing, would not
   d. increasing, would
   e. decreasing, would

Difficulty:
Correct Answer: e

22. In Problem 3, if the exponents in the production function were 0.30 for x_1 and 0.20 for x_2, this production function would exhibit (constant, increasing, decreasing) returns to scale and (would, would not) have diminishing technical rate of substitution.
   a. decreasing, would not
   b. constant, would not
   c. increasing, would
   d. constant, would
   e. decreasing, would

Difficulty:
Correct Answer: a

23. In Problem 3, if the exponents in the production function were 0.80 for x_1 and 0.20 for x_2, this production function would exhibit (constant, increasing, decreasing) returns to scale and (would, would not) have diminishing technical rate of substitution.
   a. constant, would
   b. decreasing, would not
   c. increasing, would
   d. constant, would not
   e. decreasing, would

Difficulty:
Correct Answer: d

24. In Problem 3, if the exponents in the production function were 0.60 for x_1 and 0.40 for x_2, this production function would exhibit (constant, increasing, decreasing) returns to scale and (would, would not) have diminishing technical rate of substitution.
   a. constant, would not
   b. increasing, would
   c. decreasing, would not
   d. constant, would
   e. decreasing, would

Difficulty:
Correct Answer: e

25. In Problem 3, if the exponents in the production function were 0.40 for x_1 and 0.40 for x_2, this production function would exhibit (constant, increasing, decreasing) returns to scale and (would, would not) have diminishing technical rate of substitution.
   a. increasing, would
   b. decreasing, would not
   c. constant, would
   d. constant, would not
   e. decreasing, would

Difficulty:
Correct Answer: a

26. In Problem 8, if a = 2.50, b = 0.60, and c = 1, the marginal products of x_1, x_2, and x_3 (in this order) are
   a. increasing, decreasing, and constant.
   b. decreasing, increasing, and decreasing.
   c. all increasing.
   d. all decreasing.
   e. all increasing if $A > 1$.

Difficulty:
Correct Answer: a

27. In Problem 8, if a = 2.40, b = 0.50, and c = 1, the marginal products of x_1, x_2, and x_3 (in this order) are
   a. increasing, decreasing, and constant.
   b. all increasing.
   c. all decreasing.
   d. decreasing, increasing, and decreasing.
   e. all increasing if $A > 1$.

Difficulty:
Correct Answer: c

28. In Problem 8, if a = 2.10, b = 0.90, and c = 1, the marginal products of x_1, x_2, and x_3 (in this order) are
   a. decreasing, increasing, and decreasing.
   b. all increasing.
   c. increasing, decreasing, and constant.
   d. all decreasing.
   e. all increasing if $A > 1$.

Difficulty:
Correct Answer: b

29. In Problem 8, if a = 2.10, b = 0.40, and c = 1, the marginal products of x_1, x_2, and x_3 (in this order) are
   a. all decreasing.
   b. increasing, decreasing, and constant.
   c. decreasing, increasing, and decreasing.
   d. all increasing.
   e. all increasing if $A > 1$.

Difficulty:
Correct Answer: a

30. In Problem 8, if a = 2.10, b = 1.10, and c = 1.20, the marginal products of x_1, x_2, and x_3 (in this order) are
   a. all increasing.
   b. decreasing, increasing, and decreasing.
   c. all decreasing.
   d. increasing, decreasing, and constant.
   e. all increasing if $A > 1$.

CHAPTER 19 Profit Maximization

MULTIPLE CHOICE

Difficulty: 1
Correct Answer: b

1. In Problem 1, the production function is given by $F(L) = 6L^{2/3}$. Suppose that the cost per unit of labor is \$8 and the price of output is 4, how many units of labor will the firm hire?
   a. 16
   b. 8
   c. 4
   d. 24
   e. None of the above.

Difficulty: 1
Correct Answer: b

2. In Problem 1, the production function is given by $F(L) = 6L^{2/3}$. Suppose that the cost per unit of labor is \$16 and the price of output is 16, how many units of labor will the firm hire?
   a. 32
   b. 64
   c. 192
   d. 128
   e. None of the above.

Difficulty: 1
Correct Answer: c

3. In Problem 1, the production function is given by $F(L) = 6L^{2/3}$. Suppose that the cost per unit of labor is \$12 and the price of output is 12, how many units of labor will the firm hire?
   a. 32
   b. 192
   c. 64
   d. 128
   e. None of the above.

Difficulty: 1
Correct Answer: d

4. In Problem 1, the production function is given by $F(L) = 6L^{2/3}$. Suppose that the cost per unit of labor is \$12 and the price of output is 9, how many units of labor will the firm hire?
   a. 54
   b. 81
   c. 13.50
   d. 27
   e. None of the above.

Difficulty: 1
Correct Answer: a

5. In Problem 1, the production function is given by $F(L) = 6L^{2/3}$. Suppose that the cost per unit of labor is \$16 and the price of output is 16, how many units of labor will the firm hire?
   a. 64
   b. 192
   c. 32
   d. 128
   e. None of the above.

Difficulty: 1
Correct Answer: a

6. In Problem 2, the production function is given by $f(x) = 4x^{1/2}$. If the price of the commodity produced is \$100 per unit and the cost of the input is \$15 per unit, how much profit will the firm make if it maximize profits?
   a. \$2,666.67
   b. \$1,331.33
   c. \$5,337.33
   d. \$2,651.67
   e. \$1,336.33

Difficulty: 1
Correct Answer: c

7. In Problem 2, the production function is given by $f(x) = 4x^{1/2}$. If the price of the commodity produced is \$50

per unit and the cost of the input is \$40 per unit, how much profit will the firm make if it maximize profits?
a. \$235
b. \$123
c. \$250
d. \$504
e. \$128

Difficulty: 1
Correct Answer: c

8. In Problem 2, the production function is given by $f(x) = 4x^{1/2}$. If the price of the commodity produced is \$100 per unit and the cost of the input is \$45 per unit, how much profit will the firm make if it maximize profits?
a. \$1,781.78
b. \$873.89
c. \$888.89
d. \$442.44
e. \$447.44

Difficulty: 1
Correct Answer: a

9. In Problem 2, the production function is given by $f(x) = 4x^{1/2}$. If the price of the commodity produced is \$90 per unit and the cost of the input is \$45 per unit, how much profit will the firm make if it maximize profits?
a. \$720
b. \$1,444
c. \$705
d. \$358
e. \$363

Difficulty: 1
Correct Answer: c

10. In Problem 2, the production function is given by $f(x) = 4x^{1/2}$. If the price of the commodity produced is \$50 per unit and the cost of the input is \$25 per unit, how much profit will the firm make if it maximize profits?
a. \$804
b. \$385
c. \$400
d. \$198
e. \$203

Difficulty: 1
Correct Answer: c

11. In Problem 11, the production function is $f(x_1, x_2) = x^{1/2}{}_1 x^{1/2}{}_2$. If the price of factor 1 is \$4 and the price of factor 2 is \$6, in what proportions should the firm use factors 1 and 2 if it wants to maximize profits?
a. $x_1 = x_2$.
b. $x_1 = 0.67x_2$.
c. $x_1 = 1.50x_2$.
d. We can't tell without knowing the price of output.
e. $x_1 = 6x_2$.

Difficulty: 1
Correct Answer: a

12. In Problem 11, the production function is $f(x_1, x_2) = x^{1/2}{}_1 x^{1/2}{}_2$. If the price of factor 1 is \$14 and the price of factor 2 is \$7, in what proportions should the firm use factors 1 and 2 if it wants to maximize profits?
a. $x_1 = 0.50x_2$.
b. $x_1 = x_2$.
c. We can't tell without knowing the price of output.
d. $x_1 = 2x_2$.
e. $x_1 = 7x_2$.

Difficulty: 1
Correct Answer: c

13. In Problem 11, the production function is $f(x_1, x_2) = x^{1/2}{}_1 x^{1/2}{}_2$. If the price of factor 1 is \$8 and the price of factor 2 is \$4, in what proportions should the firm use factors 1 and 2 if it wants to maximize profits?
a. We can't tell without knowing the price of output.
b. $x_1 = x_2$.
c. $x_1 = 0.50x_2$.
d. $x_1 = 2x_2$.
e. $x_1 = 4x_2$.

Difficulty: 1
Correct Answer: c

14. In Problem 11, the production function is $f(x_1, x_2) = x^{1/2}{}_1 x^{1/2}{}_2$. If the price of factor 1 is \$8 and the price of factor 2 is \$16, in what proportions should the firm use factors 1 and 2 if it wants to maximize profits?
a. $x_1 = x_2$.
b. $x_1 = 0.50x_2$.
c. $x_1 = 2x_2$.
d. We can't tell without knowing the price of output.
e. $x_1 = 16x_2$.

Difficulty: 1
Correct Answer: b

15. In Problem 11, the production function is $f(x_1, x_2) = x^{1/2}{}_1 x^{1/2}{}_2$. If the price of factor 1 is \$10 and the price of factor 2 is \$20, in what proportions should the firm use factors 1 and 2 if it wants to maximize profits?
a. We can't tell without knowing the price of output.
b. $x_1 = 2x_2$.
c. $x_1 = 0.50x_2$.
d. $x_1 = x_2$.
e. $x_1 = 20x_2$.

Difficulty: 2
Correct Answer: a

16. In Problem 9, when Farmer Hoglund applies N pounds of fertilizer per acre, the marginal product of fertilizer is $1 - N/200$ bushels of corn. If the price of corn is \$3

per bushel and the price of fertilizer is \$.30 per pound, then how many pounds of fertilizer per acre should Farmer Hoglund use in order to maximize his profits?

a. 180
b. 360
c. 94
d. 368
e. 200

Difficulty: 2
Correct Answer: c

17. In Problem 9, when Farmer Hoglund applies N pounds of fertilizer per acre, the marginal product of fertilizer is $1 - N/200$ bushels of corn. If the price of corn is \$4 per bushel and the price of fertilizer is \$.40 per pound, then how many pounds of fertilizer per acre should Farmer Hoglund use in order to maximize his profits?

a. 360
b. 94
c. 180
d. 368
e. 200

Difficulty: 2
Correct Answer: d

18. In Problem 9, when Farmer Hoglund applies N pounds of fertilizer per acre, the marginal product of fertilizer is $1 - N/200$ bushels of corn. If the price of corn is \$4 per bushel and the price of fertilizer is \$.40 per pound, then how many pounds of fertilizer per acre should Farmer Hoglund use in order to maximize his profits?

a. 368
b. 94
c. 360
d. 180
e. 200

Difficulty: 2
Correct Answer: b

19. In Problem 9, when Farmer Hoglund applies N pounds of fertilizer per acre, the marginal product of fertilizer is $1 - N/200$ bushels of corn. If the price of corn is \$1 per bushel and the price of fertilizer is \$.40 per pound, then how many pounds of fertilizer per acre should Farmer Hoglund use in order to maximize his profits?

a. 64
b. 120
c. 248
d. 240
e. 200

Difficulty: 2
Correct Answer: c

20. In Problem 9, when Farmer Hoglund applies N pounds of fertilizer per acre, the marginal product of fertilizer is $1 - N/200$ bushels of corn. If the price of corn is \$1 per bushel and the price of fertilizer is \$.20 per pound, then how many pounds of fertilizer per acre should Farmer Hoglund use in order to maximize his profits?

a. 320
b. 328
c. 160
d. 84
e. 200

Difficulty:
Correct Answer: a

21. In Problem 12, if the price of the output good is \$4, the price of factor 1 is \$1, and the price of factor 2 is \$3, what is the profit-maximizing amount of factor 1?

a. 8
b. 2
c. 1
d. 0
e. There is not enough information to tell.

CHAPTER 20 Cost Minimization

MULTIPLE CHOICE

Difficulty:
Correct Answer: b

1. Suppose that Nadine in Problem 1 has a production function $3x_1 + x_2$. If the factor prices are \$3 for factor 1 and \$3 for factor 2, how much will it cost her to produce 80 units of output?
   a. \$960
   b. \$80
   c. \$240
   d. \$600
   e. \$160

Difficulty:
Correct Answer: d

2. Suppose that Nadine in Problem 1 has a production function $4x_1 + x_2$. If the factor prices are \$4 for factor 1 and \$2 for factor 2, how much will it cost her to produce 70 units of output?
   a. \$700
   b. \$1,260
   c. \$140
   d. \$70
   e. \$105

Difficulty:
Correct Answer: c

3. Suppose that Nadine in Problem 1 has a production function $3x_1 + x_2$. If the factor prices are \$12 for factor 1 and \$3 for factor 2, how much will it cost her to produce 20 units of output?
   a. \$430
   b. \$780
   c. \$60
   d. \$80
   e. \$70

Difficulty:
Correct Answer: a

4. Suppose that Nadine in Problem 1 has a production function $4x_1 + x_2$. If the factor prices are \$12 for factor 1 and \$2 for factor 2, how much will it cost her to produce 50 units of output?
   a. \$100
   b. \$2,500
   c. \$150
   d. \$1,325
   e. \$125

Difficulty:
Correct Answer: c

5. Suppose that Nadine in Problem 1 has a production function $5x_1 + x_2$. If the factor prices are \$10 for factor 1 and \$3 for factor 2, how much will it cost her to produce 70 units of output?
   a. \$1,960
   b. \$3,710
   c. \$140
   d. \$210
   e. \$175

Difficulty: 1
Correct Answer: d

6. In Problem 2, suppose that a new alloy is invented which uses copper and zinc in fixed proportions where 1 unit of output requires 3 units of copper and 3 units of zinc for each unit of alloy produced. If no other inputs are needed, the price of copper is \$3, and the price of zinc is \$3, what is the average cost per unit when 4,000 units of the alloy are produced?
   a. \$9.50
   b. \$1,000
   c. \$1
   d. \$18
   e. \$9,500

Difficulty: 1
Correct Answer: a

7. In Problem 2, suppose that a new alloy is invented which uses copper and zinc in fixed proportions where 1 unit of output requires 5 units of copper and 3 units of zinc for each unit of alloy produced. If no other inputs are needed, the price of copper is \$4, and the price of zinc is \$2, what is the average cost per unit when 3,000 units of the alloy are produced?
   a. \$26
   b. \$13.33
   c. \$666.67
   d. \$.67
   e. \$13,333.33

Difficulty: 1
Correct Answer: c

8. In Problem 2, suppose that a new alloy is invented which uses copper and zinc in fixed proportions where 1 unit of output requires 4 units of copper and 4 units of zinc for each unit of alloy produced. If no other inputs are needed, the price of copper is \$5, and the price of zinc is \$2, what is the average cost per unit when 2,000 units of the alloy are produced?
   a. \$14.25
   b. \$.50
   c. \$28
   d. \$500
   e. \$14,250

Difficulty: 1
Correct Answer: d

9. In Problem 2, suppose that a new alloy is invented which uses copper and zinc in fixed proportions where 1 unit of output requires 3 units of copper and 3 units of zinc for each unit of alloy produced. If no other inputs are needed, the price of copper is \$4, and the price of zinc is \$5, what is the average cost per unit when 4,000 units of the alloy are produced?
   a. \$1.33
   b. \$14.17
   c. \$1,333.33
   d. \$27
   e. \$14,166.67

Difficulty: 1
Correct Answer: a

10. In Problem 2, suppose that a new alloy is invented which uses copper and zinc in fixed proportions where 1 unit of output requires 3 units of copper and 4 units of zinc for each unit of alloy produced. If no other inputs are needed, the price of copper is \$2, and the price of zinc is \$3, what is the average cost per unit when 3,000 units of the alloy are produced?
   a. \$18
   b. \$.67
   c. \$666.67
   d. \$9.33
   e. \$9,333.33

Difficulty: 2
Correct Answer: a

11. In Problem 3, the production function is $f(L, M) = 4L^{1/2}M^{1/2}$, where L is the number of units of labor and M is the number of machines used. If the cost of labor is \$100 per unit and the cost of machines is \$16 per unit, then the total cost of producing 7 units of output will be
   a. \$140.
   b. \$406.
   c. \$112.
   d. \$280.
   e. None of the above.

Difficulty: 2
Correct Answer: c

12. In Problem 3, the production function is $f(L, M) = 4L^{1/2}M^{1/2}$, where L is the number of units of labor and M is the number of machines used. If the cost of labor is \$9 per unit and the cost of machines is \$81 per unit, then the total cost of producing 10 units of output will be
   a. \$270.
   b. \$90.
   c. \$135.
   d. \$450.
   e. None of the above.

Difficulty: 2
Correct Answer: a

13. In Problem 3, the production function is $f(L, M) = 4L^{1/2}M^{1/2}$, where L is the number of units of labor and M is the number of machines used. If the cost of labor is \$49 per unit and the cost of machines is \$25 per unit, then the total cost of producing 7 units of output will be
   a. \$122.50.
   b. \$259.
   c. \$175.
   d. \$245.
   e. None of the above.

Difficulty: 2
Correct Answer: d

14. In Problem 3, the production function is $f(L, M) = 4L^{1/2}M^{1/2}$, where L is the number of units of labor and M is the number of machines used. If the cost of labor is \$25 per unit and the cost of machines is \$64 per unit,

then the total cost of producing 6 units of output will be

a. \$240.
b. \$150.
c. \$267.
d. \$120.
e. None of the above.

Difficulty: 2
Correct Answer: a

15. In Problem 3, the production function is $f(L, M) = 4L^{1/2}M^{1/2}$, where L is the number of units of labor and M is the number of machines used. If the cost of labor is \$49 per unit and the cost of machines is \$36 per unit, then the total cost of producing 4 units of output will be
    a. \$84.
    b. \$170.
    c. \$144.
    d. \$168.
    e. None of the above.

Difficulty: 2
Correct Answer: e

16. Suppose that in the short run, the firm in Problem 3 which has production function $F(L, M) = 4L^{1/2}M^{1/2}$ must use 4 machines. If the cost of labor is \$10 per unit and the cost of machines is \$6 per unit, the short-run total cost of producing 64 units of output is
    a. \$512.
    b. \$384.
    c. \$640.
    d. \$1,328.
    e. \$664.

Difficulty: 2
Correct Answer: e

17. Suppose that in the short run, the firm in Problem 3 which has production function $F(L, M) = 4L^{1/2}M^{1/2}$ must use 9 machines. If the cost of labor is \$5 per unit and the cost of machines is \$6 per unit, the short-run total cost of producing 84 units of output is
    a. \$598.
    b. \$420.
    c. \$462.
    d. \$504.
    e. \$299.

Difficulty: 2
Correct Answer: e

18. Suppose that in the short run, the firm in Problem 3 which has production function $F(L, M) = 4L^{1/2}M^{1/2}$ must use 9 machines. If the cost of labor is \$10 per unit and the cost of machines is \$4 per unit, the short-run total cost of producing 60 units of output is
    a. \$420.
    b. \$600.
    c. \$240.
    d. \$572.
    e. \$286.

Difficulty: 2
Correct Answer: e

19. Suppose that in the short run, the firm in Problem 3 which has production function $F(L, M) = 4L^{1/2}M^{1/2}$ must use 9 machines. If the cost of labor is \$5 per unit and the cost of machines is \$5 per unit, the short-run total cost of producing 108 units of output is
    a. \$900.
    b. \$540.
    c. \$540.
    d. \$540.
    e. \$450.

Difficulty: 2
Correct Answer: e

20. Suppose that in the short run, the firm in Problem 3 which has production function $F(L, M) = 4L^{1/2}M^{1/2}$ must use 9 machines. If the cost of labor is \$7 per unit and the cost of machines is \$9 per unit, the short-run total cost of producing 96 units of output is
    a. \$1,058.
    b. \$672.
    c. \$864.
    d. \$768.
    e. \$529.

Difficulty:
Correct Answer: a

21. In Problem 12, Al's production function for deer is $f(x_1, x_2) = (2x_1 + x_2)^{1/2}$, where x_1 is the amount of plastic and x_2 is the amount of wood used. If the cost of plastic is \$8 per unit and the cost of wood is \$1 per unit, then the cost of producing 7 deer is
    a. \$49.
    b. \$119.
    c. \$196.
    d. \$7.
    e. \$28.

Difficulty:
Correct Answer: d

22. In Problem 12, Al's production function for deer is $f(x_1, x_2) = (2x_1 + x_2)^{1/2}$, where x_1 is the amount of plastic and x_2 is the amount of wood used. If the cost of plastic is \$4 per unit and the cost of wood is \$4 per unit, then the cost of producing 8 deer is
    a. \$16.
    b. \$96.
    c. \$256.

d. $128.
e. $32.

Difficulty:
Correct Answer: b

23. In Problem 12, Al's production function for deer is $f(x_1, x_2) = (2x_1 + x_2)^{1/2}$, where x_1 is the amount of plastic and x_2 is the amount of wood used. If the cost of plastic is $4 per unit and the cost of wood is $1 per unit, then the cost of producing 4 deer is
a. $32.
b. $16.
c. $36.
d. $4.
e. $8.

Difficulty:
Correct Answer: d

24. In Problem 12, Al's production function for deer is $f(x_1, x_2) = (2x_1 + x_2)^{1/2}$, where x_1 is the amount of plastic and x_2 is the amount of wood used. If the cost of plastic is $8 per unit and the cost of wood is $3 per unit, then the cost of producing 5 deer is
a. $15.
b. $100.
c. $95.
d. $75.
e. $20.

Difficulty:
Correct Answer: c

25. In Problem 12, Al's production function for deer is $f(x_1, x_2) = (2x_1 + x_2)^{1/2}$, where x_1 is the amount of plastic and x_2 is the amount of wood used. If the cost of plastic is $4 per unit and the cost of wood is $3 per unit, then the cost of producing 5 deer is
a. $55.
b. $10.
c. $50.
d. $75.
e. $15.

Difficulty: 2
Correct Answer: d

26. Two firms, Wickedly Efficient Widgets (WEW) and Wildly Nepotistic Widgets (WNW), both produce widgets with the same production function $y = K^{1/2}L^{1/2}$, where K is the input of capital and L is the input of labor. Each company can hire labor at $1 per unit and capital at $1 per unit. WEW produces 10 widgets per week, choosing its input combination so as to produce these 10 widgets in the cheapest way possible. WNW also produces 10 widgets per week, but its dotty CEO requires it to use twice as much labor as WEW uses. Given that it must use twice as many laborers as WEW does and must produce the same output, how much larger are WNW's total costs than WEW's?
a. $10 per week
b. $20 per week
c. $15 per week
d. $5 per week
e. $2 per week

CHAPTER 21 Cost Curves

MULTIPLE CHOICE

Difficulty:
Correct Answer: a

1. In Problem 2, if Mr. Dent Carr's total costs were $5s^2 + 50s + 20$, then if he repairs 10 cars, his average variable costs will be
   a. \$100.
   b. \$102.
   c. \$150.
   d. \$200.
   e. \$75.

Difficulty:
Correct Answer: d

2. In Problem 2, if Mr. Dent Carr's total costs were $2s^2 + 50s + 75$, then if he repairs 25 cars, his average variable costs will be
   a. \$150.
   b. \$200.
   c. \$103.
   d. \$100.
   e. \$75.

Difficulty:
Correct Answer: b

3. In Problem 2, if Mr. Dent Carr's total costs were $2s^2 + 75s + 100$, then if he repairs 25 cars, his average variable costs will be
   a. \$250.
   b. \$125.
   c. \$129.
   d. \$175.
   e. \$87.50.

Difficulty:
Correct Answer: c

4. In Problem 2, if Mr. Dent Carr's total costs were $2s^2 + 20s + 40$, then if he repairs 10 cars, his average variable costs will be
   a. \$44.
   b. \$80.
   c. \$40.
   d. \$60.
   e. \$30.

Difficulty:
Correct Answer: d

5. In Problem 2, if Mr. Dent Carr's total costs were $4s^2 + 40s + 20$, then if he repairs 10 cars, his average variable costs will be
   a. \$120.
   b. \$82.
   c. \$160.
   d. \$80.
   e. \$60.

Difficulty:
Correct Answer: a

6. In Problem 3, Rex Carr could pay \$10 for a shovel that lasts one year and pay \$5 a car to his brother Scoop to bury the cars, or he could buy a low-quality car smasher that costs \$200 a year to own and that smashes cars at a marginal cost of \$1 per car. If it is also possible for Rex to buy a high-quality hydraulic car smasher that cost \$650 per year to own and if with this smasher he could dispose of cars at a cost of \$.75 per car, it would be worthwhile for him to buy this high-quality smasher if he planned to dispose of
   a. at least 1,800 cars per year.
   b. no more than 900 cars per year.
   c. at least 1,810 cars per year.
   d. no more than 1,800 cars per year.
   e. at least 900 cars per year.

Difficulty:
Correct Answer: a

7. In Problem 3, Rex Carr could pay \$10 for a shovel that lasts one year and pay \$5 a car to his brother Scoop to bury the cars, or he could buy a low-quality car

smasher that costs $200 a year to own and that smashes cars at a marginal cost of $1 per car. If it is also possible for Rex to buy a high-quality hydraulic car smasher that cost $300 per year to own and if with this smasher he could dispose of cars at a cost of $.75 per car, it would be worthwhile for him to buy this high-quality smasher if he planned to dispose of

a. at least 400 cars per year.
b. no more than 400 cars per year.
c. no more than 200 cars per year.
d. at least 410 cars per year.
e. at least 200 cars per year.

Difficulty:
Correct Answer: c

8. In Problem 3, Rex Carr could pay $10 for a shovel that lasts one year and pay $5 a car to his brother Scoop to bury the cars, or he could buy a low-quality car smasher that costs $200 a year to own and that smashes cars at a marginal cost of $1 per car. If it is also possible for Rex to buy a high-quality hydraulic car smasher that cost $550 per year to own and if with this smasher he could dispose of cars at a cost of $.80 per car, it would be worthwhile for him to buy this high-quality smasher if he planned to dispose of
   a. at least 1,760 cars per year.
   b. no more than 1,750 cars per year.
   c. at least 1,750 cars per year.
   d. no more than 875 cars per year.
   e. at least 875 cars per year.

Difficulty:
Correct Answer: d

9. In Problem 3, Rex Carr could pay $10 for a shovel that lasts one year and pay $5 a car to his brother Scoop to bury the cars, or he could buy a low-quality car smasher that costs $200 a year to own and that smashes cars at a marginal cost of $1 per car. If it is also possible for Rex to buy a high-quality hydraulic car smasher that cost $550 per year to own and if with this smasher he could dispose of cars at a cost of $.75 per car, it would be worthwhile for him to buy this high-quality smasher if he planned to dispose of
   a. at least 1,410 cars per year.
   b. no more than 700 cars per year.
   c. no more than 1,400 cars per year.
   d. at least 1,400 cars per year.
   e. at least 700 cars per year.

Difficulty:
Correct Answer: b

10. In Problem 3, Rex Carr could pay $10 for a shovel that lasts one year and pay $5 a car to his brother Scoop to bury the cars, or he could buy a low-quality car smasher that costs $200 a year to own and that smashes cars at a marginal cost of $1 per car. If it is also possible for Rex to buy a high-quality hydraulic car smasher that cost $450 per year to own and if with this smasher he could dispose of cars at a cost of $.80 per car, it would be worthwhile for him to buy this high-quality smasher if he planned to dispose of
    a. at least 1,260 cars per year.
    b. at least 1,250 cars per year.
    c. no more than 625 cars per year.
    d. no more than 1,250 cars per year.
    e. at least 625 cars per year.

Difficulty:
Correct Answer: c

11. Mary Magnolia in Problem 4 has variable costs equal to y^2/F, where y is the number of bouquets she sells per month and where F is the number of square feet of space in her shop. If Mary has signed a lease for a shop with 800 square feet, if she is not able to get out of the lease or to expand her store in the short run, and if the price of a bouquet is $6 per unit, how many bouquets per month should she sell in the short run?
    a. 800
    b. 400
    c. 2,400
    d. 3,600
    e. 2,640

Difficulty:
Correct Answer: a

12. Mary Magnolia in Problem 4 has variable costs equal to y^2/F, where y is the number of bouquets she sells per month and where F is the number of square feet of space in her shop. If Mary has signed a lease for a shop with 1,000 square feet, if she is not able to get out of the lease or to expand her store in the short run, and if the price of a bouquet is $5 per unit, how many bouquets per month should she sell in the short run?
    a. 2,500
    b. 500
    c. 1,000
    d. 3,750
    e. 2,750

Difficulty:
Correct Answer: d

13. Mary Magnolia in Problem 4 has variable costs equal to y^2/F, where y is the number of bouquets she sells per month and where F is the number of square feet of space in her shop. If Mary has signed a lease for a shop with 1,400 square feet, if she is not able to get out of the lease or to expand her store in the short run, and if

the price of a bouquet is $3 per unit, how many bouquets per month should she sell in the short run?
a. 1,400
b. 3,150
c. 700
d. 2,100
e. 2,310

Difficulty:
Correct Answer: c

14. Mary Magnolia in Problem 4 has variable costs equal to y^2/F, where y is the number of bouquets she sells per month and where F is the number of square feet of space in her shop. If Mary has signed a lease for a shop with 400 square feet, if she is not able to get out of the lease or to expand her store in the short run, and if the price of a bouquet is $5 per unit, how many bouquets per month should she sell in the short run?
a. 200
b. 1,500
c. 1,000
d. 400
e. 1,100

Difficulty:
Correct Answer: a

15. Mary Magnolia in Problem 4 has variable costs equal to y^2/F, where y is the number of bouquets she sells per month and where F is the number of square feet of space in her shop. If Mary has signed a lease for a shop with 1,000 square feet, if she is not able to get out of the lease or to expand her store in the short run, and if the price of a bouquet is $3 per unit, how many bouquets per month should she sell in the short run?
a. 1,500
b. 500
c. 2,250
d. 1,000
e. 1,650

Difficulty:
Correct Answer: a

16. Touchie MacFeelie's production function is $.1J^{1/2}L^{3/4}$, where J is the number of old jokes used and L is the number of hours of cartoonists' labor. Touchie is stuck with 400 old jokes for which he paid 4 dollars each. If the wage rate for cartoonists is 3 dollars, then the total cost of producing 128 comics books is
a. 2,368 dollars.
b. 1,184 dollars.
c. 3,552 dollars.
d. 2,496 dollars.
e. 592 dollars.

Difficulty:
Correct Answer: d

17. Touchie MacFeelie's production function is $.1J^{1/2}L^{3/4}$, where J is the number of old jokes used and L is the number of hours of cartoonists' labor. Touchie is stuck with 1,600 old jokes for which he paid 6 dollars each. If the wage rate for cartoonists is 5 dollars, then the total cost of producing 108 comics books is
a. 15,007.50 dollars.
b. 5,002.50 dollars.
c. 10,113 dollars.
d. 10,005 dollars.
e. 2,501.25 dollars.

Difficulty:
Correct Answer: a

18. Touchie MacFeelie's production function is $.1J^{1/2}L^{3/4}$, where J is the number of old jokes used and L is the number of hours of cartoonists' labor. Touchie is stuck with 400 old jokes for which he paid 2 dollars each. If the wage rate for cartoonists is 5 dollars, then the total cost of producing 54 comics books is
a. 1,205 dollars.
b. 1,807.50 dollars.
c. 602.50 dollars.
d. 1,259 dollars.
e. 301.25 dollars.

Difficulty:
Correct Answer: b

19. Touchie MacFeelie's production function is $.1J^{1/2}L^{3/4}$, where J is the number of old jokes used and L is the number of hours of cartoonists' labor. Touchie is stuck with 900 old jokes for which he paid 4 dollars each. If the wage rate for cartoonists is 6 dollars, then the total cost of producing 24 comics books is
a. 3,720 dollars.
b. 3,696 dollars.
c. 1,848 dollars.
d. 5,544 dollars.
e. 924 dollars.

Difficulty:
Correct Answer: c

20. Touchie MacFeelie's production function is $.1J^{1/2}L^{3/4}$, where J is the number of old jokes used and L is the number of hours of cartoonists' labor. Touchie is stuck with 1,600 old jokes for which he paid 3 dollars each. If the wage rate for cartoonists is 2 dollars, then the total cost of producing 108 comics books is
a. 2,481 dollars.
b. 5,070 dollars.
c. 4,962 dollars.
d. 7,443 dollars.
e. 1,240.50 dollars.

Difficulty:
Correct Answer: e

21. Recall that Touchie McFeelie's production function for comics books is $.1J^{1/2}L^{3/4}$. Suppose that Touchie can vary both jokes and cartoonists' labor. If old jokes cost \$3 each and cartoonists' labor costs \$18 per hour, then the cheapest way to produce comics books requires using jokes and labor in the ratio
    a. $J/L = 6$.
    b. $J/L = 8$.
    c. $J/L = 2$.
    d. $J/L = 2/3$.
    e. $J/L = 4$.

Difficulty:
Correct Answer: e

22. Recall that Touchie McFeelie's production function for comics books is $.1J^{1/2}L^{3/4}$. Suppose that Touchie can vary both jokes and cartoonists' labor. If old jokes cost \$3 each and cartoonists' labor costs \$9 per hour, then the cheapest way to produce comics books requires using jokes and labor in the ratio
    a. $J/L = 1$.
    b. $J/L = 3$.
    c. $J/L = 4$.
    d. $J/L = 2/3$.
    e. $J/L = 2$.

Difficulty:
Correct Answer: e

23. Recall that Touchie McFeelie's production function for comics books is $.1J^{1/2}L^{3/4}$. Suppose that Touchie can vary both jokes and cartoonists' labor. If old jokes cost \$4 each and cartoonists' labor costs \$24 per hour, then the cheapest way to produce comics books requires using jokes and labor in the ratio
    a. $J/L = 6$.
    b. $J/L = 8$.
    c. $J/L = 2/3$.
    d. $J/L = 2$.
    e. $J/L = 4$.

Difficulty:
Correct Answer: e

24. Recall that Touchie McFeelie's production function for comics books is $.1J^{1/2}L^{3/4}$. Suppose that Touchie can vary both jokes and cartoonists' labor. If old jokes cost \$2 each and cartoonists' labor costs \$12 per hour, then the cheapest way to produce comics books requires using jokes and labor in the ratio
    a. $J/L = 6$.
    b. $J/L = 2$.
    c. $J/L = 2/3$.
    d. $J/L = 8$.
    e. $J/L = 4$.

Difficulty:
Correct Answer: e

25. Recall that Touchie McFeelie's production function for comics books is $.1J^{1/2}L^{3/4}$. Suppose that Touchie can vary both jokes and cartoonists' labor. If old jokes cost \$1 each and cartoonists' labor costs \$3 per hour, then the cheapest way to produce comics books requires using jokes and labor in the ratio
    a. $J/L = 4$.
    b. $J/L = 2/3$.
    c. $J/L = 3$.
    d. $J/L = 1$.
    e. $J/L = 2$.

CHAPTER 22 Firm Supply

MULTIPLE CHOICE

Difficulty:
Correct Answer: b

1. Suppose that Dent Carr's long-run total cost of repairing s cars per week is $c(s) = 2s^2 + 50$. If the price he receives for repairing a car is \$8, then in the long run, how many cars will he fix per week if he maximize profits?
   a. 2
   b. 0
   c. 4
   d. 3
   e. 6

Difficulty:
Correct Answer: a

2. Suppose that Dent Carr's long-run total cost of repairing s cars per week is $c(s) = 3s^2 + 108$. If the price he receives for repairing a car is \$24, then in the long run, how many cars will he fix per week if he maximize profits?
   a. 0
   b. 4
   c. 6
   d. 8
   e. 12

Difficulty:
Correct Answer: d

3. Suppose that Dent Carr's long-run total cost of repairing s cars per week is $c(s) = 3s^2 + 75$. If the price he receives for repairing a car is \$36, then in the long run, how many cars will he fix per week if he maximize profits?
   a. 0
   b. 12
   c. 9
   d. 6
   e. 18

Difficulty:
Correct Answer: b

4. Suppose that Dent Carr's long-run total cost of repairing s cars per week is $c(s) = 2s^2 + 18$. If the price he receives for repairing a car is \$8, then in the long run, how many cars will he fix per week if he maximize profits?
   a. 4
   b. 0
   c. 3
   d. 2
   e. 6

Difficulty:
Correct Answer: a

5. Suppose that Dent Carr's long-run total cost of repairing s cars per week is $c(s) = 3s^2 + 108$. If the price he receives for repairing a car is \$24, then in the long run, how many cars will he fix per week if he maximize profits?
   a. 0
   b. 8
   c. 4
   d. 6
   e. 12

Difficulty:
Correct Answer: a

6. In Problem 9, suppose that Irma's production function is $f(x_1, x_2) = (\min\{x_1, 3x_2\})^{1/2}$. If the price of factor 1 is $w_1 = \$2$ and the price of factor 2 is $w_2 = \$15$, then her supply function is given by the equation
   a. $S(p) = p/14$.
   b. $S(p) = p(\max\{w_1, 3w_2\})^2$.
   c. $S(p) = p(\min\{w_1, 3w_2\})^2$.
   d. $S(p) = 7p$.
   e. $S(p) = \min\{2p, 45p\}$.

Difficulty:
Correct Answer: b

7. In Problem 9, suppose that Irma's production function is $f(x_1, x_2) = (\min\{x_1, 2x_2\})^{1/2}$. If the price of factor 1 is $w_1 = \$3$ and the price of factor 2 is $w_2 = \$6$, then her supply function is given by the equation
   a. $S(p) = 6p$.
   b. $S(p) = p/12$.
   c. $S(p) = p(\min\{w_1, 2w_2\})^2$.
   d. $S(p) = p(\max\{w_1, 2w_2\})^2$.
   e. $S(p) = \min\{3p, 12p\}$.

Difficulty:
Correct Answer: d

8. In Problem 9, suppose that Irma's production function is $f(x_1, x_2) = (\min\{x_1, 3x_2\})^{1/2}$. If the price of factor 1 is $w_1 = \$2$ and the price of factor 2 is $w_2 = \$6$, then her supply function is given by the equation
   a. $S(p) = p(\max\{w_1, 3w_2\})^2$.
   b. $S(p) = 4p$.
   c. $S(p) = p(\min\{w_1, 3w_2\})^2$.
   d. $S(p) = p/8$.
   e. $S(p) = \min\{2p, 18p\}$.

Difficulty:
Correct Answer: c

9. In Problem 9, suppose that Irma's production function is $f(x_1, x_2) = (\min\{x_1, 3x_2\})^{1/2}$. If the price of factor 1 is $w_1 = \$3$ and the price of factor 2 is $w_2 = \$9$, then her supply function is given by the equation
   a. $S(p) = p(\min\{w_1, 3w_2\})^2$.
   b. $S(p) = 6p$.
   c. $S(p) = p/12$.
   d. $S(p) = p(\max\{w_1, 3w_2\})^2$.
   e. $S(p) = \min\{3p, 27p\}$.

Difficulty:
Correct Answer: d

10. In Problem 9, suppose that Irma's production function is $f(x_1, x_2) = (\min\{x_1, 3x_2\})^{1/2}$. If the price of factor 1 is $w_1 = \$5$ and the price of factor 2 is $w_2 = \$15$, then her supply function is given by the equation
   a. $S(p) = p(\max\{w_1, 3w_2\})^2$.
   b. $S(p) = p(\min\{w_1, 3w_2\})^2$.
   c. $S(p) = 10p$.
   d. $S(p) = p/20$.
   e. $S(p) = \min\{5p, 45p\}$.

Difficulty:
Correct Answer: d

11. A firm has a long-run cost function, $C(q) = 9q^2 + 9$. In the long run, this firm will supply a positive amount of output, as long as the price is greater than
   a. \$36.
   b. \$44.
   c. \$9.
   d. \$18.
   e. \$23.

Difficulty:
Correct Answer: c

12. A firm has a long-run cost function, $C(q) = 8q^2 + 288$. In the long run, this firm will supply a positive amount of output, as long as the price is greater than
   a. \$200.
   b. \$192.
   c. \$96.
   d. \$48.
   e. \$101.

Difficulty:
Correct Answer: a

13. A firm has a long-run cost function, $C(q) = 4q^2 + 4$. In the long run, this firm will supply a positive amount of output, as long as the price is greater than
   a. \$8.
   b. \$4.
   c. \$24.
   d. \$16.
   e. \$13.

Difficulty:
Correct Answer: a

14. A firm has a long-run cost function, $C(q) = 8q^2 + 72$. In the long run, this firm will supply a positive amount of output, as long as the price is greater than
   a. \$48.
   b. \$104.
   c. \$96.
   d. \$24.
   e. \$53.

Difficulty:
Correct Answer: c

15. A firm has a long-run cost function, $C(q) = 3q^2 + 108$. In the long run, this firm will supply a positive amount of output, as long as the price is greater than
   a. \$72.
   b. \$80.
   c. \$36.
   d. \$18.
   e. \$41.

CHAPTER 23 | Industry Supply

MULTIPLE CHOICE

Difficulty:
Correct Answer: c

1. In Problem 1, if the cost of plaster and labor were $11 per gnome and everything else is as in the problem (gnome molds cost $1,000, interest rate is 10%), what is the lowest price of gnomes at which there would be a positive supply in the long run?
   a. $11
   b. $22
   c. $13.20
   d. $12.10
   e. $13.20

Difficulty:
Correct Answer: c

2. In Problem 1, if the cost of plaster and labor were $13 per gnome and everything else is as in the problem (gnome molds cost $1,000, interest rate is 10%), what is the lowest price of gnomes at which there would be a positive supply in the long run?
   a. $14.30
   b. $26
   c. $15.20
   d. $13
   e. $15.60

Difficulty:
Correct Answer: b

3. In Problem 1, if the cost of plaster and labor were $5 per gnome and everything else is as in the problem (gnome molds cost $1,000, interest rate is 10%), what is the lowest price of gnomes at which there would be a positive supply in the long run?
   a. $5.50
   b. $7.20
   c. $5
   d. $10
   e. $6

Difficulty:
Correct Answer: d

4. In Problem 1, if the cost of plaster and labor were $10 per gnome and everything else is as in the problem (gnome molds cost $1,000, interest rate is 10%), what is the lowest price of gnomes at which there would be a positive supply in the long run?
   a. $10
   b. $11
   c. $20
   d. $12.20
   e. $12

Difficulty:
Correct Answer: c

5. In Problem 1, if the cost of plaster and labor were $5 per gnome and everything else is as in the problem (gnome molds cost $1,000, interest rate is 10%), what is the lowest price of gnomes at which there would be a positive supply in the long run?
   a. $5
   b. $10
   c. $7.20
   d. $5.50
   e. $6

Difficulty:
Correct Answer: c

6. Suppose that the garden gnome industry was in long-run equilibrium given the circumstances described in Problem 1. Suppose, as in Problem 2, that it was discovered to everyone's surprise on January 1, 1993, after it was too late to change orders for gnome molds, that the cost of the plaster and labor needed to make a gnome had changed to $8. If the demand curve does not change, what will happen to the equilibrium price of gnomes?
   a. Rises by $1.
   b. Falls by $1.
   c. Stays constant.
   d. Rises by $8.
   e. Falls by $4.

Difficulty:
Correct Answer: a

7. Suppose that the garden gnome industry was in long-run equilibrium given the circumstances described in Problem 1. Suppose, as in Problem 2, that it was discovered to everyone's surprise on January 1, 1993, after it was too late to change orders for gnome molds, that the cost of the plaster and labor needed to make a gnome had changed to $9. If the demand curve does not change, what will happen to the equilibrium price of gnomes?
   a. Stays constant.
   b. Rises by $2.
   c. Falls by $2.
   d. Rises by $9.
   e. Falls by $4.50.

Difficulty:
Correct Answer: c

8. Suppose that the garden gnome industry was in long-run equilibrium given the circumstances described in Problem 1. Suppose, as in Problem 2, that it was discovered to everyone's surprise on January 1, 1993, after it was too late to change orders for gnome molds, that the cost of the plaster and labor needed to make a gnome had changed to $6. If the demand curve does not change, what will happen to the equilibrium price of gnomes?
   a. Rises by $6.
   b. Rises by $1.
   c. Stays constant.
   d. Falls by $1.
   e. Falls by $3.

Difficulty:
Correct Answer: a

9. Suppose that the garden gnome industry was in long-run equilibrium given the circumstances described in Problem 1. Suppose, as in Problem 2, that it was discovered to everyone's surprise on January 1, 1993, after it was too late to change orders for gnome molds, that the cost of the plaster and labor needed to make a gnome had changed to $6. If the demand curve does not change, what will happen to the equilibrium price of gnomes?
   a. Stays constant.
   b. Falls by $1.
   c. Rises by $6.
   d. Rises by $1.
   e. Falls by $3.

Difficulty:
Correct Answer: c

10. Suppose that the garden gnome industry was in long-run equilibrium given the circumstances described in Problem 1. Suppose, as in Problem 2, that it was discovered to everyone's surprise on January 1, 1993, after it was too late to change orders for gnome molds, that the cost of the plaster and labor needed to make a gnome had changed to $6. If the demand curve does not change, what will happen to the equilibrium price of gnomes?
   a. Falls by $1.
   b. Rises by $6.
   c. Stays constant.
   d. Rises by $1.
   e. Falls by $3.

Difficulty:
Correct Answer: a

11. Suppose that the garden gnome industry was in long-run equilibrium as described in Problem 1. On January 1, 1993, the cost of plaster and labor remained at $7 per gnome, gnome molds still cost $1,000, and the interest rate remained at 10%, but the government introduced a tax of $4 on every garden gnome sold. Then the equilibrium price of garden gnomes in 1993 would be
   a. $11.
   b. $9.20.
   c. $13.
   d. $4.
   e. $15.

Difficulty:
Correct Answer: a

12. Suppose that the garden gnome industry was in long-run equilibrium as described in Problem 1. On January 1, 1993, the cost of plaster and labor remained at $7 per gnome, gnome molds still cost $1,000, and the interest rate remained at 10%, but the government introduced a tax of $9 on every garden gnome sold. Then the equilibrium price of garden gnomes in 1993 would be
   a. $16.
   b. $9.
   c. $18.
   d. $9.20.
   e. $25.

Difficulty:
Correct Answer: d

13. Suppose that the garden gnome industry was in long-run equilibrium as described in Problem 1. On January 1, 1993, the cost of plaster and labor remained at $7 per gnome, gnome molds still cost $1,000, and the interest rate remained at 10%, but the government introduced a tax of $7 on every garden gnome sold. Then the equilibrium price of garden gnomes in 1993 would be
   a. $16.
   b. $9.20.
   c. $7.
   d. $14.
   e. $21.

Difficulty:
Correct Answer: d

14. Suppose that the garden gnome industry was in long-run equilibrium as described in Problem 1. On January 1, 1993, the cost of plaster and labor remained at $7 per gnome, gnome molds still cost $1,000, and the interest rate remained at 10%, but the government introduced a tax of $8 on every garden gnome sold. Then the equilibrium price of garden gnomes in 1993 would be
   a. $17.
   b. $8.
   c. $9.20.
   d. $15.
   e. $23.

Difficulty:
Correct Answer: d

15. Suppose that the garden gnome industry was in long-run equilibrium as described in Problem 1. On January 1, 1993, the cost of plaster and labor remained at $7 per gnome, gnome molds still cost $1,000, and the interest rate remained at 10%, but the government introduced a tax of $4 on every garden gnome sold. Then the equilibrium price of garden gnomes in 1993 would be
   a. $13.
   b. $4.
   c. $9.20.
   d. $11.
   e. $15.

Difficulty:
Correct Answer: a

16. Suppose that the cost of capturing a cockatoo and transporting him to the United States is about $40 per bird. Cockatoos are drugged and smuggled in suitcases to the United States. Half of the smuggled cockatoos die in transit. Each smuggled cockatoo has a 10% probability of being discovered, in which case the smuggler is fined. If the fine imposed for each smuggled cockatoo is increased to $1,000, then the equilibrium price of cockatoos in the United States will be
   a. $311.11.
   b. $140.
   c. $90.
   d. $70.
   e. $222.22.

Difficulty:
Correct Answer: d

17. Suppose that the cost of capturing a cockatoo and transporting him to the United States is about $40 per bird. Cockatoos are drugged and smuggled in suitcases to the United States. Half of the smuggled cockatoos die in transit. Each smuggled cockatoo has a 10% probability of being discovered, in which case the smuggler is fined. If the fine imposed for each smuggled cockatoo is increased to $1,000, then the equilibrium price of cockatoos in the United States will be
   a. $140.
   b. $90.
   c. $70.
   d. $311.11.
   e. $222.22.

Difficulty:
Correct Answer: b

18. Suppose that the cost of capturing a cockatoo and transporting him to the United States is about $40 per bird. Cockatoos are drugged and smuggled in suitcases to the United States. Half of the smuggled cockatoos die in transit. Each smuggled cockatoo has a 10% probability of being discovered, in which case the smuggler is fined. If the fine imposed for each smuggled cockatoo is increased to $700, then the equilibrium price of cockatoos in the United States will be
   a. $61.
   b. $244.44.
   c. $75.
   d. $110.
   e. $155.56.

Difficulty:
Correct Answer: c

19. Suppose that the cost of capturing a cockatoo and transporting him to the United States is about $40 per bird. Cockatoos are drugged and smuggled in suitcases to the United States. Half of the smuggled cockatoos die in transit. Each smuggled cockatoo has a 10% probability of being discovered, in which case the smuggler is fined. If the fine imposed for each smuggled cockatoo is increased to $900, then the equilibrium price of cockatoos in the United States will be
   a. $130.
   b. $85.
   c. $288.89.
   d. $67.
   e. $200.

Difficulty:
Correct Answer: d

20. Suppose that the cost of capturing a cockatoo and transporting him to the United States is about $40 per bird. Cockatoos are drugged and smuggled in suitcases to the United States. Half of the smuggled cockatoos die in transit. Each smuggled cockatoo has a 10% probability of being discovered, in which case the

smuggler is fined. If the fine imposed for each smuggled cockatoo is increased to $1,100, then the equilibrium price of cockatoos in the United States will be

a. $150.
b. $95.
c. $73.
d. $333.33.
e. $244.44.

Difficulty:
Correct Answer: a

21. In Problem 13, in the absence of government interference, there is a constant marginal cost of $5 per ounce for growing marijuana and delivering it to buyers. If the probability that any shipment of marijuana seized is .30 and the fine if a shipper caught is $50 per ounce, then the equilibrium price of marijuana per ounce is
a. $28.57.
b. $20.
c. $55.
d. $3.50.
e. $6.50.

Difficulty:
Correct Answer: b

22. In Problem 13, in the absence of government interference, there is a constant marginal cost of $5 per ounce for growing marijuana and delivering it to buyers. If the probability that any shipment of marijuana seized is .20 and the fine if a shipper caught is $45 per ounce, then the equilibrium price of marijuana per ounce is
a. $50.
b. $17.50.
c. $4.
d. $14.
e. $6.

Difficulty:
Correct Answer: c

23. In Problem 13, in the absence of government interference, there is a constant marginal cost of $5 per ounce for growing marijuana and delivering it to buyers. If the probability that any shipment of marijuana seized is .10 and the fine if a shipper caught is $20 per ounce, then the equilibrium price of marijuana per ounce is
a. $25.
b. $4.50.
c. $7.78.
d. $7.
e. $5.50.

Difficulty:
Correct Answer: a

24. In Problem 13, in the absence of government interference, there is a constant marginal cost of $5 per ounce for growing marijuana and delivering it to buyers. If the probability that any shipment of marijuana seized is .50 and the fine if a shipper caught is $40 per ounce, then the equilibrium price of marijuana per ounce is
a. $50.
b. $45.
c. $2.50.
d. $25.
e. $7.50.

Difficulty:
Correct Answer: a

25. In Problem 13, in the absence of government interference, there is a constant marginal cost of $5 per ounce for growing marijuana and delivering it to buyers. If the probability that any shipment of marijuana seized is .50 and the fine if a shipper caught is $40 per ounce, then the equilibrium price of marijuana per ounce is
a. $50.
b. $2.50.
c. $25.
d. $45.
e. $7.50.

Difficulty:
Correct Answer: d

26. In Problem 8, the supply curve of any firm is $S_i(p) = p/2$. If a firm produces 6 units of output, what are its total variable costs?
a. $72
b. $34
c. $54
d. $36
e. There is not enough information given to determine total variable costs.

Difficulty:
Correct Answer: a

27. In Problem 8, the supply curve of any firm is $S_i(p) = p/2$. If a firm produces 4 units of output, what are its total variable costs?
a. $16
b. $14
c. $24
d. $32
e. There is not enough information given to determine total variable costs.

Difficulty:
Correct Answer: d

28. In Problem 8, the supply curve of any firm is $S_i(p) = p/2$. If a firm produces 2 units of output, what are its total variable costs?
    a. \$8
    b. \$6
    c. \$2
    d. \$4
    e. There is not enough information given to determine total variable costs.

Difficulty:
Correct Answer: b

29. In Problem 8, the supply curve of any firm is $S_i(p) = p/2$. If a firm produces 5 units of output, what are its total variable costs?
    a. \$37.50
    b. \$25
    c. \$50
    d. \$23
    e. There is not enough information given to determine total variable costs.

Difficulty:
Correct Answer: a

30. In Problem 8, the supply curve of any firm is $S_i(p) = p/2$. If a firm produces 3 units of output, what are its total variable costs?
    a. \$9
    b. \$13.50
    c. \$7
    d. \$18
    e. There is not enough information given to determine total variable costs.

Difficulty:
Correct Answer: a

31. In Problem 9, if the demand curve for pollicles is negatively sloped and the government imposes a tax t on every unit of output sold by the industry, in the long run
    a. fewer pollicles will be sold.
    b. more pollicles will be sold.
    c. each firm in the industry produces more pollicles.
    d. each firm in the industry produces fewer pollicles.
    e. the same number of pollicles will be sold.

Difficulty:
Correct Answer: a

32. In Problem 8, if market demand is equal to $D(p) = 20 - 3p$, the equilibrium price and number of firms operating in the market are (in that order)
    a. \$3.08 and 7
    b. \$3.00 and 6
    c. \$3.00 and 8
    d. \$3.14 and 3
    e. \$3.33 and 5

Difficulty:
Correct Answer: d

33. In Problem 4, suppose that each firm has the cost function $c(y) = y^2 + 9$ for $y > 0$ and $c(0) = 0$. With industry demand given by $D(p) = 51 - p$, the equilibrium price and equilibrium number of firms in the industry (in that order) will be
    a. \$8 and 11.
    b. \$3 and 18.
    c. \$3 and 48.
    d. \$6 and 15.
    e. \$6 and 45.

CHAPTER 24 Monopoly

MULTIPLE CHOICE

Difficulty:
Correct Answer: c

1. In Problem 1, if the demand schedule for Bong's book is $Q = 2{,}000 - 100p$, the cost of having the book typeset is \$9,000, and the marginal cost of printing an extra book is \$4, then he would maximize his profits by
   a. having it typeset and selling 800 copies.
   b. having it typeset and selling 1,000 copies.
   c. not having it typeset and not selling any copies.
   d. having it typeset and selling 1,600 copies.
   e. having it typeset and selling 400 copies.

Difficulty:
Correct Answer: d

2. In Problem 1, if the demand schedule for Bong's book is $Q = 5{,}000 - 100p$, the cost of having the book typeset is \$6,000, and the marginal cost of printing an extra book is \$4, then he would maximize his profits by
   a. not having it typeset and not selling any copies.
   b. having it typeset and selling 4,600 copies.
   c. having it typeset and selling 2,500 copies.
   d. having it typeset and selling 2,300 copies.
   e. having it typeset and selling 1,150 copies.

Difficulty:
Correct Answer: a

3. In Problem 1, if the demand schedule for Bong's book is $Q = 3{,}000 - 100p$, the cost of having the book typeset is \$9,000, and the marginal cost of printing an extra book is \$4, then he would maximize his profits by
   a. having it typeset and selling 1,300 copies.
   b. having it typeset and selling 2,600 copies.
   c. having it typeset and selling 1,500 copies.
   d. not having it typeset and not selling any copies.
   e. having it typeset and selling 650 copies.

Difficulty:
Correct Answer: b

4. In Problem 1, if the demand schedule for Bong's book is $Q = 2{,}000 - 100p$, the cost of having the book typeset is \$9,000, and the marginal cost of printing an extra book is \$4, then he would maximize his profits by
   a. having it typeset and selling 1,600 copies.
   b. not having it typeset and not selling any copies.
   c. having it typeset and selling 1,000 copies.
   d. having it typeset and selling 800 copies.
   e. having it typeset and selling 400 copies.

Difficulty:
Correct Answer: a

5. In Problem 1, if the demand schedule for Bong's book is $Q = 3{,}000 - 100p$, the cost of having the book typeset is \$10,000, and the marginal cost of printing an extra book is \$4, then he would maximize his profits by
   a. having it typeset and selling 1,300 copies.
   b. having it typeset and selling 1,500 copies.
   c. having it typeset and selling 2,600 copies.
   d. not having it typeset and not selling any copies.
   e. having it typeset and selling 650 copies.

Difficulty:
Correct Answer: e

6. In Problem 2, if the demand for pigeon pies is given by $p(y) = 110 - y/3$, then the level of output that will maximize Peter's profit is
   a. 169.
   b. 33.
   c. 330.
   d. 495.
   e. None of the above.

Difficulty:
Correct Answer: e

7. In Problem 2, if the demand for pigeon pies is given by $p(y) = 140 - y/4$, then the level of output that will maximize Peter's profit is
   a. 56.

b. 560.
c. 284.
d. 840.
e. None of the above.

Difficulty:
Correct Answer: b

8. In Problem 2, if the demand for pigeon pies is given by $p(y) = 50 - y/2$, then the level of output that will maximize Peter's profit is
   a. 100.
   b. 50.
   c. 150.
   d. 10.
   e. None of the above.

Difficulty:
Correct Answer: d

9. In Problem 2, if the demand for pigeon pies is given by $p(y) = 140 - y/2$, then the level of output that will maximize Peter's profit is
   a. 28.
   b. 420.
   c. 280.
   d. 140.
   e. None of the above.

Difficulty:
Correct Answer: e

10. In Problem 2, if the demand for pigeon pies is given by $p(y) = 140 - y/3$, then the level of output that will maximize Peter's profit is
    a. 630.
    b. 214.
    c. 420.
    d. 42.
    e. None of the above.

Difficulty:
Correct Answer: c

11. A profit-maximizing monopoly faces an inverse demand function described by the equation $p(y) = 30 - y$ and its total costs are $c(y) = 6y$, where prices and costs are measured in dollars. In the past it was not taxed, but now it must pay a tax of 2 dollars per unit of output. After the tax, the monopoly will
    a. increase its price by 2 dollars.
    b. increase its price by 3 dollars.
    c. increase its price by 1 dollar.
    d. leave its price constant.
    e. None of the above.

Difficulty:
Correct Answer: c

12. A profit-maximizing monopoly faces an inverse demand function described by the equation $p(y) = 60 - y$ and its total costs are $c(y) = 10y$, where prices and costs are measured in dollars. In the past it was not taxed, but now it must pay a tax of 4 dollars per unit of output. After the tax, the monopoly will
    a. increase its price by 4 dollars.
    b. leave its price constant.
    c. increase its price by 2 dollars.
    d. increase its price by 6 dollars.
    e. None of the above.

Difficulty:
Correct Answer: d

13. A profit-maximizing monopoly faces an inverse demand function described by the equation $p(y) = 50 - y$ and its total costs are $c(y) = 10y$, where prices and costs are measured in dollars. In the past it was not taxed, but now it must pay a tax of 2 dollars per unit of output. After the tax, the monopoly will
    a. leave its price constant.
    b. increase its price by 2 dollars.
    c. increase its price by 3 dollars.
    d. increase its price by 1 dollar.
    e. None of the above.

Difficulty:
Correct Answer: a

14. A profit-maximizing monopoly faces an inverse demand function described by the equation $p(y) = 90 - y$ and its total costs are $c(y) = 8y$, where prices and costs are measured in dollars. In the past it was not taxed, but now it must pay a tax of 8 dollars per unit of output. After the tax, the monopoly will
    a. increase its price by 4 dollars.
    b. leave its price constant.
    c. increase its price by 8 dollars.
    d. increase its price by 12 dollars.
    e. None of the above.

Difficulty:
Correct Answer: b

15. A profit-maximizing monopoly faces an inverse demand function described by the equation $p(y) = 90 - y$ and its total costs are $c(y) = 9y$, where prices and costs are measured in dollars. In the past it was not taxed, but now it must pay a tax of 4 dollars per unit of output. After the tax, the monopoly will
    a. increase its price by 4 dollars.
    b. increase its price by 2 dollars.
    c. leave its price constant.
    d. increase its price by 6 dollars.
    e. None of the above.

Difficulty: 3
Correct Answer: b

16. A firm has invented a new beverage called Slops. It doesn't taste very good, but it gives people a craving for Lawrence Welk's music and Professor Johnson's jokes. Some people are willing to pay money for this effect, so the demand for Slops is given by the equation $q = 10 - p$. Slops can be made at zero marginal cost from old-fashioned macroeconomics books dissolved in bathwater. But before any Slops can be produced, the firm must undertake a fixed cost of $30. Since the inventor has a patent on Slops, it can be a monopolist in this new industry.
    a. The firm will produce 5 units of Slops.
    b. A Pareto improvement could be achieved by having the government pay the firm a subsidy of $35 and insisting that the firm offer Slops at zero price.
    c. From the point of view of social efficiency, it is best that no Slops be produced.
    d. The firm will produce 10 units of Slops.
    e. None of the above.

Difficulty: 3
Correct Answer: b

17. A firm has invented a new beverage called Slops. It doesn't taste very good, but it gives people a craving for Lawrence Welk's music and Professor Johnson's jokes. Some people are willing to pay money for this effect, so the demand for Slops is given by the equation $q = 16 - p$. Slops can be made at zero marginal cost from old-fashioned macroeconomics books dissolved in bathwater. But before any Slops can be produced, the firm must undertake a fixed cost of $69. Since the inventor has a patent on Slops, it can be a monopolist in this new industry.
    a. The firm will produce 16 units of Slops.
    b. A Pareto improvement could be achieved by having the government pay the firm a subsidy of $74 and insisting that the firm offer Slops at zero price.
    c. From the point of view of social efficiency, it is best that no Slops be produced.
    d. The firm will produce 8 units of Slops.
    e. None of the above.

Difficulty: 3
Correct Answer: c

18. A firm has invented a new beverage called Slops. It doesn't taste very good, but it gives people a craving for Lawrence Welk's music and Professor Johnson's jokes. Some people are willing to pay money for this effect, so the demand for Slops is given by the equation $q = 18 - p$. Slops can be made at zero marginal cost from old-fashioned macroeconomics books dissolved in bathwater. But before any Slops can be produced, the firm must undertake a fixed cost of $86. Since the inventor has a patent on Slops, it can be a monopolist in this new industry.
    a. The firm will produce 9 units of Slops.
    b. From the point of view of social efficiency, it is best that no Slops be produced.
    c. A Pareto improvement could be achieved by having the government pay the firm a subsidy of $91 and insisting that the firm offer Slops at zero price.
    d. The firm will produce 18 units of Slops.
    e. None of the above.

Difficulty: 3
Correct Answer: c

19. A firm has invented a new beverage called Slops. It doesn't taste very good, but it gives people a craving for Lawrence Welk's music and Professor Johnson's jokes. Some people are willing to pay money for this effect, so the demand for Slops is given by the equation $q = 20 - p$. Slops can be made at zero marginal cost from old-fashioned macroeconomics books dissolved in bathwater. But before any Slops can be produced, the firm must undertake a fixed cost of $105. Since the inventor has a patent on Slops, it can be a monopolist in this new industry.
    a. The firm will produce 10 units of Slops.
    b. From the point of view of social efficiency, it is best that no Slops be produced.
    c. A Pareto improvement could be achieved by having the government pay the firm a subsidy of $110 and insisting that the firm offer Slops at zero price.
    d. The firm will produce 20 units of Slops.
    e. None of the above.

Difficulty: 3
Correct Answer: b

20. A firm has invented a new beverage called Slops. It doesn't taste very good, but it gives people a craving for Lawrence Welk's music and Professor Johnson's jokes. Some people are willing to pay money for this effect, so the demand for Slops is given by the equation $q = 18 - p$. Slops can be made at zero marginal cost from old-fashioned macroeconomics books dissolved in bathwater. But before any Slops can be produced, the firm must undertake a fixed cost of $86. Since the inventor has a patent on Slops, it can be a monopolist in this new industry.
    a. The firm will produce 9 units of Slops.
    b. A Pareto improvement could be achieved by having the government pay the firm a subsidy of $91 and insisting that the firm offer Slops at zero price.
    c. From the point of view of social efficiency, it is best that no Slops be produced.
    d. The firm will produce 18 units of Slops.
    e. None of the above.

Difficulty:
Correct Answer: a

21. The demand for Professor Bongmore's new book is given by the function $Q = 4{,}000 - 100p$. If the cost of having the book edited and typeset is \$17,000, if the marginal cost of printing an extra copy is \$4, and if he has no other costs, then he would maximize his profits by
   a. having it edited and typeset and selling 1,800 copies.
   b. having it edited and typeset and selling 2,000 copies.
   c. not having it edited and typeset and not selling any copies.
   d. having it edited and typeset and selling 3,600 copies.
   e. having it typeset and selling 900 copies.

Difficulty:
Correct Answer: c

22. The demand for Professor Bongmore's new book is given by the function $Q = 8{,}000 - 100p$. If the cost of having the book edited and typeset is \$7,000, if the marginal cost of printing an extra copy is \$4, and if he has no other costs, then he would maximize his profits by
   a. having it edited and typeset and selling 4,000 copies.
   b. not having it edited and typeset and not selling any copies.
   c. having it edited and typeset and selling 3,800 copies.
   d. having it edited and typeset and selling 7,600 copies.
   e. having it typeset and selling 1,900 copies.

Difficulty:
Correct Answer: b

23. The demand for Professor Bongmore's new book is given by the function $Q = 5{,}000 - 100p$. If the cost of having the book edited and typeset is \$20,000, if the marginal cost of printing an extra copy is \$4, and if he has no other costs, then he would maximize his profits by
   a. not having it edited and typeset and not selling any copies.
   b. having it edited and typeset and selling 2,300 copies.
   c. having it edited and typeset and selling 2,500 copies.
   d. having it edited and typeset and selling 4,600 copies.
   e. having it typeset and selling 1,150 copies.

Difficulty:
Correct Answer: a

24. The demand for Professor Bongmore's new book is given by the function $Q = 8{,}000 - 100p$. If the cost of having the book edited and typeset is \$17,000, if the marginal cost of printing an extra copy is \$4, and if he has no other costs, then he would maximize his profits by
   a. having it edited and typeset and selling 3,800 copies.
   b. having it edited and typeset and selling 4,000 copies.
   c. not having it edited and typeset and not selling any copies.
   d. having it edited and typeset and selling 7,600 copies.
   e. having it typeset and selling 1,900 copies.

Difficulty:
Correct Answer: a

25. The demand for Professor Bongmore's new book is given by the function $Q = 6{,}000 - 100p$. If the cost of having the book edited and typeset is \$18,000, if the marginal cost of printing an extra copy is \$4, and if he has no other costs, then he would maximize his profits by
   a. having it edited and typeset and selling 2,800 copies.
   b. not having it edited and typeset and not selling any copies.
   c. having it edited and typeset and selling 5,600 copies.
   d. having it edited and typeset and selling 3,000 copies.
   e. having it typeset and selling 1,400 copies.

Difficulty:
Correct Answer: c

26. In Problem 1, if demand for the book is $Q = 1{,}000 - 300p$, the marginal revenue function is given by
   a. 300.
   b. $1{,}000 - 600$.
   c. $3.33 - Q/150$.
   d. $3.33Q - Q^2/300$.
   e. $-1/300$.

Difficulty:
Correct Answer: b

27. In Problem 1, if demand for the book is $Q = 1{,}400 - 100p$, the marginal revenue function is given by
   a. 100.
   b. $14 - Q/50$.
   c. $1{,}400 - 200$.
   d. $14Q - Q^2/100$.
   e. $-1/100$.

Difficulty:
Correct Answer: b

28. In Problem 1, if demand for the book is $Q = 2{,}000 - 300p$, the marginal revenue function is given by
   a. 300.
   b. $6.67 - Q/150$.
   c. $2{,}000 - 600$.
   d. $6.67Q - Q^2/300$.
   e. $-1/300$.

Difficulty:
Correct Answer: b

29. In Problem 1, if demand for the book is $Q = 1{,}600 - 100p$, the marginal revenue function is given by
   a. $16Q - Q^2/100$.
   b. $16 - Q/50$.
   c. $1{,}600 - 200$.
   d. 100.
   e. $-1/100$.

Difficulty:
Correct Answer: a

30. In Problem 1, if demand for the book is $Q = 900 - 300p$, the marginal revenue function is given by
   a. $3 - Q/150$.
   b. $900 - 600$.
   c. $3Q - Q^2/300$.
   d. 300.
   e. $-1/300$.

Difficulty:
Correct Answer: c

31. In Problem 6, if there are no fixed costs and marginal cost is constant at \$44, the price elasticity of demand at the profit-maximizing level of output is closest to
   a. −0.39.
   b. −5.14.
   c. −2.57.
   d. −10.29.
   e. −0.19.

Difficulty:
Correct Answer: a

32. In Problem 6, if there are no fixed costs and marginal cost is constant at \$24, the price elasticity of demand at the profit-maximizing level of output is closest to
   a. −1.63.
   b. −0.61.
   c. −3.26.
   d. −6.53.
   e. −0.31.

Difficulty:
Correct Answer: c

33. In Problem 6, if there are no fixed costs and marginal cost is constant at \$56, the price elasticity of demand at the profit-maximizing level of output is closest to
   a. −0.28.
   b. −7.09.
   c. −3.55.
   d. −14.18.
   e. −0.14.

Difficulty:
Correct Answer: d

34. In Problem 6, if there are no fixed costs and marginal cost is constant at \$48, the price elasticity of demand at the profit-maximizing level of output is closest to
   a. −5.69.
   b. −0.35.
   c. −11.38.
   d. −2.85.
   e. −0.18.

Difficulty:
Correct Answer: a

35. In Problem 6, if there are no fixed costs and marginal cost is constant at \$8, the price elasticity of demand at the profit-maximizing level of output is closest to
   a. −1.17.
   b. −4.70.
   c. −0.85.
   d. −2.35.
   e. −0.43.

CHAPTER 25 Monopoly Behavior

MULTIPLE CHOICE

Difficulty:
Correct Answer: a

1. In Problem 1, if demand in the United States is given by $Q_1 = 7{,}200 - 300p_1$, where p_1 is the price in the United States, and if the demand in England is given by $3{,}600 - 200p_2$, where p_2 is the price in England, then the difference between the price charged in England and the price charged in the United States will be
   a. \$3.
   b. \$6.
   c. \$0.
   d. \$13.
   e. \$9.

Difficulty:
Correct Answer: c

2. In Problem 1, if demand in the United States is given by $Q_1 = 14{,}000 - 1{,}000p_1$, where p_1 is the price in the United States, and if the demand in England is given by $1{,}600 - 200p_2$, where p_2 is the price in England, then the difference between the price charged in England and the price charged in the United States will be
   a. \$8.
   b. \$0.
   c. \$3.
   d. \$6.
   e. \$9.

Difficulty:
Correct Answer: b

3. In Problem 1, if demand in the United States is given by $Q_1 = 13{,}200 - 600p_1$, where p_1 is the price in the United States, and if the demand in England is given by $9{,}000 - 500p_2$, where p_2 is the price in England, then the difference between the price charged in England and the price charged in the United States will be
   a. \$4.
   b. \$2.
   c. \$0.
   d. \$12.
   e. \$6.

Difficulty:
Correct Answer: b

4. In Problem 1, if demand in the United States is given by $Q_1 = 11{,}200 - 800p_1$, where p_1 is the price in the United States, and if the demand in England is given by $1{,}600 - 200p_2$, where p_2 is the price in England, then the difference between the price charged in England and the price charged in the United States will be
   a. \$8.
   b. \$3.
   c. \$6.
   d. \$0.
   e. \$9.

Difficulty:
Correct Answer: d

5. In Problem 1, if demand in the United States is given by $Q_1 = 18{,}000 - 900p_1$, where p_1 is the price in the United States, and if the demand in England is given by $2{,}000 - 200p_2$, where p_2 is the price in England, then the difference between the price charged in England and the price charged in the United States will be
   a. \$10.
   b. \$0.
   c. \$11.
   d. \$5.
   e. \$15.

Difficulty:
Correct Answer: a

6. If a monopolist faces an inverse demand curve, $p(y) = 100 - 2y$ and has constant marginal costs of \$32 and zero fixed costs and if this monopolist is able to practice perfect price discrimination, its total profits will be

a. \$1,156.
b. \$17.
c. \$578.
d. \$1,734.
e. \$289.

Difficulty:
Correct Answer: c

7. If a monopolist faces an inverse demand curve, $p(y) = 100 - 2y$ and has constant marginal costs of \$4 and zero fixed costs and if this monopolist is able to practice perfect price discrimination, its total profits will be
   a. \$24.
   b. \$3,456.
   c. \$2,304.
   d. \$1,152.
   e. \$576.

Difficulty:
Correct Answer: a

8. If a monopolist faces an inverse demand curve, $p(y) = 100 - 2y$ and has constant marginal costs of \$8 and zero fixed costs and if this monopolist is able to practice perfect price discrimination, its total profits will be
   a. \$2,116.
   b. \$23.
   c. \$1,058.
   d. \$3,174.
   e. \$529.

Difficulty:
Correct Answer: a

9. If a monopolist faces an inverse demand curve, $p(y) = 100 - 2y$ and has constant marginal costs of \$24 and zero fixed costs and if this monopolist is able to practice perfect price discrimination, its total profits will be
   a. \$1,444.
   b. \$19.
   c. \$2,166.
   d. \$722.
   e. \$361.

Difficulty:
Correct Answer: b

10. If a monopolist faces an inverse demand curve, $p(y) = 100 - 2y$ and has constant marginal costs of \$16 and zero fixed costs and if this monopolist is able to practice perfect price discrimination, its total profits will be
    a. \$21.
    b. \$1,764.
    c. \$2,646.
    d. \$882.
    e. \$441.

Difficulty:
Correct Answer: b

11. A price-discriminating monopolist sells in two separate markets such that goods sold in one market are never resold in the other. It charges \$4 in one market and \$9 in the other market. At these prices, the price elasticity in the first market is −1.50 and the price elasticity in the second market is −0.40. Which of the following actions is sure to raise the monopolist's profits?
    a. Lower p_2.
    b. Raise p_2.
    c. Raise p_1 and lower p_2.
    d. Raise both p_1 and p_2.
    e. Raise p_2 and lower p_1.

Difficulty:
Correct Answer: c

12. A price-discriminating monopolist sells in two separate markets such that goods sold in one market are never resold in the other. It charges \$6 in one market and \$11 in the other market. At these prices, the price elasticity in the first market is −1.40 and the price elasticity in the second market is −0.90. Which of the following actions is sure to raise the monopolist's profits?
    a. Lower p_2.
    b. Raise p_1 and lower p_2.
    c. Raise p_2.
    d. Raise both p_1 and p_2.
    e. Raise p_2 and lower p_1.

Difficulty:
Correct Answer: c

13. A price-discriminating monopolist sells in two separate markets such that goods sold in one market are never resold in the other. It charges \$6 in one market and \$8 in the other market. At these prices, the price elasticity in the first market is −2.40 and the price elasticity in the second market is −0.70. Which of the following actions is sure to raise the monopolist's profits?
    a. Raise both p_1 and p_2.
    b. Raise p_1 and lower p_2.
    c. Raise p_2.
    d. Lower p_2.
    e. Raise p_2 and lower p_1.

Difficulty:
Correct Answer: b

14. A price-discriminating monopolist sells in two separate markets such that goods sold in one market are never resold in the other. It charges \$6 in one market and \$8 in the other market. At these prices, the price elasticity in the first market is −2.10 and the price elasticity in

the second market is −0.40. Which of the following actions is sure to raise the monopolist's profits?
a. Raise both p_1 and p_2.
b. Raise p_2.
c. Lower p_2.
d. Raise p_1 and lower p_2.
e. Raise p_2 and lower p_1.

Difficulty:
Correct Answer: a

15. A price-discriminating monopolist sells in two separate markets such that goods sold in one market are never resold in the other. It charges $2 in one market and $12 in the other market. At these prices, the price elasticity in the first market is −2.50 and the price elasticity in the second market is −0.70. Which of the following actions is sure to raise the monopolist's profits?
a. Raise p_2.
b. Raise both p_1 and p_2.
c. Lower p_2.
d. Raise p_1 and lower p_2.
e. Raise p_2 and lower p_1.

Difficulty:
Correct Answer: b

16. Suppose that 2,000 people are interested in attending ElvisLand. Once a person arrives at ElvisLand, his or her demand for rides is given by $x = \max\{5 - p, 0)$, where p is the price per ride. There is a constant marginal cost of $2 for providing a ride at ElvisLand. If ElvisLand charges a profit-maximizing two-part tariff, with one price for admission to ElvisLand and another price per ride for those who get in. How much should it charge per ride and how much for admission?
a. $2 per ride and $5 for admission
b. $2 per ride and $4.50 for admission
c. $0 per ride and $3 for admission
d. $0 per ride and $6.50 for admission
e. $5 per ride and $5 for admission

Difficulty:
Correct Answer: c

17. Suppose that 2,500 people are interested in attending ElvisLand. Once a person arrives at ElvisLand, his or her demand for rides is given by $x = \max\{3 - p, 0\}$, where p is the price per ride. There is a constant marginal cost of $2 for providing a ride at ElvisLand. ElvisLand charges a profit-maximizing two-part tariff, with one price for admission to ElvisLand and another price per ride for those who get in. How much should it charge per ride and how much for admission?
a. $2 per ride and $3 for admission
b. $0 per ride and $2.50 for admission
c. $2 per ride and $.50 for admission
d. $0 per ride and $1 for admission
e. $3 per ride and $3 for admission

Difficulty:
Correct Answer: d

18. Suppose that 3,500 people are interested in attending ElvisLand. Once a person arrives at ElvisLand, his or her demand for rides is given by $x = \max\{7 - p, 0\}$, where p is the price per ride. There is a constant marginal cost of $3 for providing a ride at ElvisLand. ElvisLand charges a profit-maximizing two-part tariff, with one price for admission to ElvisLand and another price per ride for those who get in. How much should it charge per ride and how much for admission?
a. $3 per ride and $7 for admission
b. $0 per ride and $4 for admission
c. $0 per ride and $11 for admission
d. $3 per ride and $8 for admission
e. $7 per ride and $7 for admission

Difficulty:
Correct Answer: c

19. Suppose that 3,500 people are interested in attending ElvisLand. Once a person arrives at ElvisLand, his or her demand for rides is given by $x = \max\{2 - p, 0\}$, where p is the price per ride. There is a constant marginal cost of $1 for providing a ride at ElvisLand. ElvisLand charges a profit-maximizing two-part tariff, with one price for admission to ElvisLand and another price per ride for those who get in. How much should it charge per ride and how much for admission?
a. $1 per ride and $2 for admission
b. $0 per ride and $1 for admission
c. $1 per ride and $.50 for admission
d. $0 per ride and $1.50 for admission
e. $2 per ride and $2 for admission

Difficulty:
Correct Answer: b

20. Suppose that 1,000 people are interested in attending ElvisLand. Once a person arrives at ElvisLand, his or her demand for rides is given by $x = \max\{6 - p, 0\}$, where p is the price per ride. There is a constant marginal cost of $3 for providing a ride at ElvisLand. If ElvisLand charges a profit-maximizing two-part tariff, with one price for admission to ElvisLand and another price per ride for those who get in. How much should it charge per ride and how much for admission?
a. $3 per ride and $6 for admission
b. $3 per ride and $4.50 for admission
c. $0 per ride and $3 for admission
d. $0 per ride and $7.50 for admission
e. $6 per ride and $6 for admission

CHAPTER 26 Factor Markets

MULTIPLE CHOICE

Difficulty:
Correct Answer: b

1. Suppose that in Problem 2, the demand curve for mineral water is given by $p = 20 - 16q$, where p is the price per bottle paid by consumers and q is the number of bottles purchased by consumers. Mineral water is supplied to consumers by a monopolistic distributor, who buys from a monopolist producer who is able to produce mineral water at zero cost. The producer charges the distributor a price of c per bottle, that will maximize the producer's total revenue. Given his marginal cost of c, the distributor chooses an output to maximize profits. The price paid by consumers under this arrangement is
   a. \$10.
   b. \$15.
   c. \$1.25.
   d. \$.63.
   e. \$5.

Difficulty:
Correct Answer: a

2. Suppose that in Problem 2, the demand curve for mineral water is given by $p = 20 - 12q$, where p is the price per bottle paid by consumers and q is the number of bottles purchased by consumers. Mineral water is supplied to consumers by a monopolistic distributor, who buys from a monopolist producer who is able to produce mineral water at zero cost. The producer charges the distributor a price of c per bottle, that will maximize the producer's total revenue. Given his marginal cost of c, the distributor chooses an output to maximize profits. The price paid by consumers under this arrangement is
   a. \$15.
   b. \$.83.
   c. \$1.67.
   d. \$10.
   e. \$5.

Difficulty:
Correct Answer: a

3. Suppose that in Problem 2, the demand curve for mineral water is given by $p = 70 - 16q$, where p is the price per bottle paid by consumers and q is the number of bottles purchased by consumers. Mineral water is supplied to consumers by a monopolistic distributor, who buys from a monopolist producer who is able to produce mineral water at zero cost. The producer charges the distributor a price of c per bottle, that will maximize the producer's total revenue. Given his marginal cost of c, the distributor chooses an output to maximize profits. The price paid by consumers under this arrangement is
   a. \$52.50.
   b. \$35.
   c. \$4.38.
   d. \$2.19.
   e. \$17.50.

Difficulty:
Correct Answer: b

4. Suppose that in Problem 2, the demand curve for mineral water is given by $p = 60 - 8q$, where p is the price per bottle paid by consumers and q is the number of bottles purchased by consumers. Mineral water is supplied to consumers by a monopolistic distributor, who buys from a monopolist producer who is able to produce mineral water at zero cost. The producer charges the distributor a price of c per bottle, that will maximize the producer's total revenue. Given his marginal cost of c, the distributor chooses an output to maximize profits. The price paid by consumers under this arrangement is
   a. \$30.
   b. \$45.
   c. \$3.75.

d. $7.50.
e. $15.

Difficulty:
Correct Answer: d

5. Suppose that in Problem 2, the demand curve for mineral water is given by $p = 40 - 16q$, where p is the price per bottle paid by consumers and q is the number of bottles purchased by consumers. Mineral water is supplied to consumers by a monopolistic distributor, who buys from a monopolist producer who is able to produce mineral water at zero cost. The producer charges the distributor a price of c per bottle, that will maximize the producer's total revenue. Given his marginal cost of c, the distributor chooses an output to maximize profits. The price paid by consumers under this arrangement is
   a. $2.50.
   b. $20.
   c. $1.25.
   d. $30.
   e. $10.

Difficulty:
Correct Answer: d

6. Suppose that the labor supply curve for a large university in a small town is given by $w = 60 + 0.08L$, where L is number of units of labor per week and w is the weekly wage paid per unit of labor. If the university is currently hiring 1,000 units of labor per week, the marginal cost of an additional unit of labor
   a. equals the wage rate.
   b. is twice the wage rate.
   c. equals the wage rate plus $160.
   d. equals the wage rate plus $80.
   e. equals the wage rate plus $240.

Difficulty:
Correct Answer: d

7. Suppose that the labor supply curve for a large university in a small town is given by $w = 160 + 0.03L$, where L is number of units of labor per week and w is the weekly wage paid per unit of labor. If the university is currently hiring 1,000 units of labor per week, the marginal cost of an additional unit of labor
   a. equals the wage rate.
   b. is twice the wage rate.
   c. equals the wage rate plus $60.
   d. equals the wage rate plus $30.
   e. equals the wage rate plus $90.

Difficulty:
Correct Answer: c

8. Suppose that the labor supply curve for a large university in a small town is given by $w = 140 + 0.02L$, where L is number of units of labor per week and w is the weekly wage paid per unit of labor. If the university is currently hiring 1,000 units of labor per week, the marginal cost of an additional unit of labor
   a. equals the wage rate plus $40.
   b. is twice the wage rate.
   c. equals the wage rate plus $20.
   d. equals the wage rate.
   e. equals the wage rate plus $60.

Difficulty:
Correct Answer: b

9. Suppose that the labor supply curve for a large university in a small town is given by $w = 160 + 0.05L$, where L is number of units of labor per week and w is the weekly wage paid per unit of labor. If the university is currently hiring 1,000 units of labor per week, the marginal cost of an additional unit of labor
   a. equals the wage rate.
   b. equals the wage rate plus $50.
   c. is twice the wage rate.
   d. equals the wage rate plus $100.
   e. equals the wage rate plus $150.

Difficulty:
Correct Answer: b

10. Suppose that the labor supply curve for a large university in a small town is given by $w = 140 + 0.05L$, where L is number of units of labor per week and w is the weekly wage paid per unit of labor. If the university is currently hiring 1,000 units of labor per week, the marginal cost of an additional unit of labor
   a. is twice the wage rate.
   b. equals the wage rate plus $50.
   c. equals the wage rate plus $100.
   d. equals the wage rate.
   e. equals the wage rate plus $150.

Difficulty:
Correct Answer: a

11. Rabelaisian Restaurants has a monopoly in the town of Upper Glutton. Its production function is $Q = 30L$, where L is the amount of labor it uses and Q is the number of meals produced. Rabelaisian Restaurants finds that in order to hire L units of labor, it must pay a wage of $30 + .1L$ per unit of labor. The demand curve for meals at Rabelaisian Restaurants is given by $P = 27.67 - Q/1{,}000$. The profit-maximizing output for Rabelaisian Restaurants is
   a. 12,000 meals.
   b. 24,000 meals.
   c. 3,000 meals.
   d. 2,500 meals.
   e. 1,500 meals.

Difficulty:
Correct Answer: c

12. Rabelaisian Restaurants has a monopoly in the town of Upper Glutton. Its production function is $Q = 10L$, where L is the amount of labor it uses and Q is the number of meals produced. Rabelaisian Restaurants finds that in order to hire L units of labor, it must pay a wage of $10 + .1L$ per unit of labor. The demand curve for meals at Rabelaisian Restaurants is given by $P = 41 - Q/1{,}000$. The profit-maximizing output for Rabelaisian Restaurants is
    a. 2,500 meals.
    b. 20,000 meals.
    c. 10,000 meals.
    d. 2,000 meals.
    e. 1,250 meals.

Difficulty:
Correct Answer: c

13. Rabelaisian Restaurants has a monopoly in the town of Upper Glutton. Its production function is $Q = 40L$, where L is the amount of labor it uses and Q is the number of meals produced. Rabelaisian Restaurants finds that in order to hire L units of labor, it must pay a wage of $40 + .1L$ per unit of labor. The demand curve for meals at Rabelaisian Restaurants is given by $P = 13.75 - Q/1{,}000$. The profit-maximizing output for Rabelaisian Restaurants is
    a. 12,000 meals.
    b. 1,000 meals.
    c. 6,000 meals.
    d. 1,500 meals.
    e. 750 meals.

Difficulty:
Correct Answer: d

14. Rabelaisian Restaurants has a monopoly in the town of Upper Glutton. Its production function is $Q = 10L$, where L is the amount of labor it uses and Q is the number of meals produced. Rabelaisian Restaurants finds that in order to hire L units of labor, it must pay a wage of $10 + .1L$ per unit of labor. The demand curve for meals at Rabelaisian Restaurants is given by $P = 49 - Q/1{,}000$. The profit-maximizing output for Rabelaisian Restaurants is
    a. 24,000 meals.
    b. 2,500 meals.
    c. 3,000 meals.
    d. 12,000 meals.
    e. 1,500 meals.

Difficulty:
Correct Answer: b

15. Rabelaisian Restaurants has a monopoly in the town of Upper Glutton. Its production function is $Q = 10L$, where L is the amount of labor it uses and Q is the number of meals produced. Rabelaisian Restaurants finds that in order to hire L units of labor, it must pay a wage of $10 + .1L$ per unit of labor. The demand curve for meals at Rabelaisian Restaurants is given by $P = 49 - Q/1{,}000$. The profit-maximizing output for Rabelaisian Restaurants is
    a. 3,000 meals.
    b. 12,000 meals.
    c. 2,500 meals.
    d. 24,000 meals.
    e. 1,500 meals.

Difficulty:
Correct Answer: a

16. In Problem 1, suppose that the demand curve for antimacassars is $p = 66 - Q/900$. The firm's profit-maximizing output is closest to
    a. 14,625 antimacassars.
    b. 7,312.50 antimacassars.
    c. 21,937.50 antimacassars.
    d. 4,826.25 antimacassars.
    e. 3,656.25 antimacassars.

Difficulty:
Correct Answer: d

17. In Problem 1, suppose that the demand curve for antimacassars is $p = 55 - Q/1{,}100$. The firm's profit-maximizing output is closest to
    a. 4,900.50 antimacassars.
    b. 22,275 antimacassars.
    c. 7,425 antimacassars.
    d. 14,850 antimacassars.
    e. 3,712.50 antimacassars.

Difficulty:
Correct Answer: b

18. In Problem 1, suppose that the demand curve for antimacassars is $p = 53 - Q/1{,}000$. The firm's profit-maximizing output is closest to
    a. 6,500 antimacassars.
    b. 13,000 antimacassars.
    c. 19,500 antimacassars.
    d. 4,290 antimacassars.
    e. 3,250 antimacassars.

Difficulty:
Correct Answer: b

19. In Problem 1, suppose that the demand curve for antimacassars is $p = 66 - Q/1{,}000$. The firm's profit-maximizing output is closest to
   a. 24,375 antimacassars.
   b. 16,250 antimacassars.
   c. 5,362.50 antimacassars.
   d. 8,125 antimacassars.
   e. 4,062.50 antimacassars.

Difficulty:
Correct Answer: d

20. In Problem 1, suppose that the demand curve for antimacassars is $p = 51 - Q/900$. The firm's profit-maximizing output is closest to
   a. 16,875 antimacassars.
   b. 5,625 antimacassars.
   c. 3,712.50 antimacassars.
   d. 11,250 antimacassars.
   e. 2,812.50 antimacassars.

CHAPTER 27 Oligopoly

MULTIPLE CHOICE

Difficulty:
Correct Answer: a

1. Suppose that the duopolists Carl and Simon in Problem 1 face a demand function for pumpkins of $Q = 16{,}400 - 400P$, where Q is the total number of pumpkins that reach the market and P is the price of pumpkins. Suppose further that each farmer has a constant marginal cost of \$1 for each pumpkin produced. If Carl believes that Simon is going to produce Q_s pumpkins this year, then the reaction function tells us how many pumpkins Carl should produce in order to maximize his profits. Carl's reaction function is $R_C(Q_s) =$
   a. $8{,}000 - Q_s/2$.
   b. $16{,}400 - 400Q_s$.
   c. $16{,}400 - 800Q_s$.
   d. $4{,}000 - Q_s/2$.
   e. $12{,}000 - Q_s$.

Difficulty:
Correct Answer: b

2. Suppose that the duopolists Carl and Simon in Problem 1 face a demand function for pumpkins of $Q = 16{,}800 - 800P$, where Q is the total number of pumpkins that reach the market and P is the price of pumpkins. Suppose further that each farmer has a constant marginal cost of \$1 for each pumpkin produced. If Carl believes that Simon is going to produce Q_s pumpkins this year, then the reaction function tells us how many pumpkins Carl should produce in order to maximize his profits. Carl's reaction function is $R_C(Q_s) =$
   a. $16{,}800 - 800Q_s$.
   b. $8{,}000 - Q_s/2$.
   c. $16{,}800 - 1{,}600Q_s$.
   d. $4{,}000 - Q_s/2$.
   e. $12{,}000 - Q_s$.

Difficulty:
Correct Answer: c

3. Suppose that the duopolists Carl and Simon in Problem 1 face a demand function for pumpkins of $Q = 1{,}800 - 400P$, where Q is the total number of pumpkins that reach the market and P is the price of pumpkins. Suppose further that each farmer has a constant marginal cost of \$.50 for each pumpkin produced. If Carl believes that Simon is going to produce Q_s pumpkins this year, then the reaction function tells us how many pumpkins Carl should produce in order to maximize his profits. Carl's reaction function is $R_C(Q_s) =$
   a. $1{,}800 - 400Q_s$.
   b. $1{,}800 - 800Q_s$.
   c. $800 - Q_s/2$.
   d. $400 - Q_s/2$.
   e. $1{,}200 - Q_s$.

Difficulty:
Correct Answer: d

4. Suppose that the duopolists Carl and Simon in Problem 1 face a demand function for pumpkins of $Q = 8{,}400 - 800P$, where Q is the total number of pumpkins that reach the market and P is the price of pumpkins. Suppose further that each farmer has a constant marginal cost of \$.50 for each pumpkin produced. If Carl believes that Simon is going to produce Q_s pumpkins this year, then the reaction function tells us how many pumpkins Carl should produce in order to maximize his profits. Carl's reaction function is $R_C(Q_s) =$
   a. $2{,}000 - Q_s/2$.
   b. $8{,}400 - 800Q_s$.
   c. $8{,}400 - 1{,}600Q_s$.
   d. $4{,}000 - Q_s/2$.
   e. $6{,}000 - Q_s$.

Difficulty:
Correct Answer: c

5. Suppose that the duopolists Carl and Simon in Problem 1 face a demand function for pumpkins of $Q = 16{,}800 - 800P$, where Q is the total number of pumpkins that reach the market and P is the price of pumpkins. Suppose further that each farmer has a constant marginal cost of \$1 for each pumpkin produced. If Carl believes that Simon is going to produce Q_s pumpkins this year, then the reaction function tells us how many pumpkins Carl should produce in order to maximize his profits. Carl's reaction function is $R_C(Q_s) =$
   a. $16{,}800 - 800Q_s$.
   b. $4{,}000 - Q_s/2$.
   c. $8{,}000 - Q_s/2$.
   d. $16{,}800 - 1{,}600Q_s$.
   e. $12{,}000 - Q_s$.

Difficulty: 2
Correct Answer: d

6. If in Problem 4, the inverse demand for bean sprouts were given by $P(Y) = 940 - 5Y$ and the total cost of producing Y units for any firm were $TC(Y) = 40Y$ and if the industry consisted of two Cournot duopolists, then in equilibrium each firm's production would be
   a. 90 units.
   b. 45 units.
   c. 30 units.
   d. 60 units.
   e. 47 units.

Difficulty: 2
Correct Answer: c

7. If in Problem 4, the inverse demand for bean sprouts were given by $P(Y) = 300 - 3Y$ and the total cost of producing Y units for any firm were $TC(Y) = 30Y$ and if the industry consisted of two Cournot duopolists, then in equilibrium each firm's production would be
   a. 45 units.
   b. 22.50 units.
   c. 30 units.
   d. 15 units.
   e. 25 units.

Difficulty: 2
Correct Answer: b

8. If in Problem 4, the inverse demand for bean sprouts were given by $P(Y) = 430 - 2Y$ and the total cost of producing Y units for any firm were $TC(Y) = 10Y$ and if the industry consisted of two Cournot duopolists, then in equilibrium each firm's production would be
   a. 52.50 units.
   b. 70 units.
   c. 105 units.
   d. 35 units.
   e. 53.75 units.

Difficulty: 2
Correct Answer: b

9. If in Problem 4, the inverse demand for bean sprouts were given by $P(Y) = 640 - 3Y$ and the total cost of producing Y units for any firm were $TC(Y) = 10Y$ and if the industry consisted of two Cournot duopolists, then in equilibrium each firm's production would be
   a. 52.50 units.
   b. 70 units.
   c. 105 units.
   d. 35 units.
   e. 53.33 units.

Difficulty: 2
Correct Answer: c

10. If in Problem 4, the inverse demand for bean sprouts were given by $P(Y) = 550 - 3Y$ and the total cost of producing Y units for any firm were $TC(Y) = 10Y$ and if the industry consisted of two Cournot duopolists, then in equilibrium each firm's production would be
   a. 90 units.
   b. 30 units.
   c. 60 units.
   d. 45 units.
   e. 45.83 units.

Difficulty:
Correct Answer: a

11. In Problem 5, suppose that Grinch and Grubb go into the wine business in a small country where wine is difficult to grow. The demand for wine is given by $p = \$480 - .2Q$, where p is the price and Q is the total quantity sold. The industry consists of just the two Cournot duopolists, Grinch and Grubb. Imports are prohibited. Grinch has constant marginal costs of \$6 and Grubb has marginal costs of \$45. How much Grinch's output in equilibrium?
   a. 675
   b. 1,350
   c. 337.50
   d. 1,012.50
   e. 2,025

Difficulty:
Correct Answer: d

12. In Problem 5, suppose that Grinch and Grubb go into the wine business in a small country where wine is difficult to grow. The demand for wine is given by $p = \$360 - .2Q$, where p is the price and Q is the total quantity sold. The industry consists of just the two Cournot duopolists, Grinch and Grubb. Imports are prohibited. Grinch has constant marginal costs of \$45 and Grubb has marginal costs of \$15. How much Grinch's output in equilibrium?

a. 237.50
b. 712.50
c. 950
d. 475
e. 1,425

Difficulty:
Correct Answer: b

13. In Problem 5, suppose that Grinch and Grubb go into the wine business in a small country where wine is difficult to grow. The demand for wine is given by $p = \$420 - .2Q$, where p is the price and Q is the total quantity sold. The industry consists of just the two Cournot duopolists, Grinch and Grubb. Imports are prohibited. Grinch has constant marginal costs of $60 and Grubb has marginal costs of $30. How much Grinch's output in equilibrium?
a. 275
b. 550
c. 825
d. 1,100
e. 1,650

Difficulty:
Correct Answer: d

14. In Problem 5, suppose that Grinch and Grubb go into the wine business in a small country where wine is difficult to grow. The demand for wine is given by $p = \$360 - .2Q$, where p is the price and Q is the total quantity sold. The industry consists of just the two Cournot duopolists, Grinch and Grubb. Imports are prohibited. Grinch has constant marginal costs of $75 and Grubb has marginal costs of $15. How much Grinch's output in equilibrium?
a. 562.50
b. 187.50
c. 750
d. 375
e. 1,125

Difficulty:
Correct Answer: a

15. In Problem 5, suppose that Grinch and Grubb go into the wine business in a small country where wine is difficult to grow. The demand for wine is given by $p = \$480 - .2Q$, where p is the price and Q is the total quantity sold. The industry consists of just the two Cournot duopolists, Grinch and Grubb. Imports are prohibited. Grinch has constant marginal costs of $30 and Grubb has marginal costs of $45. How much Grinch's output in equilibrium?
a. 775
b. 1,162.50
c. 387.50
d. 1,550
e. 2,325

Difficulty:
Correct Answer: a

16. In Problem 6, suppose that two Cournot duopolists serve the Peoria-Dubuque route, and the demand curve for tickets per day is $Q = 170 - 2p$ (so $p = 85 - Q/2$). Total costs of running a flight on this route are $850 + 10q$, where q is the number of passengers on the flight. Each flight has a capacity of 80 passengers. In Cournot equilibrium, each duopolist will run one flight per day and will make a daily profit of
a. $400.
b. $425.
c. $170.
d. $800.
e. $1,750.

Difficulty:
Correct Answer: b

17. In Problem 6, suppose that two Cournot duopolists serve the Peoria-Dubuque route, and the demand curve for tickets per day is $Q = 250 - 2p$ (so $p = 125 - Q/2$). Total costs of running a flight on this route are $2{,}050 + 20q$, where q is the number of passengers on the flight. Each flight has a capacity of 80 passengers. In Cournot equilibrium, each duopolist will run one flight per day and will make a daily profit of
a. $1,025.
b. $400.
c. $250.
d. $800.
e. $3,850.

Difficulty:
Correct Answer: c

18. In Problem 6, suppose that two Cournot duopolists serve the Peoria-Dubuque route, and the demand curve for tickets per day is $Q = 190 - 2p$ (so $p = 95 - Q/2$). Total costs of running a flight on this route are $1{,}050 + 20q$, where q is the number of passengers on the flight. Each flight has a capacity of 80 passengers. In Cournot equilibrium, each duopolist will run one flight per day and will make a daily profit of
a. $525.
b. $190.
c. $200.
d. $400.
e. $2,250.

Difficulty:
Correct Answer: b

19. In Problem 6, suppose that two Cournot duopolists serve the Peoria-Dubuque route, and the demand curve for tickets per day is $Q = 160 - 2p$ (so $p = 80 - Q/2$). Total costs of running a flight on this route are $400 + 20q$, where q is the number of passengers on the flight.

Each flight has a capacity of 80 passengers. In Cournot equilibrium, each duopolist will run one flight per day and will make a daily profit of
a. \$800.
b. \$400.
c. \$200.
d. \$160.
e. \$1,600.

Difficulty:
Correct Answer: b

20. In Problem 6, suppose that two Cournot duopolists serve the Peoria-Dubuque route, and the demand curve for tickets per day is $Q = 240 - 2p$ (so $p = 120 - Q/2$). Total costs of running a flight on this route are $900 + 30q$, where q is the number of passengers on the flight. Each flight has a capacity of 80 passengers. In Cournot equilibrium, each duopolist will run one flight per day and will make a daily profit of
a. \$240.
b. \$900.
c. \$1,800.
d. \$450.
e. \$3,600.

Difficulty:
Correct Answer: c

21. In Problem 4, suppose that the market demand curve for bean sprouts is given by $P = 1{,}280 - 4Q$, where P is the price and Q is total industry output. Suppose that the industry has two firms, a Stackleberg leader and a follower. Each firm has a constant marginal cost of \$80 per unit of output. In equilibrium, total output by the two firms will be
a. 150.
b. 75.
c. 225.
d. 300.
e. 37.50.

Difficulty:
Correct Answer: a

22. In Problem 4, suppose that the market demand curve for bean sprouts is given by $P = 1{,}680 - 2Q$, where P is the price and Q is total industry output. Suppose that the industry has two firms, a Stackleberg leader and a follower. Each firm has a constant marginal cost of \$80 per unit of output. In equilibrium, total output by the two firms will be
a. 600.
b. 400.
c. 200.
d. 800.
e. 100.

Difficulty:
Correct Answer: c

23. In Problem 4, suppose that the market demand curve for bean sprouts is given by $P = 3{,}040 - 3Q$, where P is the price and Q is total industry output. Suppose that the industry has two firms, a Stackleberg leader and a follower. Each firm has a constant marginal cost of \$40 per unit of output. In equilibrium, total output by the two firms will be
a. 1,000.
b. 250.
c. 750.
d. 500.
e. 125.

Difficulty:
Correct Answer: d

24. In Problem 4, suppose that the market demand curve for bean sprouts is given by $P = 1{,}480 - 2Q$, where P is the price and Q is total industry output. Suppose that the industry has two firms, a Stackleberg leader and a follower. Each firm has a constant marginal cost of \$80 per unit of output. In equilibrium, total output by the two firms will be
a. 175.
b. 700.
c. 350.
d. 525.
e. 87.50.

Difficulty:
Correct Answer: b

25. In Problem 4, suppose that the market demand curve for bean sprouts is given by $P = 1{,}660 - 4Q$, where P is the price and Q is total industry output. Suppose that the industry has two firms, a Stackleberg leader and a follower. Each firm has a constant marginal cost of \$60 per unit of output. In equilibrium, total output by the two firms will be
a. 400.
b. 300.
c. 100.
d. 200.
e. 50.

Difficulty:
Correct Answer: a

26. There are two firms in the blastopheme industry. The demand curve for blastophemes is given by $p = 4{,}500 - 4q$. Each firm has one manufacturing plant and each firm i has a cost function $C(q_i) = q_i^2$, where q_i is the output of firm i. The two firms form a cartel and arrange to split total industry profits equally. Under this cartel arrangement, they will maximize joint profits if

a. and only if each firm produces 250 units in its plant.
b. they produce a total of 500 units, no matter which firm produces them.
c. and only if they each produce a total of 562.50 units.
d. they produce a total of 375 units, no matter which firm produces them.
e. they shut down one of the two plants, having the other operate as a monopoly and splitting the profits.

Difficulty:
Correct Answer: c

27. There are two firms in the blastopheme industry. The demand curve for blastophemes is given by $p = 3{,}000 - 2q$. Each firm has one manufacturing plant and each firm i has a cost function $C(q_i) = q^2{}_i$, where q_i is the output of firm i. The two firms form a cartel and arrange to split total industry profits equally. Under this cartel arrangement, they will maximize joint profits if
a. and only if they each produce a total of 750 units.
b. they produce a total of 500 units, no matter which firm produces them.
c. and only if each firm produces 300 units in its plant.
d. they produce a total of 600 units, no matter which firm produces them.
e. they shut down one of the two plants, having the other operate as a monopoly and splitting the profits.

Difficulty:
Correct Answer: a

28. There are two firms in the blastopheme industry. The demand curve for blastophemes is given by $p = 1{,}500 - 2q$. Each firm has one manufacturing plant and each firm i has a cost function $C(q_i) = q^2{}_i$, where q_i is the output of firm i. The two firms form a cartel and arrange to split total industry profits equally. Under this cartel arrangement, they will maximize joint profits if
a. and only if each firm produces 150 units in its plant.
b. they produce a total of 300 units, no matter which firm produces them.
c. they produce a total of 250 units, no matter which firm produces them.
d. and only if they each produce a total of 375 units.
e. they shut down one of the two plants, having the other operate as a monopoly and splitting the profits.

Difficulty:
Correct Answer: b

29. There are two firms in the blastopheme industry. The demand curve for blastophemes is given by $p = 4{,}500 - 4q$. Each firm has one manufacturing plant and each firm i has a cost function $C(q_i) = q^2{}_i$, where q_i is the output of firm i. The two firms form a cartel and arrange to split total industry profits equally. Under this cartel arrangement, they will maximize joint profits if
a. they produce a total of 375 units, no matter which firm produces them.
b. and only if each firm produces 250 units in its plant.
c. and only if they each produce a total of 562.50 units.
d. they produce a total of 500 units, no matter which firm produces them.
e. they shut down one of the two plants, having the other operate as a monopoly and splitting the profits.

Difficulty:
Correct Answer: a

30. There are two firms in the blastopheme industry. The demand curve for blastophemes is given by $p = 6{,}600 - 5q$. Each firm has one manufacturing plant and each firm i has a cost function $C(q_i) = q^2{}_i$, where q_i is the output of firm i. The two firms form a cartel and arrange to split total industry profits equally. Under this cartel arrangement, they will maximize joint profits if
a. and only if each firm produces 300 units in its plant.
b. they produce a total of 600 units, no matter which firm produces them.
c. and only if they each produce a total of 660 units.
d. they produce a total of 440 units, no matter which firm produces them.
e. they shut down one of the two plants, having the other operate as a monopoly and splitting the profits.

CHAPTER 28 Game Theory

MULTIPLE CHOICE

Difficulty:
Correct Answer: e

1. (See Problem 1.) Alice and Betsy are playing a game in which each can play either of two strategies, "leave" or "stay." If both play the strategy "leave," then each gets a payoff of \$400. If both play the strategy "stay," then each gets a payoff of \$800. If one plays "stay" and the other plays "leave," then the one who plays "stay" gets a payoff of \$$C$ and the one who plays "leave" gets a payoff of \$$D$. When is the outcome where both play "leave" a Nash equilibrium?
   a. Never, since \$800 > \$400.
   b. When \$400 > C and D > \$800 but not when \$800 > D.
   c. When $D > C$ and C > \$400.
   d. Whenever D < \$800.
   e. Whenever \$400 > C.

Difficulty:
Correct Answer: e

2. (See Problem 1.) Alice and Betsy are playing a game in which each can play either of two strategies, "leave" or "stay." If both play the strategy "leave," then each gets a payoff of \$300. If both play the strategy "stay," then each gets a payoff of \$600. If one plays "stay" and the other plays "leave," then the one who plays "stay" gets a payoff of \$$C$ and the one who plays "leave" gets a payoff of \$$D$. When is the outcome where both play "leave" a Nash equilibrium?
   a. When \$300 > C and D > \$600 but not when \$600 > D.
   b. Never, since \$600 > \$300.
   c. Whenever D < \$600.
   d. When $D > C$ and C > \$300.
   e. Whenever \$300 > C.

Difficulty:
Correct Answer: e

3. (See Problem 1.) Alice and Betsy are playing a game in which each can play either of two strategies, "leave" or "stay." If both play the strategy "leave," then each gets a payoff of \$100. If both play the strategy "stay," then each gets a payoff of \$800. If one plays "stay" and the other plays "leave," then the one who plays "stay" gets a payoff of \$$C$ and the one who plays "leave" gets a payoff of \$$D$. When is the outcome where both play "leave" a Nash equilibrium?
   a. When $D > C$ and C > \$100.
   b. Never, since \$800 > \$100.
   c. When \$100 > C and D > \$800 but not when \$800 > D.
   d. Whenever D < \$800.
   e. Whenever \$100 > C.

Difficulty:
Correct Answer: e

4. (See Problem 1.) Alice and Betsy are playing a game in which each can play either of two strategies, "leave" or "stay." If both play the strategy "leave," then each gets a payoff of \$200. If both play the strategy "stay," then each gets a payoff of \$800. If one plays "stay" and the other plays "leave," then the one who plays "stay" gets a payoff of \$$C$ and the one who plays "leave" gets a payoff of \$$D$. When is the outcome where both play "leave" a Nash equilibrium?
   a. When $D > C$ and C > \$200.
   b. Never, since \$800 > \$200.
   c. Whenever D < \$800.
   d. When \$200 > C and D > \$800 but not when \$800 > D.
   e. Whenever \$200 > C.

Difficulty:
Correct Answer: e

5. (See Problem 1.) Alice and Betsy are playing a game in which each can play either of two strategies, "leave" or

"stay." If both play the strategy "leave," then each gets a payoff of \$100. If both play the strategy "stay," then each gets a payoff of \$400. If one plays "stay" and the other plays "leave," then the one who plays "stay" gets a payoff of \$$C$ and the one who plays "leave" gets a payoff of \$$D$. When is the outcome where both play "leave" a Nash equilibrium?

a. Never, since \$400 > \$100.
b. Whenever D < \$400.
c. When $D > C$ and C > \$100.
d. When \$100 > C and D > \$400 but not when \$400 > D.
e. Whenever \$100 > C.

Difficulty:
Correct Answer: e

6. (See Problem 2.) A small community has 10 people, each of whom has a wealth of \$18,000. Each individual must choose whether to contribute \$200 or \$0 to the support of public entertainment for their community. The money value of the benefit that a person gets from this public entertainment is .80 times the total amount of money contributed by individuals in the community.
   a. This game has a Nash equilibrium in which 5 people contribute \$200 and for public entertainment and 5 people contribute nothing.
   b. This game has no Nash equilibrium in pure strategies, but has a Nash equilibrium in mixed strategies.
   c. This game has two Nash equilibria, one in which everybody contributes \$200 and one in which nobody contributes \$200.
   d. This game has a dominant strategy equilibrium in which all 10 citizens contribute \$200 to support public entertainment.
   e. This game has a dominant strategy equilibrium in which nobody contributes anything for public entertainment.

Difficulty:
Correct Answer: e

7. (See Problem 2.) A small community has 10 people, each of whom has a wealth of \$3,000. Each individual must choose whether to contribute \$300 or \$0 to the support of public entertainment for their community. The money value of the benefit that a person gets from this public entertainment is .50 times the total amount of money contributed by individuals in the community.
   a. This game has a dominant strategy equilibrium in which all 10 citizens contribute \$300 to support public entertainment.
   b. This game has two Nash equilibria, one in which everybody contributes \$300 and one in which nobody contributes \$300.
   c. This game has no Nash equilibrium in pure strategies, but has a Nash equilibrium in mixed strategies.
   d. This game has a Nash equilibrium in which 5 people contribute \$300 and for public entertainment and 5 people contribute nothing.
   e. This game has a dominant strategy equilibrium in which nobody contributes anything for public entertainment.

Difficulty:
Correct Answer: e

8. (See Problem 2.) A small community has 10 people, each of whom has a wealth of \$17,000. Each individual must choose whether to contribute \$200 or \$0 to the support of public entertainment for their community. The money value of the benefit that a person gets from this public entertainment is .80 times the total amount of money contributed by individuals in the community.
   a. This game has two Nash equilibria, one in which everybody contributes \$200 and one in which nobody contributes \$200.
   b. This game has a dominant strategy equilibrium in which all 10 citizens contribute \$200 to support public entertainment.
   c. This game has a Nash equilibrium in which 5 people contribute \$200 and for public entertainment and 5 people contribute nothing.
   d. This game has no Nash equilibrium in pure strategies, but has a Nash equilibrium in mixed strategies.
   e. This game has a dominant strategy equilibrium in which nobody contributes anything for public entertainment.

Difficulty:
Correct Answer: e

9. (See Problem 2.) A small community has 10 people, each of whom has a wealth of \$2,000. Each individual must choose whether to contribute \$100 or \$0 to the support of public entertainment for their community. The money value of the benefit that a person gets from this public entertainment is .65 times the total amount of money contributed by individuals in the community.
   a. This game has a dominant strategy equilibrium in which all 10 citizens contribute \$100 to support public entertainment.
   b. This game has two Nash equilibria, one in which everybody contributes \$100 and one in which nobody contributes \$100.
   c. This game has no Nash equilibrium in pure strategies, but has a Nash equilibrium in mixed strategies.
   d. This game has a Nash equilibrium in which 5 people contribute \$100 and for public entertainment and 5 people contribute nothing.
   e. This game has a dominant strategy equilibrium in which nobody contributes anything for public entertainment.

Difficulty:
Correct Answer: e

10. (See Problem 2.) A small community has 10 people, each of whom has a wealth of \$19,000. Each individual must choose whether to contribute \$200 or \$0 to the support of public entertainment for their community. The money value of the benefit that a person gets from this public entertainment is .80 times the total amount of money contributed by individuals in the community.
    a. This game has a dominant strategy equilibrium in which all 10 citizens contribute \$200 to support public entertainment.
    b. This game has two Nash equilibria, one in which everybody contributes \$200 and one in which nobody contributes \$200.
    c. This game has a Nash equilibrium in which 5 people contribute \$200 and for public entertainment and 5 people contribute nothing.
    d. This game has no Nash equilibrium in pure strategies, but has a Nash equilibrium in mixed strategies.
    e. This game has a dominant strategy equilibrium in which nobody contributes anything for public entertainment.

Difficulty:
Correct Answer: a

11. (See Problem 2.) A small community has 40 people, each of whom has a wealth of \$5,000. Each individual must choose whether to contribute \$200 or \$0 to the support of public entertainment for their community. The money value of the benefit that a person gets from this public entertainment is b times the total amount of money contributed by individuals in the community.
    a. If $40b > 1$, everybody is better off if all contribute to the public entertainment fund than if nobody contributes, but if $40b < 1$, everybody is better off if nobody contributes than if all contribute.
    b. Everybody is worse off if all contribute than if nobody contributes if $b > 1$, but if $b < 1$, everybody is better off if nobody contributes.
    c. If $40b > 1$, there is a dominant strategy equilibrium in which everybody contributes.
    d. This game has a dominant strategy equilibrium in which nobody contributes anything for public entertainment.
    e. In order for there to be a dominant strategy equilibrium in which all contribute, it must be that $b > 40$.

Difficulty:
Correct Answer: b

12. (See Problem 2.) A small community has 40 people, each of whom has a wealth of \$3,000. Each individual must choose whether to contribute \$400 or \$0 to the support of public entertainment for their community. The money value of the benefit that a person gets from this public entertainment is b times the total amount of money contributed by individuals in the community.
    a. This game has a dominant strategy equilibrium in which nobody contributes anything for public entertainment.
    b. If $40b > 1$, everybody is better off if all contribute to the public entertainment fund than if nobody contributes, but if $40b < 1$, everybody is better off if nobody contributes than if all contribute.
    c. If $40b > 1$, there is a dominant strategy equilibrium in which everybody contributes.
    d. Everybody is worse off if all contribute than if nobody contributes if $b > 1$, but if $b < 1$, everybody is better off if nobody contributes.
    e. In order for there to be a dominant strategy equilibrium in which all contribute, it must be that $b > 40$.

Difficulty:
Correct Answer: b

13. (See Problem 2.) A small community has 10 people, each of whom has a wealth of \$5,000. Each individual must choose whether to contribute \$300 or \$0 to the support of public entertainment for their community. The money value of the benefit that a person gets from this public entertainment is b times the total amount of money contributed by individuals in the community.
    a. This game has a dominant strategy equilibrium in which nobody contributes anything for public entertainment.
    b. If $10b > 1$, everybody is better off if all contribute to the public entertainment fund than if nobody contributes, but if $10b < 1$, everybody is better off if nobody contributes than if all contribute.
    c. If $10b > 1$, there is a dominant strategy equilibrium in which everybody contributes.
    d. Everybody is worse off if all contribute than if nobody contributes if $b > 1$, but if $b < 1$, everybody is better off if nobody contributes.
    e. In order for there to be a dominant strategy equilibrium in which all contribute, it must be that $b > 10$.

Difficulty:
Correct Answer: a

14. (See Problem 2.) A small community has 40 people, each of whom has a wealth of \$16,000. Each individual must choose whether to contribute \$100 or \$0 to the support of public entertainment for their community. The money value of the benefit that a person gets from this public entertainment is b times the total amount of money contributed by individuals in the community.
    a. If $40b > 1$, everybody is better off if all contribute to the public entertainment fund than if nobody con-

tributes, but if $40b < 1$, everybody is better off if nobody contributes than if all contribute.

b. This game has a dominant strategy equilibrium in which nobody contributes anything for public entertainment.
c. If $40b > 1$, there is a dominant strategy equilibrium in which everybody contributes.
d. Everybody is worse off if all contribute than if nobody contributes if $b > 1$, but if $b < 1$, everybody is better off if nobody contributes.
e. In order for there to be a dominant strategy equilibrium in which all contribute, it must be that $b > 40$.

Difficulty:
Correct Answer: a

15. (See Problem 2.) A small community has 20 people, each of whom has a wealth of \$12,000. Each individual must choose whether to contribute \$300 or \$0 to the support of public entertainment for their community. The money value of the benefit that a person gets from this public entertainment is b times the total amount of money contributed by individuals in the community.
    a. If $20b > 1$, everybody is better off if all contribute to the public entertainment fund than if nobody contributes, but if $20b < 1$, everybody is better off if nobody contributes than if all contribute.
    b. If $20b > 1$, there is a dominant strategy equilibrium in which everybody contributes.
    c. Everybody is worse off if all contribute than if nobody contributes if $b > 1$, but if $b < 1$, everybody is better off if nobody contributes.
    d. This game has a dominant strategy equilibrium in which nobody contributes anything for public entertainment.
    e. In order for there to be a dominant strategy equilibrium in which all contribute, it must be that $b > 20$.

Difficulty:
Correct Answer: a

16. (See Problem 4, the Stag Hunt.) Two partners start a business. Each has two possible strategies, spend full time or secretly take a second job and spend only part time on the business. Any profits that the business makes will be split equally between the two partners, regardless of whether they work full time or part time for the business. If a partner takes a second job, he will earn \$50,000 from this job plus his share of profits from the business. If he spends full time on the business, his only source of income is his share of profits from this business. If both partners spend full time on the business, total profits will be \$200,000. If one partner spends full time on the business and the other takes a second job, the business profits will be \$80,000. If both partners take second job, the total business profits are \$20,000.
    a. This game has two Nash equilibria, one in which each partner has an income of \$100,000 and one in which each partner has an income of \$60,000.
    b. In the only Nash equilibrium for this game, one partner earns \$90,000 and the other earns \$40,000.
    c. In the only Nash equilibrium for this game, both partners earn \$100,000.
    d. In the only Nash equilibrium for this game, both partners earn \$60,000.
    e. This game has no pure strategy Nash equilibria, but has a mixed strategy equilibrium.

Difficulty:
Correct Answer: d

17. (See Problem 4, the Stag Hunt.) Two partners start a business. Each has two possible strategies, spend full time or secretly take a second job and spend only part time on the business. Any profits that the business makes will be split equally between the two partners, regardless of whether they work full time or part time for the business. If a partner takes a second job, he will earn \$10,000 from this job plus his share of profits from the business. If he spends full time on the business, his only source of income is his share of profits from this business. If both partners spend full time on the business, total profits will be \$200,000. If one partner spends full time on the business and the other takes a second job, the business profits will be \$80,000. If both partners take second job, the total business profits are \$20,000.
    a. This game has two Nash equilibria, one in which each partner has an income of \$100,000 and one in which each partner has an income of \$20,000.
    b. In the only Nash equilibrium for this game, both partners earn \$20,000.
    c. In the only Nash equilibrium for this game, one partner earns \$50,000 and the other earns \$40,000.
    d. In the only Nash equilibrium for this game, both partners earn \$100,000.
    e. This game has no pure strategy Nash equilibria, but has a mixed strategy equilibrium.

Difficulty:
Correct Answer: d

18. (See Problem 4, the Stag Hunt.) Two partners start a business. Each has two possible strategies, spend full time or secretly take a second job and spend only part time on the business. Any profits that the business makes will be split equally between the two partners, regardless of whether they work full time or part time for the business. If a partner takes a second job, he will

earn $60,000 from this job plus his share of profits from the business. If he spends full time on the business, his only source of income is his share of profits from this business. If both partners spend full time on the business, total profits will be $200,000. If one partner spends full time on the business and the other takes a second job, the business profits will be $80,000. If both partners take second job, the total business profits are $20,000.

a. In the only Nash equilibrium for this game, both partners earn $70,000.
b. In the only Nash equilibrium for this game, one partner earns $100,000 and the other earns $40,000.
c. In the only Nash equilibrium for this game, both partners earn $100,000.
d. This game has two Nash equilibria, one in which each partner has an income of $100,000 and one in which each partner has an income of $70,000.
e. This game has no pure strategy Nash equilibria, but has a mixed strategy equilibrium.

Difficulty:
Correct Answer: d

19. (See Problem 4, the Stag Hunt.) Two partners start a business. Each has two possible strategies, spend full time or secretly take a second job and spend only part time on the business. Any profits that the business makes will be split equally between the two partners, regardless of whether they work full time or part time for the business. If a partner takes a second job, he will earn $20,000 from this job plus his share of profits from the business. If he spends full time on the business, his only source of income is his share of profits from this business. If both partners spend full time on the business, total profits will be $200,000. If one partner spends full time on the business and the other takes a second job, the business profits will be $80,000. If both partners take second job, the total business profits are $20,000.
    a. In the only Nash equilibrium for this game, one partner earns $60,000 and the other earns $40,000.
    b. In the only Nash equilibrium for this game, both partners earn $30,000.
    c. This game has two Nash equilibria, one in which each partner has an income of $100,000 and one in which each partner has an income of $30,000.
    d. In the only Nash equilibrium for this game, both partners earn $100,000.
    e. This game has no pure strategy Nash equilibria, but has a mixed strategy equilibrium.

Difficulty:
Correct Answer: c

20. (See Problem 4, the Stag Hunt.) Two partners start a business. Each has two possible strategies, spend full time or secretly take a second job and spend only part time on the business. Any profits that the business makes will be split equally between the two partners, regardless of whether they work full time or part time for the business. If a partner takes a second job, he will earn $80,000 from this job plus his share of profits from the business. If he spends full time on the business, his only source of income is his share of profits from this business. If both partners spend full time on the business, total profits will be $200,000. If one partner spends full time on the business and the other takes a second job, the business profits will be $80,000. If both partners take second job, the total business profits are $20,000.
    a. In the only Nash equilibrium for this game, both partners earn $100,000.
    b. In the only Nash equilibrium for this game, one partner earns $120,000 and the other earns $40,000.
    c. In the only Nash equilibrium for this game, both partners earn $90,000.
    d. This game has two Nash equilibria, one in which each partner has an income of $100,000 and one in which each partner has an income of $90,000.
    e. This game has no pure strategy Nash equilibria, but has a mixed strategy equilibrium.

Difficulty:
Correct Answer: d

21. (See Problem 7.) If the number of persons who attend the club meeting this week is X, then the number of people who will attend next week is $120 + 0.20X$. What is a long-run equilibrium attendance for this club?
    a. 120
    b. 600
    c. 240
    d. 150
    e. 30

Difficulty:
Correct Answer: c

22. (See Problem 7.) If the number of persons who attend the club meeting this week is X, then the number of people who will attend next week is $80 + 0.20X$. What is a long-run equilibrium attendance for this club?
    a. 400
    b. 80
    c. 100
    d. 160
    e. 20

Difficulty:
Correct Answer: b

23. (See Problem 7.) If the number of persons who attend the club meeting this week is X, then the number of people who will attend next week is $48 + 0.40X$. What is a long-run equilibrium attendance for this club?
    a. 96
    b. 80
    c. 120
    d. 48
    e. 32

Difficulty:
Correct Answer: c

24. (See Problem 7.) If the number of persons who attend the club meeting this week is X, then the number of people who will attend next week is $30 + 0.70X$. What is a long-run equilibrium attendance for this club?
    a. 42.86
    b. 60
    c. 100
    d. 30
    e. 70

Difficulty:
Correct Answer: c

25. (See Problem 7.) If the number of persons who attend the club meeting this week is X, then the number of people who will attend next week is $56 + 0.60X$. What is a long-run equilibrium attendance for this club?
    a. 93.33
    b. 112
    c. 140
    d. 56
    e. 84

CHAPTER 29 Game Applications

MULTIPLE CHOICE

Difficulty:
Correct Answer: c

1. (See Problem 2.) Arthur and Bertha are asked by their boss to vote on a company policy. Each of them will be allowed to vote for one of three possible policies, *A*, *B*, and *C*. Arthur likes *A* best, *B* second best, and *C* least. Bertha likes *B* best, *A* second best, and *C* least. The money value to Arthur of outcome *C* is \$0, outcome *B* is \$1, and outcome *A* is \$3. The money value to Bertha of outcome *C* is \$0, outcome *B* is \$4, and outcome *A* is \$1. The boss likes outcome *C* best, but if Arthur and Bertha both vote for one of the other outcomes, he will pick the outcome they voted for. If Arthur and Bertha vote for different outcomes, the boss will pick *C*. Arthur and Bertha know this is the case. They are not allowed to communicate with each other, and each decides to use a mixed strategy in which each randomizes between voting for *A* or for *B*. What is the mixed strategy equilibrium for Arthur and Bertha in this game?
   a. Arthur and Bertha each votes for *A* with probability 1/2 and for *B* with probability 1/2.
   b. Arthur votes for *A* with probability 3/7 and for *B* with probability 4/7. Bertha votes for *A* with probability 4/7 and for *B* with probability 3/7.
   c. Arthur votes for *A* with probability 3/4 and for *B* with probability 1/4. Bertha votes for *A* with probability 1/5 and for *B* with probability 4/5.
   d. Arthur votes for *A* with probability 1/5 and for *B* with probability 4/5. Bertha votes for *A* with probability 3/4 and for *B* with probability 1/4.
   e. Arthur votes for *A* and Bertha votes for *B*.

Difficulty:
Correct Answer: b

2. (See Problem 2.) Arthur and Bertha are asked by their boss to vote on a company policy. Each of them will be allowed to vote for one of three possible policies, *A*, *B*, and *C*. Arthur likes *A* best, *B* second best, and *C* least. Bertha likes *B* best, *A* second best, and *C* least. The money value to Arthur of outcome *C* is \$0, outcome *B* is \$1, and outcome *A* is \$4. The money value to Bertha of outcome *C* is \$0, outcome *B* is \$4, and outcome *A* is \$1. The boss likes outcome *C* best, but if Arthur and Bertha both vote for one of the other outcomes, he will pick the outcome they voted for. If Arthur and Bertha vote for different outcomes, the boss will pick *C*. Arthur and Bertha know this is the case. They are not allowed to communicate with each other, and each decides to use a mixed strategy in which each randomizes between voting for *A* or for *B*. What is the mixed strategy equilibrium for Arthur and Bertha in this game?
   a. Arthur votes for *A* with probability 4/8 and for *B* with probability 4/8. Bertha votes for *A* with probability 4/8 and for *B* with probability 4/8.
   b. Arthur votes for *A* with probability 4/5 and for *B* with probability 1/5. Bertha votes for *A* with probability 1/5 and for *B* with probability 4/5.
   c. Arthur votes for *A* with probability 1/5 and for *B* with probability 4/5. Bertha votes for *A* with probability 4/5 and for *B* with probability 1/5.
   d. Arthur and Bertha each votes for *A* with probability 1/2 and for *B* with probability 1/2.
   e. Arthur votes for *A* and Bertha votes for *B*.

Difficulty:
Correct Answer: a

3. (See Problem 2.) Arthur and Bertha are asked by their boss to vote on a company policy. Each of them will be allowed to vote for one of three possible policies, *A*, *B*, and *C*. Arthur likes *A* best, *B* second best, and *C* least. Bertha likes *B* best, *A* second best, and *C* least. The money value to Arthur of outcome *C* is \$0, outcome *B* is \$1, and outcome *A* is \$4. The money value to Bertha of outcome *C* is \$0, outcome *B* is \$4, and outcome *A* is \$1. The boss likes outcome *C* best, but if Arthur and Bertha both vote for one of the other outcomes, he will

pick the outcome they voted for. If Arthur and Bertha vote for different outcomes, the boss will pick *C*. Arthur and Bertha know this is the case. They are not allowed to communicate with each other, and each decides to use a mixed strategy in which each randomizes between voting for *A* or for *B*. What is the mixed strategy equilibrium for Arthur and Bertha in this game?

a. Arthur votes for *A* with probability 4/5 and for *B* with probability 1/5. Bertha votes for *A* with probability 1/5 and for *B* with probability 4/5.
b. Arthur and Bertha each votes for *A* with probability 1/2 and for *B* with probability 1/2.
c. Arthur votes for *A* with probability 1/5 and for *B* with probability 4/5. Bertha votes for *A* with probability 4/5 and for *B* with probability 1/5.
d. Arthur votes for *A* with probability 4/8 and for *B* with probability 4/8. Bertha votes for *A* with probability 4/8 and for *B* with probability 4/8.
e. Arthur votes for *A* and Bertha votes for *B*.

Difficulty:
Correct Answer: b

4. (See Problem 2.) Arthur and Bertha are asked by their boss to vote on a company policy. Each of them will be allowed to vote for one of three possible policies, *A*, *B*, and *C*. Arthur likes *A* best, *B* second best, and *C* least. Bertha likes *B* best, *A* second best, and *C* least. The money value to Arthur of outcome *C* is \$0, outcome *B* is \$1, and outcome *A* is \$5. The money value to Bertha of outcome *C* is \$0, outcome *B* is \$4, and outcome *A* is \$1. The boss likes outcome *C* best, but if Arthur and Bertha both vote for one of the other outcomes, he will pick the outcome they voted for. If Arthur and Bertha vote for different outcomes, the boss will pick *C*. Arthur and Bertha know this is the case. They are not allowed to communicate with each other, and each decides to use a mixed strategy in which each randomizes between voting for *A* or for *B*. What is the mixed strategy equilibrium for Arthur and Bertha in this game?

a. Arthur and Bertha each votes for *A* with probability 1/2 and for *B* with probability 1/2.
b. Arthur votes for *A* with probability 5/6 and for *B* with probability 1/6. Bertha votes for *A* with probability 1/5 and for *B* with probability 4/5.
c. Arthur votes for *A* with probability 1/5 and for *B* with probability 4/5. Bertha votes for *A* with probability 5/6 and for *B* with probability 1/6.
d. Arthur votes for *A* with probability 5/9 and for *B* with probability 4/9. Bertha votes for *A* with probability 4/9 and for *B* with probability 5/9.
e. Arthur votes for *A* and Bertha votes for *B*.

Difficulty:
Correct Answer: b

5. (See Problem 2.) Arthur and Bertha are asked by their boss to vote on a company policy. Each of them will be allowed to vote for one of three possible policies, *A*, *B*, and *C*. Arthur likes *A* best, *B* second best, and *C* least. Bertha likes *B* best, *A* second best, and *C* least. The money value to Arthur of outcome *C* is \$0, outcome *B* is \$1, and outcome *A* is \$3. The money value to Bertha of outcome *C* is \$0, outcome *B* is \$4, and outcome *A* is \$1. The boss likes outcome *C* best, but if Arthur and Bertha both vote for one of the other outcomes, he will pick the outcome they voted for. If Arthur and Bertha vote for different outcomes, the boss will pick *C*. Arthur and Bertha know this is the case. They are not allowed to communicate with each other, and each decides to use a mixed strategy in which each randomizes between voting for *A* or for *B*. What is the mixed strategy equilibrium for Arthur and Bertha in this game?

a. Arthur and Bertha each votes for *A* with probability 1/2 and for *B* with probability 1/2.
b. Arthur votes for *A* with probability 3/4 and for *B* with probability 1/4. Bertha votes for *A* with probability 1/5 and for *B* with probability 4/5.
c. Arthur votes for *A* with probability 1/5 and for *B* with probability 4/5. Bertha votes for *A* with probability 3/4 and for *B* with probability 1/4.
d. Arthur votes for *A* with probability 3/7 and for *B* with probability 4/7. Bertha votes for *A* with probability 4/7 and for *B* with probability 3/7.
e. Arthur votes for *A* and Bertha votes for *B*.

Difficulty:
Correct Answer: a

6. (See Problem 3.) Two players are engaged in a game of "chicken." There are two possible strategies, Swerve and Drive Straight. A player who chooses to Swerve is called "chicken" and gets a payoff of zero, regardless of what the other player does. A player who chooses to Drive Straight gets a payoff of 84 if the other player Swerves and a payoff of -36 if the other player also chooses to Drive Straight. This game has two pure strategy equilibria and

a. a mixed strategy equilibrium in which each player swerves with probability 0.30 and drives straight with probability 0.70.
b. two mixed strategies in which players alternate between swerving and driving straight.
c. a mixed strategy equilibrium in which one player swerves with probability 0.30 and the other swerves with probability 0.70.

d. a mixed strategy in which each player swerves with probability 0.15 and drives straight with probability 0.85.
e. no mixed strategies.

Difficulty:
Correct Answer: d

7. (See Problem 3.) Two players are engaged in a game of "chicken." There are two possible strategies, Swerve and Drive Straight. A player who chooses to Swerve is called "chicken" and gets a payoff of zero, regardless of what the other player does. A player who chooses to Drive Straight gets a payoff of 15.43 if the other player Swerves and a payoff of −36 if the other player also chooses to Drive Straight. This game has two pure strategy equilibria and
a. two mixed strategies in which players alternate between swerving and driving straight.
b. a mixed strategy in which each player swerves with probability 0.35 and drives straight with probability 0.65.
c. a mixed strategy equilibrium in which one player swerves with probability 0.70 and the other swerves with probability 0.30.
d. a mixed strategy equilibrium in which each player swerves with probability 0.70 and drives straight with probability 0.30.
e. no mixed strategies.

Difficulty:
Correct Answer: a

8. (See Problem 3.) Two players are engaged in a game of "chicken." There are two possible strategies, Swerve and Drive Straight. A player who chooses to Swerve is called "chicken" and gets a payoff of zero, regardless of what the other player does. A player who chooses to Drive Straight gets a payoff of 48 if the other player Swerves and a payoff of −48 if the other player also chooses to Drive Straight. This game has two pure strategy equilibria and
a. a mixed strategy equilibrium in which each player swerves with probability 0.50 and drives straight with probability 0.50.
b. a mixed strategy in which each player swerves with probability 0.25 and drives straight with probability 0.75.
c. a mixed strategy equilibrium in which one player swerves with probability 0.50 and the other swerves with probability 0.50.
d. two mixed strategies in which players alternate between swerving and driving straight.
e. no mixed strategies.

Difficulty:
Correct Answer: c

9. (See Problem 3.) Two players are engaged in a game of "chicken." There are two possible strategies, Swerve and Drive Straight. A player who chooses to Swerve is called "chicken" and gets a payoff of zero, regardless of what the other player does. A player who chooses to Drive Straight gets a payoff of 4 if the other player Swerves and a payoff of −36 if the other player also chooses to Drive Straight. This game has two pure strategy equilibria and
a. a mixed strategy equilibrium in which one player swerves with probability 0.90 and the other swerves with probability 0.10.
b. a mixed strategy in which each player swerves with probability 0.45 and drives straight with probability 0.55.
c. a mixed strategy equilibrium in which each player swerves with probability 0.90 and drives straight with probability 0.10.
d. two mixed strategies in which players alternate between swerving and driving straight.
e. no mixed strategies.

Difficulty:
Correct Answer: a

10. (See Problem 3.) Two players are engaged in a game of "chicken." There are two possible strategies, Swerve and Drive Straight. A player who chooses to Swerve is called "chicken" and gets a payoff of zero, regardless of what the other player does. A player who chooses to Drive Straight gets a payoff of 3 if the other player Swerves and a payoff of −12 if the other player also chooses to Drive Straight. This game has two pure strategy equilibria and
a. a mixed strategy equilibrium in which each player swerves with probability 0.80 and drives straight with probability 0.20.
b. a mixed strategy equilibrium in which one player swerves with probability 0.80 and the other swerves with probability 0.20.
c. a mixed strategy in which each player swerves with probability 0.40 and drives straight with probability 0.60.
d. two mixed strategies in which players alternate between swerving and driving straight.
e. no mixed strategies.

Difficulty:
Correct Answer: a

11. (See Problem 6.) Big Pig and Little Pig have two possible strategies, Press the Button, and Wait at the Trough. If both pigs choose Wait, both get 3. If both pigs Press the Button, then Big Pig gets 9 and Little

Pig gets 1. If Little Pig Presses the Button and Big Pig Waits at the Trough, then Big Pig gets 10 and Little Pig gets 0. Finally, if Big Pig Presses the Button and Little Pig Waits, then Big Pig gets 4 and Little Pig gets 1. In Nash equilibrium,

a. Little Pig will get a payoff of 1 and Big Pig will get a payoff of 4.
b. Little Pig will get a payoff of 1 and Big Pig will get a payoff of 9.
c. both pigs will wait at the trough.
d. Little Pig will get a payoff of zero.
e. the pigs must be using mixed strategies.

Difficulty:
Correct Answer: a

12. (See Problem 6.) Big Pig and Little Pig have two possible strategies, Press the Button, and Wait at the Trough. If both pigs choose Wait, both get 4. If both pigs Press the Button, then Big Pig gets 7 and Little Pig gets 3. If Little Pig Presses the Button and Big Pig Waits at the Trough, then Big Pig gets 10 and Little Pig gets 0. Finally, if Big Pig Presses the Button and Little Pig Waits, then Big Pig gets 2 and Little Pig gets 5. In Nash equilibrium,
    a. both pigs will wait at the trough.
    b. Little Pig will get a payoff of zero.
    c. Little Pig will get a payoff of 3 and Big Pig will get a payoff of 7.
    d. Little Pig will get a payoff of 5 and Big Pig will get a payoff of 2.
    e. the pigs must be using mixed strategies.

Difficulty:
Correct Answer: e

13. (See Problem 6.) Big Pig and Little Pig have two possible strategies, Press the Button, and Wait at the Trough. If both pigs choose Wait, both get 1. If both pigs Press the Button, then Big Pig gets 6 and Little Pig gets 4. If Little Pig Presses the Button and Big Pig Waits at the Trough, then Big Pig gets 10 and Little Pig gets 0. Finally, if Big Pig Presses the Button and Little Pig Waits, then Big Pig gets 6 and Little Pig gets 2. In Nash equilibrium,
    a. Little Pig will get a payoff of 4 and Big Pig will get a payoff of 6.
    b. Little Pig will get a payoff of 2 and Big Pig will get a payoff of 6.
    c. both pigs will wait at the trough.
    d. Little Pig will get a payoff of zero.
    e. the pigs must be using mixed strategies.

Difficulty:
Correct Answer: a

14. (See Problem 6.) Big Pig and Little Pig have two possible strategies, Press the Button, and Wait at the Trough. If both pigs choose Wait, both get 3. If both pigs Press the Button, then Big Pig gets 9 and Little Pig gets 1. If Little Pig Presses the Button and Big Pig Waits at the Trough, then Big Pig gets 10 and Little Pig gets 0. Finally, if Big Pig Presses the Button and Little Pig Waits, then Big Pig gets 7 and Little Pig gets 4. In Nash equilibrium,
    a. Little Pig will get a payoff of 4 and Big Pig will get a payoff of 7.
    b. Little Pig will get a payoff of zero.
    c. both pigs will wait at the trough.
    d. Little Pig will get a payoff of 1 and Big Pig will get a payoff of 9.
    e. the pigs must be using mixed strategies.

Difficulty:
Correct Answer: d

15. (See Problem 6.) Big Pig and Little Pig have two possible strategies, Press the Button, and Wait at the Trough. If both pigs choose Wait, both get 1. If both pigs Press the Button, then Big Pig gets 9 and Little Pig gets 1. If Little Pig Presses the Button and Big Pig Waits at the Trough, then Big Pig gets 10 and Little Pig gets 0. Finally, if Big Pig Presses the Button and Little Pig Waits, then Big Pig gets 5 and Little Pig gets 1. In Nash equilibrium,
    a. Little Pig will get a payoff of zero.
    b. both pigs will wait at the trough.
    c. Little Pig will get a payoff of 1 and Big Pig will get a payoff of 9.
    d. Little Pig will get a payoff of 1 and Big Pig will get a payoff of 5.
    e. the pigs must be using mixed strategies.

Difficulty:
Correct Answer: b

16. (See Problem 7.) The old Michigan football coach had only two strategies, Run the Ball to the Left Side of the line, and Run the Ball to the Right Side. The defense can concentrate either on the left side or the right side of Michigan's line. If the opponent concentrates on the wrong side, Michigan is sure to gain at least 5 yards. If the defense defended the left side and Michigan ran left, Michigan would be stopped for no gain. But if the opponent defended the right side when Michigan ran right, Michigan would still gain at least 5 yards with probability .70. It is the last play of the game and Michigan needs to gain 5 yards to win. Both sides choose Nash equilibrium strategies. In Nash equilibrium, Michigan would

a. be sure to run to the right side.
b. run to the right side with probability .77.
c. run to the right side with probability .87.
d. run to the two sides with equal probability.
e. run to the right side with probability .70.

Difficulty:
Correct Answer: a

17. (See Problem 7.) The old Michigan football coach had only two strategies, Run the Ball to the Left Side of the line, and Run the Ball to the Right Side. The defense can concentrate either on the left side or the right side of Michigan's line. If the opponent concentrates on the wrong side, Michigan is sure to gain at least 5 yards. If the defense defended the left side and Michigan ran left, Michigan would be stopped for no gain. But if the opponent defended the right side when Michigan ran right, Michigan would still gain at least 5 yards with probability .60. It is the last play of the game and Michigan needs to gain 5 yards to win. Both sides choose Nash equilibrium strategies. In Nash equilibrium, Michigan would
a. run to the right side with probability .71.
b. run to the right side with probability .83.
c. be sure to run to the right side.
d. run to the two sides with equal probability.
e. run to the right side with probability .60.

Difficulty:
Correct Answer: c

18. (See Problem 7.) The old Michigan football coach had only two strategies, Run the Ball to the Left Side of the line, and Run the Ball to the Right Side. The defense can concentrate either on the left side or the right side of Michigan's line. If the opponent concentrates on the wrong side, Michigan is sure to gain at least 5 yards. If the defense defended the left side and Michigan ran left, Michigan would be stopped for no gain. But if the opponent defended the right side when Michigan ran right, Michigan would still gain at least 5 yards with probability .50. It is the last play of the game and Michigan needs to gain 5 yards to win. Both sides choose Nash equilibrium strategies. In Nash equilibrium, Michigan would
a. run to the two sides with equal probability.
b. be sure to run to the right side.
c. run to the right side with probability .67.
d. run to the right side with probability .80.
e. run to the right side with probability .50.

Difficulty:
Correct Answer: a

19. (See Problem 7.) The old Michigan football coach had only two strategies, Run the Ball to the Left Side of the line, and Run the Ball to the Right Side. The defense can concentrate either on the left side or the right side of Michigan's line. If the opponent concentrates on the wrong side, Michigan is sure to gain at least 5 yards. If the defense defended the left side and Michigan ran left, Michigan would be stopped for no gain. But if the opponent defended the right side when Michigan ran right, Michigan would still gain at least 5 yards with probability .70. It is the last play of the game and Michigan needs to gain 5 yards to win. Both sides choose Nash equilibrium strategies. In Nash equilibrium, Michigan would
a. run to the right side with probability .77.
b. run to the right side with probability .87.
c. run to the two sides with equal probability.
d. be sure to run to the right side.
e. run to the right side with probability .70.

Difficulty:
Correct Answer: a

20. (See Problem 7.) The old Michigan football coach had only two strategies, Run the Ball to the Left Side of the line, and Run the Ball to the Right Side. The defense can concentrate either on the left side or the right side of Michigan's line. If the opponent concentrates on the wrong side, Michigan is sure to gain at least 5 yards. If the defense defended the left side and Michigan ran left, Michigan would be stopped for no gain. But if the opponent defended the right side when Michigan ran right, Michigan would still gain at least 5 yards with probability .70. It is the last play of the game and Michigan needs to gain 5 yards to win. Both sides choose Nash equilibrium strategies. In Nash equilibrium, Michigan would
a. run to the right side with probability .77.
b. be sure to run to the right side.
c. run to the right side with probability .87.
d. run to the two sides with equal probability.
e. run to the right side with probability .70.

Difficulty:
Correct Answer: a

21. Suppose that in the Hawk-Dove game discussed in Problem 8, the payoff to each player is -9 if both play Hawk. If both play Dove, the payoff to each player is 5, and if one plays Hawk and the other plays Dove, the one that plays Hawk gets a payoff of 9 and the one that plays Dove gets 0. In equilibrium, we would expect hawks and doves to do equally well. This happens when the proportion of the total population that plays Hawk is
a. .31.
b. .15.
c. .08.
d. .65.
e. 1.

Difficulty:
Correct Answer: b

22. Suppose that in the Hawk-Dove game discussed in Problem 8, the payoff to each player is -7 if both play Hawk. If both play Dove, the payoff to each player is 4, and if one plays Hawk and the other plays Dove, the one that plays Hawk gets a payoff of 7 and the one that plays Dove gets 0. In equilibrium, we would expect hawks and doves to do equally well. This happens when the proportion of the total population that plays Hawk is
    a. .08.
    b. .30.
    c. .65.
    d. .15.
    e. 1.

Difficulty:
Correct Answer: a

23. Suppose that in the Hawk-Dove game discussed in Problem 8, the payoff to each player is -7 if both play Hawk. If both play Dove, the payoff to each player is 5, and if one plays Hawk and the other plays Dove, the one that plays Hawk gets a payoff of 9 and the one that plays Dove gets 0. In equilibrium, we would expect hawks and doves to do equally well. This happens when the proportion of the total population that plays Hawk is
    a. .36.
    b. .68.
    c. .09.
    d. .18.
    e. 1.

Difficulty:
Correct Answer: b

24. Suppose that in the Hawk-Dove game discussed in Problem 8, the payoff to each player is -3 if both play Hawk. If both play Dove, the payoff to each player is 1, and if one plays Hawk and the other plays Dove, the one that plays Hawk gets a payoff of 5 and the one that plays Dove gets 0. In equilibrium, we would expect hawks and doves to do equally well. This happens when the proportion of the total population that plays Hawk is
    a. .14.
    b. .57.
    c. .79.
    d. .29.
    e. 1.

Difficulty:
Correct Answer: c

25. Suppose that in the Hawk-Dove game discussed in Problem 8, the payoff to each player is -8 if both play Hawk. If both play Dove, the payoff to each player is 3, and if one plays Hawk and the other plays Dove, the one that plays Hawk gets a payoff of 8 and the one that plays Dove gets 0. In equilibrium, we would expect hawks and doves to do equally well. This happens when the proportion of the total population that plays Hawk is
    a. .19.
    b. .69.
    c. .38.
    d. .10.
    e. 1

No alternative quizzes for Chapter 30.

CHAPTER 31 Exchange

MULTIPLE CHOICE

Difficulty: 2
Correct Answer: b

1. An economy has two people, Charlie and Doris. There are two goods, apples and bananas. Charlie has an initial endowment of 6 apples and 4 bananas. Doris has an initial endowment of 12 apples and 2 bananas. Charlie's utility function is $U(A_C, B_C) = A_C B_C$, where A_C is his apple consumption and B_C is his banana consumption. Doris's utility function is $U(A_D, B_D) = A_D B_D$, where A_D and B_D are her apple and banana consumptions. At every Pareto optimal allocation,
   a. Charlie consumes the same number of apples as Doris.
   b. Charlie consumes 18 apples for every 6 bananas that he consumes.
   c. Doris consumes equal numbers of apples and bananas.
   d. Charlie consumes more bananas per apple than Doris does.
   e. Doris consumes 12 apples for every 2 bananas that she consumes.

Difficulty: 2
Correct Answer: d

2. An economy has two people, Charlie and Doris. There are two goods, apples and bananas. Charlie has an initial endowment of 3 apples and 4 bananas. Doris has an initial endowment of 6 apples and 2 bananas. Charlie's utility function is $U(A_C, B_C) = A_C B_C$, where A_C is his apple consumption and B_C is his banana consumption. Doris's utility function is $U(A_D, B_D) = A_D B_D$, where A_D and B_D are her apple and banana consumptions. At every Pareto optimal allocation,
   a. Charlie consumes the same number of apples as Doris.
   b. Charlie consumes more bananas per apple than Doris does.
   c. Doris consumes equal numbers of apples and bananas.
   d. Charlie consumes 9 apples for every 6 bananas that he consumes.
   e. Doris consumes 6 apples for every 2 bananas that she consumes.

Difficulty: 2
Correct Answer: a

3. An economy has two people, Charlie and Doris. There are two goods, apples and bananas. Charlie has an initial endowment of 3 apples and 8 bananas. Doris has an initial endowment of 6 apples and 4 bananas. Charlie's utility function is $U(A_C, B_C) = A_C B_C$, where A_C is his apple consumption and B_C is his banana consumption. Doris's utility function is $U(A_D, B_D) = A_D B_D$, where A_D and B_D are her apple and banana consumptions. At every Pareto optimal allocation,
   a. Charlie consumes 9 apples for every 12 bananas that he consumes.
   b. Charlie consumes more bananas per apple than Doris does.
   c. Doris consumes equal numbers of apples and bananas.
   d. Charlie consumes the same number of apples as Doris.
   e. Doris consumes 6 apples for every 4 bananas that she consumes.

Difficulty: 2
Correct Answer: b

4. An economy has two people, Charlie and Doris. There are two goods, apples and bananas. Charlie has an initial endowment of 3 apples and 12 bananas. Doris has an initial endowment of 6 apples and 6 bananas. Charlie's utility function is $U(A_C, B_C) = A_C B_C$, where A_C is his apple consumption and B_C is his banana consumption. Doris's utility function is $U(A_D, B_D) = A_D B_D$, where A_D and B_D are her apple and banana consumptions. At every Pareto optimal allocation,

a. Charlie consumes the same number of apples as Doris.
b. Charlie consumes 9 apples for every 18 bananas that he consumes.
c. Doris consumes equal numbers of apples and bananas.
d. Charlie consumes more bananas per apple than Doris does.
e. Doris consumes 6 apples for every 6 bananas that she consumes.

Difficulty: 2
Correct Answer: d

5. An economy has two people, Charlie and Doris. There are two goods, apples and bananas. Charlie has an initial endowment of 5 apples and 10 bananas. Doris has an initial endowment of 10 apples and 5 bananas. Charlie's utility function is $U(A_C, B_C) = A_C B_C$, where A_C is his apple consumption and B_C is his banana consumption. Doris's utility function is $U(A_D, B_D) = A_D B_D$, where A_D and B_D are her apple and banana consumptions. At every Pareto optimal allocation,
   a. Charlie consumes the same number of apples as Doris.
   b. Charlie consumes more bananas per apple than Doris does.
   c. Doris consumes equal numbers of apples and bananas.
   d. Charlie consumes 15 apples for every 15 bananas that he consumes.
   e. Doris consumes 10 apples for every 5 bananas that she consumes.

Difficulty: 2
Correct Answer: c

6. In Problem 4, Ken's utility function is $U(Q_K, W_K) = Q_K W_K$ and Barbie's utility function is $U(Q_B, W_B) = Q_B W_B$. If Ken's initial endowment were 4 units of quiche and 6 units of wine and Barbie's endowment were 8 units of quiche and 6 units of wine, then at any Pareto optimal allocation where both persons consume some of each good,
   a. Ken would consume 4 units of quiche for every 6 units of wine.
   b. Barbie would consume twice as much quiche as Ken.
   c. Ken would consume 12 units of quiche for every 12 units of wine that he consumes.
   d. Barbie would consume 8 units of quiche for every 6 units of wine that she consumes.
   e. None of the above.

Difficulty: 2
Correct Answer: a

7. In Problem 4, Ken's utility function is $U(Q_K, W_K) = Q_K W_K$ and Barbie's utility function is $U(Q_B, W_B) = Q_B W_B$. If Ken's initial endowment were 6 units of quiche and 9 units of wine and Barbie's endowment were 12 units of quiche and 9 units of wine, then at any Pareto optimal allocation where both persons consume some of each good,
   a. Ken would consume 18 units of quiche for every 18 units of wine that he consumes.
   b. Barbie would consume 12 units of quiche for every 9 units of wine that she consumes.
   c. Ken would consume 6 units of quiche for every 9 units of wine.
   d. Barbie would consume twice as much quiche as Ken.
   e. None of the above.

Difficulty: 2
Correct Answer: b

8. In Problem 4, Ken's utility function is $U(Q_K, W_K) = Q_K W_K$ and Barbie's utility function is $U(Q_B, W_B) = Q_B W_B$. If Ken's initial endowment were 4 units of quiche and 10 units of wine and Barbie's endowment were 8 units of quiche and 10 units of wine, then at any Pareto optimal allocation where both persons consume some of each good,
   a. Ken would consume 4 units of quiche for every 10 units of wine.
   b. Ken would consume 12 units of quiche for every 20 units of wine that he consumes.
   c. Barbie would consume 8 units of quiche for every 10 units of wine that she consumes.
   d. Barbie would consume twice as much quiche as Ken.
   e. None of the above.

Difficulty: 2
Correct Answer: c

9. In Problem 4, Ken's utility function is $U(Q_K, W_K) = Q_K W_K$ and Barbie's utility function is $U(Q_B, W_B) = Q_B W_B$. If Ken's initial endowment were 8 units of quiche and 11 units of wine and Barbie's endowment were 16 units of quiche and 11 units of wine, then at any Pareto optimal allocation where both persons consume some of each good,
   a. Barbie would consume twice as much quiche as Ken.
   b. Ken would consume 8 units of quiche for every 11 units of wine.
   c. Ken would consume 24 units of quiche for every 22 units of wine that he consumes.
   d. Barbie would consume 16 units of quiche for every 11 units of wine that she consumes.
   e. None of the above.

Difficulty: 2
Correct Answer: b

10. In Problem 4, Ken's utility function is $U(Q_K, W_K) = Q_K W_K$ and Barbie's utility function is $U(Q_B, W_B) = Q_B W_B$. If Ken's initial endowment were 3 units of quiche and 7 units of wine and Barbie's endowment were 6 units of quiche and 7 units of wine, then at any Pareto optimal allocation where both persons consume some of each good,
    a. Ken would consume 3 units of quiche for every 7 units of wine.
    b. Ken would consume 9 units of quiche for every 14 units of wine that he consumes.
    c. Barbie would consume twice as much quiche as Ken.
    d. Barbie would consume 6 units of quiche for every 7 units of wine that she consumes.
    e. None of the above.

Difficulty: 3
Correct Answer: d

11. In Problem 1, suppose that Morris has the utility function $U(b, w) = 4b + 12w$ and Philip has the utility function $U(b, w) = bw$. If we draw an Edgeworth box with books on the horizontal axis and wine on the vertical axis and if we measure Morris's consumptions from the lower left corner of the box, then the contract curve contains
    a. a straight line running from the upper right corner of the box to the lower left.
    b. a curve that gets steeper as you move from left to right.
    c. a straight line with slope 1/3 passing through the lower left corner of the box.
    d. a straight line with slope 1/3 passing through the upper right corner of the box.
    e. a curve that gets flatter as you move from left to right.

Difficulty: 3
Correct Answer: a

12. In Problem 1, suppose that Morris has the utility function $U(b, w) = 6b + 6w$ and Philip has the utility function $U(b, w) = bw$. If we draw an Edgeworth box with books on the horizontal axis and wine on the vertical axis and if we measure Morris's consumptions from the lower left corner of the box, then the contract curve contains
    a. a straight line with slope 1/1 passing through the upper right corner of the box.
    b. a curve that gets steeper as you move from left to right.
    c. a straight line running from the upper right corner of the box to the lower left.
    d. a straight line with slope 1/1 passing through the lower left corner of the box.
    e. a curve that gets flatter as you move from left to right.

Difficulty: 3
Correct Answer: d

13. In Problem 1, suppose that Morris has the utility function $U(b, w) = 4b + 4w$ and Philip has the utility function $U(b, w) = bw$. If we draw an Edgeworth box with books on the horizontal axis and wine on the vertical axis and if we measure Morris's consumptions from the lower left corner of the box, then the contract curve contains
    a. a straight line running from the upper right corner of the box to the lower left.
    b. a curve that gets steeper as you move from left to right.
    c. a straight line with slope 1/1 passing through the lower left corner of the box.
    d. a straight line with slope 1/1 passing through the upper right corner of the box.
    e. a curve that gets flatter as you move from left to right.

Difficulty: 3
Correct Answer: b

14. In Problem 1, suppose that Morris has the utility function $U(b, w) = 5b + 15w$ and Philip has the utility function $U(b, w) = bw$. If we draw an Edgeworth box with books on the horizontal axis and wine on the vertical axis and if we measure Morris's consumptions from the lower left corner of the box, then the contract curve contains
    a. a straight line with slope 1/3 passing through the lower left corner of the box.
    b. a straight line with slope 1/3 passing through the upper right corner of the box.
    c. a straight line running from the upper right corner of the box to the lower left.
    d. a curve that gets steeper as you move from left to right.
    e. a curve that gets flatter as you move from left to right.

Difficulty: 3
Correct Answer: b

15. In Problem 1, suppose that Morris has the utility function $U(b, w) = 7b + 21w$ and Philip has the utility function $U(b, w) = bw$. If we draw an Edgeworth box with books on the horizontal axis and wine on the vertical axis and if we measure Morris's consumptions from the lower left corner of the box, then the contract curve contains

a. a straight line with slope 1/3 passing through the lower left corner of the box.
b. a straight line with slope 1/3 passing through the upper right corner of the box.
c. a curve that gets steeper as you move from left to right.
d. a straight line running from the upper right corner of the box to the lower left.
e. a curve that gets flatter as you move from left to right.

Difficulty: 2
Correct Answer: a

16. In Problem 2, Astrid's utility function is $U(H_A, C_A) = H_AC_A$. Birger's utility function is $\min\{H_B, C_B\}$. If Astrid's initial endowment is no cheese and 13 units of herring and if Birger's initial endowments are 12 units of cheese and no herring, then where p is a competitive equilibrium price of herring and cheese is the numeraire, demand equals supply in the herring market. This implies that
a. $12/(p + 1) + 6.50 = 13$.
b. $12/13 = p$.
c. $13/12 = p$.
d. $12/p + 13/2p = 13$.
e. $\min\{13, 12\} = p$.

Difficulty: 2
Correct Answer: d

17. In Problem 2, Astrid's utility function is $U(H_A, C_A) = H_AC_A$. Birger's utility function is $\min\{H_B, C_B\}$. If Astrid's initial endowment is no cheese and 3 units of herring and if Birger's initial endowments are 13 units of cheese and no herring, then where p is a competitive equilibrium price of herring and cheese is the numeraire, demand equals supply in the herring market. This implies that
a. $13/3 = p$.
b. $3/13 = p$.
c. $13/p + 3/2p = 3$.
d. $13/(p + 1) + 1.50 = 3$.
e. $\min\{3, 13\} = p$.

Difficulty: 2
Correct Answer: b

18. In Problem 2, Astrid's utility function is $U(H_A, C_A) = H_AC_A$. Birger's utility function is $\min\{H_B, C_B\}$. If Astrid's initial endowment is no cheese and 8 units of herring and if Birger's initial endowments are 7 units of cheese and no herring, then where p is a competitive equilibrium price of herring and cheese is the numeraire, demand equals supply in the herring market. This implies that
a. $7/p + 8/2p = 8$.
b. $7/(p + 1) + 4 = 8$.
c. $8/7 = p$.
d. $7/8 = p$.
e. $\min\{8, 7\} = p$.

Difficulty: 2
Correct Answer: a

19. In Problem 2, Astrid's utility function is $U(H_A, C_A) = H_AC_A$. Birger's utility function is $\min\{H_B, C_B\}$. If Astrid's initial endowment is no cheese and 20 units of herring and if Birger's initial endowments are 4 units of cheese and no herring, then where p is a competitive equilibrium price of herring and cheese is the numeraire, demand equals supply in the herring market. This implies that
a. $4/(p + 1) + 10 = 20$.
b. $20/4 = p$.
c. $4/20 = p$.
d. $4/p + 20/2p = 20$.
e. $\min\{20, 4\} = p$.

Difficulty: 2
Correct Answer: d

20. In Problem 2, Astrid's utility function is $U(H_A, C_A) = H_AC_A$. Birger's utility function is $\min\{H_B, C_B\}$. If Astrid's initial endowment is no cheese and 20 units of herring and if Birger's initial endowments are 9 units of cheese and no herring, then where p is a competitive equilibrium price of herring and cheese is the numeraire, demand equals supply in the herring market. This implies that
a. $9/p + 20/2p = 20$.
b. $9/20 = p$.
c. $20/9 = p$.
d. $9/(p + 1) + 10 = 20$.
e. $\min\{20, 9) = p$.

Difficulty: 2
Correct Answer: a

21. Suppose that in Problem 8, Mutt's utility function is $U(m, j) = \max\{2m, j\}$ and Jeff's utility function is $U(m, j) = 3m + j$. Mutt is initially endowed with 6 units of milk and 2 units of juice, and Jeff is initially endowed with 2 units of milk and 6 units of juice. If we draw an Edgeworth box with milk on the horizontal axis and juice on the vertical axis and if we measure goods for Mutt by the distance from the lower left corner of the box, then the set of Pareto optimal allocations includes the
a. left edge of the Edgeworth box but no other edges.
b. bottom edge of the Edgeworth box but no other edges.
c. left edge and bottom edge of the Edgeworth box.
d. right edge of the Edgeworth box but no other edges.
e. right edge and top edge of the Edgeworth box.

Difficulty: 2
Correct Answer: c

22. Suppose that in Problem 8, Mutt's utility function is $U(m, j) = \max\{4m, j\}$ and Jeff's utility function is $U(m, j) = 3m + j$. Mutt is initially endowed with 6 units of milk and 2 units of juice, and Jeff is initially endowed with 2 units of milk and 6 units of juice. If we draw an Edgeworth box with milk on the horizontal axis and juice on the vertical axis and if we measure goods for Mutt by the distance from the lower left corner of the box, then the set of Pareto optimal allocations includes the
    a. right edge of the Edgeworth box but no other edges.
    b. left edge of the Edgeworth box but no other edges.
    c. bottom edge of the Edgeworth box but no other edges.
    d. left edge and bottom edge of the Edgeworth box.
    e. right edge and top edge of the Edgeworth box.

Difficulty: 2
Correct Answer: c

23. Suppose that in Problem 8, Mutt's utility function is $U(m, j) = \max\{2m, j\}$ and Jeff's utility function is $U(m, j) = 3m + j$. Mutt is initially endowed with 6 units of milk and 2 units of juice, and Jeff is initially endowed with 2 units of milk and 6 units of juice. If we draw an Edgeworth box with milk on the horizontal axis and juice on the vertical axis and if we measure goods for Mutt by the distance from the lower left corner of the box, then the set of Pareto optimal allocations includes the
    a. right edge of the Edgeworth box but no other edges.
    b. bottom edge of the Edgeworth box but no other edges.
    c. left edge of the Edgeworth box but no other edges.
    d. left edge and bottom edge of the Edgeworth box.
    e. right edge and top edge of the Edgeworth box.

Difficulty: 2
Correct Answer: d

24. Suppose that in Problem 8, Mutt's utility function is $U(m, j) = \max\{4m, j\}$ and Jeff's utility function is $U(m, j) = 2m + j$. Mutt is initially endowed with 2 units of milk and 2 units of juice, and Jeff is initially endowed with 6 units of milk and 6 units of juice. If we draw an Edgeworth box with milk on the horizontal axis and juice on the vertical axis and if we measure goods for Mutt by the distance from the lower left corner of the box, then the set of Pareto optimal allocations includes the
    a. left edge of the Edgeworth box but no other edges.
    b. right edge of the Edgeworth box but no other edges.
    c. left edge and bottom edge of the Edgeworth box.
    d. bottom edge of the Edgeworth box but no other edges.
    e. right edge and top edge of the Edgeworth box.

Difficulty: 2
Correct Answer: d

25. Suppose that in Problem 8, Mutt's utility function is $U(m, j) = \max\{3m, j\}$ and Jeff's utility function is $U(m, j) = 2m + j$. Mutt is initially endowed with 2 units of milk and 2 units of juice, and Jeff is initially endowed with 6 units of milk and 6 units of juice. If we draw an Edgeworth box with milk on the horizontal axis and juice on the vertical axis and if we measure goods for Mutt by the distance from the lower left corner of the box, then the set of Pareto optimal allocations includes the
    a. left edge and bottom edge of the Edgeworth box.
    b. right edge of the Edgeworth box but no other edges.
    c. left edge of the Edgeworth box but no other edges.
    d. bottom edge of the Edgeworth box but no other edges.
    e. right edge and top edge of the Edgeworth box.

Difficulty:
Correct Answer: b

26. In Problem 3, Professor Nightsoil's utility function is $U_N(B_N, P_N) = B_N + 4P^{1/2}{}_N$ and Dean Interface's utility function is $U_I(B_I, P_I) = B_I + 2P^{1/2}{}_I$. If Nightsoil's initial endowment is 6 bromides and 20 platitudes and if Interface's initial endowment is 2 bromides and 10 platitudes, then at any Pareto efficient allocation where both persons consume positive amounts of both goods,
    a. Nightsoil consumes the same ratio of bromides to platitudes as Interface.
    b. Interface consumes 6 platitudes.
    c. Interface consumes 4 bromides.
    d. Interface consumes 4 bromides.
    e. Interface consumes 2 platitudes.

Difficulty:
Correct Answer: a

27. In Problem 3, Professor Nightsoil's utility function is $U_N(B_N, P_N) = B_N + 4P^{1/2}{}_N$ and Dean Interface's utility function is $U_I(B_I, P_I) = B_I + P^{1/2}{}_I$. If Nightsoil's initial endowment is 5 bromides and 10 platitudes and if Interface's initial endowment is 2 bromides and 10 platitudes, then at any Pareto efficient allocation where both persons consume positive amounts of both goods,
    a. Interface consumes 4 platitudes.
    b. Nightsoil consumes the same ratio of bromides to platitudes as Interface.
    c. Interface consumes 3.50 bromides.
    d. Interface consumes 2 bromides.
    e. Interface consumes 2 platitudes.

Difficulty:
Correct Answer: d

28. In Problem 3, Professor Nightsoil's utility function is $U_N(B_N, P_N) = B_N + 4P^{1/2}_N$ and Dean Interface's utility function is $U_I(B_I, P_I) = B_I + 2P^{1/2}_I$. If Nightsoil's initial endowment is 4 bromides and 15 platitudes and if Interface's initial endowment is 7 bromides and 15 platitudes, then at any Pareto efficient allocation where both persons consume positive amounts of both goods,
    a. Interface consumes 3 bromides.
    b. Interface consumes 5.50 bromides.
    c. Nightsoil consumes the same ratio of bromides to platitudes as Interface.
    d. Interface consumes 6 platitudes.
    e. Interface consumes 3 platitudes.

Difficulty:
Correct Answer: b

29. In Problem 3, Professor Nightsoil's utility function is $U_N(B_N, P_N) = B_N + 4P^{1/2}_N$ and Dean Interface's utility function is $U_I(B_I, P_I) = B_I + 2P^{1/2}_I$. If Nightsoil's initial endowment is 7 bromides and 5 platitudes and if Interface's initial endowment is 8 bromides and 10 platitudes, then at any Pareto efficient allocation where both persons consume positive amounts of both goods,
    a. Interface consumes 1 bromide.
    b. Interface consumes 3 platitudes.
    c. Nightsoil consumes the same ratio of bromides to platitudes as Interface.
    d. Interface consumes 7.50 bromides.
    e. Interface consumes 2 platitudes.

Difficulty:
Correct Answer: a

30. In Problem 3, Professor Nightsoil's utility function is $U_N(B_N, P_N) = B_N + 4P^{1/2}_N$ and Dean Interface's utility function is $U_I(B_I, P_I) = B_I + 2P^{1/2}_I$. If Nightsoil's initial endowment is 3 bromides and 20 platitudes and if Interface's initial endowment is 5 bromides and 15 platitudes, then at any Pareto efficient allocation where both persons consume positive amounts of both goods,
    a. Interface consumes 7 platitudes.
    b. Nightsoil consumes the same ratio of bromides to platitudes as Interface.
    c. Interface consumes 4 bromides.
    d. Interface consumes 4 bromides.
    e. Interface consumes 3 platitudes.

CHAPTER 32 Production

MULTIPLE CHOICE

Difficulty:
Correct Answer: a

1. Suppose that in Problem 1, Tip can write 5 pages of term papers or solve 10 workbook problems in an hour, while Spot can write 2 pages of term papers or solve 2 workbook problems in an hour. If they each decide to work a total of 6 hours and to share their output, then if they produce as many pages of term paper as possible given that they produce 25 workbook problems,
   a. Spot will spend all of his time writing term papers and Tip will spend some time at each task.
   b. Tip will spend all of his time writing term papers and Spot will spend some time at each task.
   c. both students will spend some time at each task.
   d. Spot will write term papers only and Tip will do workbook problems only.
   e. Tip will write term papers only and Spot will do workbook problems only.

Difficulty:
Correct Answer: c

2. Suppose that in Problem 1, Tip can write 3 pages of term papers or solve 12 workbook problems in an hour, while Spot can write 4 pages of term papers or solve 12 workbook problems in an hour. If they each decide to work a total of 7 hours and to share their output, then if they produce as many pages of term paper as possible given that they produce 18 workbook problems,
   a. Spot will write term papers only and Tip will do workbook problems only.
   b. Tip will spend all of his time writing term papers and Spot will spend some time at each task.
   c. Spot will spend all of his time writing term papers and Tip will spend some time at each task.
   d. both students will spend some time at each task.
   e. Tip will write term papers only and Spot will do workbook problems only.

Difficulty:
Correct Answer: c

3. Suppose that in Problem 1, Tip can write 3 pages of term papers or solve 6 workbook problems in an hour, while Spot can write 3 pages of term papers or solve 3 workbook problems in an hour. If they each decide to work a total of 6 hours and to share their output, then if they produce as many pages of term paper as possible given that they produce 15 workbook problems,
   a. Spot will write term papers only and Tip will do workbook problems only.
   b. both students will spend some time at each task.
   c. Spot will spend all of his time writing term papers and Tip will spend some time at each task.
   d. Tip will spend all of his time writing term papers and Spot will spend some time at each task.
   e. Tip will write term papers only and Spot will do workbook problems only.

Difficulty:
Correct Answer: d

4. Suppose that in Problem 1, Tip can write 4 pages of term papers or solve 8 workbook problems in an hour, while Spot can write 5 pages of term papers or solve 15 workbook problems in an hour. If they each decide to work a total of 5 hours and to share their output, then if they produce as many pages of term paper as possible given that they produce 16 workbook problems,
   a. Spot will spend all of his time writing term papers and Tip will spend some time at each task.
   b. Spot will write term papers only and Tip will do workbook problems only.
   c. both students will spend some time at each task.
   d. Tip will spend all of his time writing term papers and Spot will spend some time at each task.
   e. Tip will write term papers only and Spot will do workbook problems only.

Difficulty:
Correct Answer: d

5. Suppose that in Problem 1, Tip can write 4 pages of term papers or solve 4 workbook problems in an hour, while Spot can write 5 pages of term papers or solve 15 workbook problems in an hour. If they each decide to work a total of 6 hours and to share their output, then if they produce as many pages of term paper as possible given that they produce 20 workbook problems,
   a. both students will spend some time at each task.
   b. Spot will write term papers only and Tip will do workbook problems only.
   c. Spot will spend all of his time writing term papers and Tip will spend some time at each task.
   d. Tip will spend all of his time writing term papers and Spot will spend some time at each task.
   e. Tip will write term papers only and Spot will do workbook problems only.

Difficulty:
Correct Answer: a

6. Al and Bill are the only workers in a small factory that makes geegaws and doodads. Al can make 6 geegaws per hour or 18 doodads per hour. Bill can make 3 geegaws per hour or 12 doodads per hour. Assuming that neither of them finds one task more odious than the other,
   a. Al has a comparative advantage in producing geegaws and Bill has a comparative advantage in producing doodads.
   b. Bill has a comparative advantage in producing geegaws and Al has a comparative advantage in producing doodads.
   c. Al has a comparative advantage in producing both geegaws and doodads.
   d. Bill has a comparative advantage in producing both geegaws and doodads.
   e. both have a comparative advantage in producing doodads.

Difficulty:
Correct Answer: d

7. Al and Bill are the only workers in a small factory that makes geegaws and doodads. Al can make 5 geegaws per hour or 20 doodads per hour. Bill can make 3 geegaws per hour or 6 doodads per hour. Assuming that neither of them finds one task more odious than the other,
   a. Bill has a comparative advantage in producing both geegaws and doodads.
   b. Al has a comparative advantage in producing geegaws and Bill has a comparative advantage in producing doodads.
   c. Al has a comparative advantage in producing both geegaws and doodads.
   d. Bill has a comparative advantage in producing geegaws and Al has a comparative advantage in producing doodads.
   e. both have a comparative advantage in producing doodads.

Difficulty:
Correct Answer: d

8. Al and Bill are the only workers in a small factory that makes geegaws and doodads. Al can make 7 geegaws per hour or 14 doodads per hour. Bill can make 4 geegaws per hour or 24 doodads per hour. Assuming that neither of them finds one task more odious than the other,
   a. Bill has a comparative advantage in producing geegaws and Al has a comparative advantage in producing doodads.
   b. Bill has a comparative advantage in producing both geegaws and doodads.
   c. Al has a comparative advantage in producing both geegaws and doodads.
   d. Al has a comparative advantage in producing geegaws and Bill has a comparative advantage in producing doodads.
   e. both have a comparative advantage in producing doodads.

Difficulty:
Correct Answer: c

9. Al and Bill are the only workers in a small factory that makes geegaws and doodads. Al can make 5 geegaws per hour or 10 doodads per hour. Bill can make 4 geegaws per hour or 24 doodads per hour. Assuming that neither of them finds one task more odious than the other,
   a. Bill has a comparative advantage in producing geegaws and Al has a comparative advantage in producing doodads.
   b. Bill has a comparative advantage in producing both geegaws and doodads.
   c. Al has a comparative advantage in producing geegaws and Bill has a comparative advantage in producing doodads.
   d. Al has a comparative advantage in producing both geegaws and doodads.
   e. both have a comparative advantage in producing doodads.

Difficulty:
Correct Answer: d

10. Al and Bill are the only workers in a small factory that makes geegaws and doodads. Al can make 7 geegaws per hour or 21 doodads per hour. Bill can make 4

geegaws per hour or 8 doodads per hour. Assuming that neither of them finds one task more odious than the other,

a. Al has a comparative advantage in producing geegaws and Bill has a comparative advantage in producing doodads.
b. Bill has a comparative advantage in producing both geegaws and doodads.
c. Al has a comparative advantage in producing both geegaws and doodads.
d. Bill has a comparative advantage in producing geegaws and Al has a comparative advantage in producing doodads.
e. both have a comparative advantage in producing doodads.

Difficulty:
Correct Answer: a

11. (See Problem 5.) Every consumer has a red-money income and a blue-money income and each commodity has a red price and a blue price. You can buy a good by paying for it either with blue money at the blue price or with red money at the red price. Harold has 12 units of red money and 10 units of blue money to spend. The red price of ambrosia is 1 and the blue price of ambrosia is 2. The red price of bubble gum is 1 and the blue price of bubble gum is 1. If ambrosia is on the horizontal axis, and bubble gum on the vertical axis, then Harold's budget set is bounded by
    a. two line segments, one running from (0, 22) to (12, 10) and another running from (12, 10) to (17, 0).
    b. two line segments one running from (0, 22) to (5, 12) and the other running from (5, 12) to (17, 0).
    c. two line segments, one running from (0, 15) to (12, 10) and the other running from (12, 10) to (24, 0).
    d. a vertical line segment and a horizontal line segment, intersecting at (12, 10).
    e. a vertical line segment and a horizontal line segment, intersecting at (5, 12).

Difficulty:
Correct Answer: b

12. (See Problem 5.) Every consumer has a red-money income and a blue-money income and each commodity has a red price and a blue price. You can buy a good by paying for it either with blue money at the blue price or with red money at the red price. Harold has 18 units of red money and 36 units of blue money to spend. The red price of ambrosia is 2 and the blue price of ambrosia is 6. The red price of bubble gum is 1 and the blue price of bubble gum is 2. If ambrosia is on the horizontal axis, and bubble gum on the vertical axis, then Harold's budget set is bounded by
    a. two line segments one running from (0, 36) to (6, 18) and the other running from (6, 18) to (15, 0).
    b. two line segments, one running from (0, 36) to (9, 18) and another running from (9, 18) to (15, 0).
    c. two line segments, one running from (0, 24) to (9, 18) and the other running from (9, 18) to (27, 0).
    d. a vertical line segment and a horizontal line segment, intersecting at (9, 18).
    e. a vertical line segment and a horizontal line segment, intersecting at (6, 18).

Difficulty:
Correct Answer: b

13. (See Problem 5.) Every consumer has a red-money income and a blue-money income and each commodity has a red price and a blue price. You can buy a good by paying for it either with blue money at the blue price or with red money at the red price. Harold has 16 units of red money and 42 units of blue money to spend. The red price of ambrosia is 2 and the blue price of ambrosia is 6. The red price of bubble gum is 1 and the blue price of bubble gum is 2. If ambrosia is on the horizontal axis, and bubble gum on the vertical axis, then Harold's budget set is bounded by
    a. two line segments, one running from (0, 28) to (8, 21) and the other running from (8, 21) to (24, 0).
    b. two line segments, one running from (0, 37) to (8, 21) and another running from (8, 21) to (15, 0).
    c. two line segments one running from (0, 37) to (7, 16) and the other running from (7, 16) to (15, 0).
    d. a vertical line segment and a horizontal line segment, intersecting at (8, 21).
    e. a vertical line segment and a horizontal line segment, intersecting at (7, 16).

Difficulty:
Correct Answer: b

14. (See Problem 5.) Every consumer has a red-money income and a blue-money income and each commodity has a red price and a blue price. You can buy a good by paying for it either with blue money at the blue price or with red money at the red price. Harold has 27 units of red money and 40 units of blue money to spend. The red price of ambrosia is 3 and the blue price of ambrosia is 8. The red price of bubble gum is 1 and the blue price of bubble gum is 2. If ambrosia is on the horizontal axis, and bubble gum on the vertical axis, then Harold's budget set is bounded by
    a. two line segments one running from (0, 47) to (5, 27) and the other running from (5, 27) to (14, 0).
    b. two line segments, one running from (0, 47) to (9, 20) and another running from (9, 20) to (14, 0).
    c. a vertical line segment and a horizontal line segment, intersecting at (9, 20).
    d. two line segments, one running from (0, 25) to (9, 20) and the other running from (9, 20) to (36, 0).
    e. a vertical line segment and a horizontal line segment, intersecting at (5, 27).

Difficulty:
Correct Answer: a

15. (See Problem 5.) Every consumer has a red-money income and a blue-money income and each commodity has a red price and a blue price. You can buy a good by paying for it either with blue money at the blue price or with red money at the red price. Harold has 40 units of red money and 35 units of blue money to spend. The red price of ambrosia is 4 and the blue price of ambrosia is 5. The red price of bubble gum is 1 and the blue price of bubble gum is 1. If ambrosia is on the horizontal axis, and bubble gum on the vertical axis, then Harold's budget set is bounded by
   a. two line segments, one running from (0, 75) to (10, 35) and another running from (10, 35) to (17, 0).
   b. a vertical line segment and a horizontal line segment, intersecting at (10, 35).
   c. two line segments one running from (0, 75) to (7, 40) and the other running from (7, 40) to (17, 0).
   d. two line segments, one running from (0, 42) to (10, 35) and the other running from (10, 35) to (50, 0).
   e. a vertical line segment and a horizontal line segment, intersecting at (7, 40).

Difficulty:
Correct Answer: a

16. (See Problem 2.) Robinson Crusoe has exactly 14 hours per day to spend gathering coconuts or catching fish. He can catch 5 fish per hour or he can pick 20 coconuts per hour. His utility function is $U(F, C) = FC$, where F is his consumption of fish and C is his consumption of coconuts. If he allocates his time in the best possible way between catching fish and picking coconuts, his consumption will be the same as it would be if he could buy fish and coconuts in a competitive market where the price of coconuts is $1, his income is
   a. $280 and the price of fish is $4.
   b. $70 and the price of fish is $5.
   c. $350 and the price of fish is $5.
   d. $280 and the price of fish is $.20.
   e. $175 and the price of fish is $.20.

Difficulty:
Correct Answer: a

17. (See Problem 2.) Robinson Crusoe has exactly 12 hours per day to spend gathering coconuts or catching fish. He can catch 2 fish per hour or he can pick 4 coconuts per hour. His utility function is $U(F, C) = FC$, where F is his consumption of fish and C is his consumption of coconuts. If he allocates his time in the best possible way between catching fish and picking coconuts, his consumption will be the same as it would be if he could buy fish and coconuts in a competitive market where the price of coconuts is $1, his income is
   a. $48 and the price of fish is $2.
   b. $48 and the price of fish is $.50.
   c. $24 and the price of fish is $2.
   d. $72 and the price of fish is $2.
   e. $36 and the price of fish is $.50.

Difficulty:
Correct Answer: a

18. (See Problem 2.) Robinson Crusoe has exactly 12 hours per day to spend gathering coconuts or catching fish. He can catch 3 fish per hour or he can pick 12 coconuts per hour. His utility function is $U(F, C) = FC$, where F is his consumption of fish and C is his consumption of coconuts. If he allocates his time in the best possible way between catching fish and picking coconuts, his consumption will be the same as it would be if he could buy fish and coconuts in a competitive market where the price of coconuts is $1, his income is
   a. $144 and the price of fish is $4.
   b. $144 and the price of fish is $.33.
   c. $36 and the price of fish is $3.
   d. $180 and the price of fish is $3.
   e. $90 and the price of fish is $.33.

Difficulty:
Correct Answer: a

19. (See Problem 2.) Robinson Crusoe has exactly 8 hours per day to spend gathering coconuts or catching fish. He can catch 2 fish per hour or he can pick 8 coconuts per hour. His utility function is $U(F, C) = FC$, where F is his consumption of fish and C is his consumption of coconuts. If he allocates his time in the best possible way between catching fish and picking coconuts, his consumption will be the same as it would be if he could buy fish and coconuts in a competitive market where the price of coconuts is $1, his income is
   a. $64 and the price of fish is $4.
   b. $64 and the price of fish is $.50.
   c. $16 and the price of fish is $2.
   d. $80 and the price of fish is $2.
   e. $40 and the price of fish is $.50.

Difficulty:
Correct Answer: d

20. (See Problem 2.) Robinson Crusoe has exactly 8 hours per day to spend gathering coconuts or catching fish. He can catch 4 fish per hour or he can pick 8 coconuts per hour. His utility function is $U(F, C) = FC$, where F is his consumption of fish and C is his consumption of coconuts. If he allocates his time in the best possible way between catching fish and picking coconuts, his consumption will be the same as it would be if he could buy fish and coconuts in a competitive market where the price of coconuts is $1, his income is

a. \$96 and the price of fish is \$4.
b. \$64 and the price of fish is \$.25.
c. \$32 and the price of fish is \$4.
d. \$64 and the price of fish is \$2.
e. \$48 and the price of fish is \$.25.

Difficulty:
Correct Answer: b

21. On a certain island there are only two goods, wheat and milk. The only scarce resource is land. There are 1,000 acres of land. An acre of land will produce either 16 units of milk or 31 units of wheat. Some citizens have lots of land; some have just a little bit. The citizens of the island all have utility functions of the form $U(M, W) = MW$. At every Pareto optimal allocation,
    a. the number of units of milk produced equals the number of units of wheat produced.
    b. total milk production is 8,000 units.
    c. all citizens consume the same commodity bundle.
    d. every consumer's marginal rate of substitution between milk and wheat is -1.
    e. None of the above is true at *every* Pareto optimal allocation.

Difficulty:
Correct Answer: b

22. On a certain island there are only two goods, wheat and milk. The only scarce resource is land. There are 1,000 acres of land. An acre of land will produce either 10 units of milk or 16 units of wheat. Some citizens have lots of land; some have just a little bit. The citizens of the island all have utility functions of the form $U(M, W) = MW$. At every Pareto optimal allocation,
    a. all citizens consume the same commodity bundle.
    b. total milk production is 5,000 units.
    c. every consumer's marginal rate of substitution between milk and wheat is -1.
    d. the number of units of milk produced equals the number of units of wheat produced.
    e. None of the above is true at *every* Pareto optimal allocation.

Difficulty:
Correct Answer: c

23. On a certain island there are only two goods, wheat and milk. The only scarce resource is land. There are 1,000 acres of land. An acre of land will produce either 3 units of milk or 7 units of wheat. Some citizens have lots of land; some have just a little bit. The citizens of the island all have utility functions of the form $U(M, W) = MW$. At every Pareto optimal allocation,
    a. the number of units of milk produced equals the number of units of wheat produced.
    b. all citizens consume the same commodity bundle.
    c. total milk production is 1,500 units.
    d. every consumer's marginal rate of substitution between milk and wheat is -1.
    e. None of the above is true at *every* Pareto optimal allocation.

Difficulty:
Correct Answer: d

24. On a certain island there are only two goods, wheat and milk. The only scarce resource is land. There are 1,000 acres of land. An acre of land will produce either 13 units of milk or 33 units of wheat. Some citizens have lots of land; some have just a little bit. The citizens of the island all have utility functions of the form $U(M, W) = MW$. At every Pareto optimal allocation,
    a. every consumer's marginal rate of substitution between milk and wheat is -1.
    b. all citizens consume the same commodity bundle.
    c. the number of units of milk produced equals the number of units of wheat produced.
    d. total milk production is 6,500 units.
    e. None of the above is true at *every* Pareto optimal allocation.

Difficulty:
Correct Answer: a

25. On a certain island there are only two goods, wheat and milk. The only scarce resource is land. There are 1,000 acres of land. An acre of land will produce either 7 units of milk or 37 units of wheat. Some citizens have lots of land; some have just a little bit. The citizens of the island all have utility functions of the form $U(M, W) = MW$. At every Pareto optimal allocation,
    a. total milk production is 3,500 units.
    b. the number of units of milk produced equals the number of units of wheat produced.
    c. every consumer's marginal rate of substitution between milk and wheat is -1.
    d. all citizens consume the same commodity bundle.
    e. None of the above is true at *every* Pareto optimal allocation.

CHAPTER 33 Welfare

MULTIPLE CHOICE

Difficulty:
Correct Answer: a

1. A Borda count is used to decide an election between three candidates, x, y, and z, where a score of 1 is awarded to a first choice, 2 to a second choice, and 3 to a third choice. There are 25 voters. 10 voters rank the candidates x first, y second, and z third; 7 voters rank the candidates x first, z second, and y third; 5 rank the candidates z first, y second, and x third; and 3 voters rank the candidates y first, z second, and x third. Which candidate wins?
   a. Candidate x.
   b. Candidate y.
   c. Candidate z.
   d. There is a tie between x and y, with z coming in third.
   e. There is a tie between y and z, with x coming in third.

Difficulty:
Correct Answer: a

2. A Borda count is used to decide an election between three candidates, x, y, and z, where a score of 1 is awarded to a first choice, 2 to a second choice, and 3 to a third choice. There are 26 voters. 9 voters rank the candidates x first, y second, and z third; 9 voters rank the candidates x first, z second, and y third; 6 rank the candidates z first, y second, and x third; and 2 voters rank the candidates y first, z second, and x third. Which candidate wins?
   a. Candidate x.
   b. There is a tie between x and y, with z coming in third.
   c. Candidate y.
   d. Candidate z.
   e. There is a tie between y and z, with x coming in third.

Difficulty:
Correct Answer: b

3. A Borda count is used to decide an election between three candidates, x, y, and z, where a score of 1 is awarded to a first choice, 2 to a second choice, and 3 to a third choice. There are 25 voters. 3 voters rank the candidates x first, y second, and z third; 10 voters rank the candidates x first, z second, and y third; 6 rank the candidates z first, y second, and x third; and 6 voters rank the candidates y first, z second, and x third. Which candidate wins?
   a. Candidate x.
   b. Candidate z.
   c. There is a tie between x and y, with z coming in third.
   d. Candidate y.
   e. There is a tie between y and z, with x coming in third.

Difficulty:
Correct Answer: c

4. A Borda count is used to decide an election between three candidates, x, y, and z, where a score of 1 is awarded to a first choice, 2 to a second choice, and 3 to a third choice. There are 20 voters. 4 voters rank the candidates x first, y second, and z third; 5 voters rank the candidates x first, z second, and y third; 8 rank the candidates z first, y second, and x third; and 3 voters rank the candidates y first, z second, and x third. Which candidate wins?
   a. Candidate y.
   b. There is a tie between x and y, with z coming in third.
   c. Candidate z.
   d. Candidate x.
   e. There is a tie between y and z, with x coming in third.

Difficulty:
Correct Answer: c

5. A Borda count is used to decide an election between three candidates, x, y, and z, where a score of 1 is awarded to a first choice, 2 to a second choice, and 3 to a third choice. There are 23 voters. 3 voters rank the candidates x first, y second, and z third; 5 voters rank the candidates x first, z second, and y third; 10 rank the candidates z first, y second, and x third; and 5 voters rank the candidates y first, z second, and x third. Which candidate wins?
   a. Candidate x.
   b. There is a tie between x and y, with z coming in third.
   c. Candidate z.
   d. Candidate y.
   e. There is a tie between y and z, with x coming in third.

Difficulty:
Correct Answer: a

6. A parent has two children living in cities with different costs of living. The cost of living in city B is 2 times the cost of living in city A. The child in city A has an income of $5,000 and the child in city B has an income of $10,000. The parent wants to give a total of $4,000 to her two children. Her utility function is $U(C_A, C_B) = C_A C_B$, where C_A and C_B are the consumptions of the children living in cities A and B respectively. She will choose to give
   a. each child $2,000, even though this will buy less goods for the child in city B.
   b. the child in city B twice as much money as the child in city A.
   c. the child in city A twice as much money as the child in city B.
   d. the child in city B the same amount of money as the child in city A.
   e. the child in city A the same amount of money as the child in city B.

Difficulty:
Correct Answer: b

7. A parent has two children living in cities with different costs of living. The cost of living in city B is 3 times the cost of living in city A. The child in city A has an income of $3,000 and the child in city B has an income of $9,000. The parent wants to give a total of $2,000 to her two children. Her utility function is $U(C_A, C_B) = C_A C_B$, where C_A and C_B are the consumptions of the children living in cities A and B respectively. She will choose to give
   a. the child in city B 3 times as much money as the child in city A.
   b. each child $1,000, even though this will buy less goods for the child in city B.
   c. the child in city A 3 times as much money as the child in city B.
   d. the child in city B 1.50 times as much money as the child in city A.
   e. the child in city A 1.50 times as much money as the child in city B.

Difficulty:
Correct Answer: d

8. A parent has two children living in cities with different costs of living. The cost of living in city B is 3 times the cost of living in city A. The child in city A has an income of $2,000 and the child in city B has an income of $6,000. The parent wants to give a total of $1,000 to her two children. Her utility function is $U(C_A, C_B) = C_A C_B$, where C_A and C_B are the consumptions of the children living in cities A and B respectively. She will choose to give
   a. the child in city B 1.50 times as much money as the child in city A.
   b. the child in city A 3 times as much money as the child in city B.
   c. the child in city B 3 times as much money as the child in city A.
   d. each child $500, even though this will buy less goods for the child in city B.
   e. the child in city A 1.50 times as much money as the child in city B.

Difficulty:
Correct Answer: d

9. A parent has two children living in cities with different costs of living. The cost of living in city B is 3 times the cost of living in city A. The child in city A has an income of $3,000 and the child in city B has an income of $9,000. The parent wants to give a total of $2,000 to her two children. Her utility function is $U(C_A, C_B) = C_A C_B$, where C_A and C_B are the consumptions of the children living in cities A and B respectively. She will choose to give
   a. the child in city B 3 times as much money as the child in city A.
   b. the child in city B 1.50 times as much money as the child in city A.
   c. the child in city A 3 times as much money as the child in city B.
   d. each child $1,000, even though this will buy less goods for the child in city B.
   e. the child in city A 1.50 times as much money as the child in city B.

Difficulty:
Correct Answer: d

10. A parent has two children living in cities with different costs of living. The cost of living in city *B* is 3 times the cost of living in city *A*. The child in city *A* has an income of $3,000 and the child in city *B* has an income of $9,000. The parent wants to give a total of $4,000 to her two children. Her utility function is $U(C_A, C_B) = C_A C_B$, where C_A and C_B are the consumptions of the children living in cities *A* and *B* respectively. She will choose to give
    a. the child in city *B* 1.50 times as much money as the child in city *A*.
    b. the child in city *A* 3 times as much money as the child in city *B*.
    c. the child in city *B* 3 times as much money as the child in city *A*.
    d. each child $2,000, even though this will buy less goods for the child in city *B*.
    e. the child in city *A* 1.50 times as much money as the child in city *B*.

Difficulty:
Correct Answer: b

11. Suppose that Paul and David from Problem 7 have utility functions $U = 4A_P + O_P$ and $U = A_D + 5O_D$, respectively, where A_P and O_P are Paul's consumptions of apples and oranges and A_D and O_D are David's consumptions of apples and oranges. The total supply of apples and oranges to be divided between them is 16 apples and 16 oranges. The "fair" allocations consist of all allocations satisfying
    a. $A_D = A_P$ and $O_D = O_P$.
    b. $8A_P + 2O_P$ is at least 80 and $2A_D + 10O_D$ is at least 96.
    c. $4A_P + O_P$ is at least 80 and $2A_D + 5O_D$ is at least 96.
    d. $A_D + O_D$ is at least 16 and $A_S + O_S$ is at least 16.
    e. $4A_P + O_P$ is at least $A_D + 5O_D$ and $A_D + 5O_D$ is at least $4A_P + O_P$.

Difficulty:
Correct Answer: a

12. Suppose that Paul and David from Problem 7 have utility functions $U = 5A_P + O_P$ and $U = A_D + 3O_D$, respectively, where A_P and O_P are Paul's consumptions of apples and oranges and A_D and O_D are David's consumptions of apples and oranges. The total supply of apples and oranges to be divided between them is 14 apples and 14 oranges. The "fair" allocations consist of all allocations satisfying
    a. $10A_P + 2O_P$ is at least 84 and $2A_D + 6O_D$ is at least 56.
    b. $5A_P + O_P$ is at least 84 and $2A_D + 3O_D$ is at least 56.
    c. $A_D + O_D$ is at least 14 and $A_S + O_S$ is at least 14.
    d. $A_D = A_P$ and $O_D = O_P$.
    e. $5A_P + O_P$ is at least A$_D$ + $3O_D$ and AD + $3O_D$ is at least $5A_P + O_P$.

Difficulty:
Correct Answer: d

13. Suppose that Paul and David from Problem 7 have utility functions $U = 5A_P + O_P$ and $U = A_D + 3O_D$, respectively, where A_P and O_P are Paul's consumptions of apples and oranges and A_D and O_D are David's consumptions of apples and oranges. The total supply of apples and oranges to be divided between them is 16 apples and 14 oranges. The "fair" allocations consist of all allocations satisfying
    a. $5A_P + O_P$ is at least 94 and $2A_D + 3O_D$ is at least 58.
    b. $A_D = A_P$ and $O_D = O_P$.
    c. $A_D + O_D$ is at least 15 and $A_S + O_S$ is at least 15.
    d. $10A_P + 2O_P$ is at least 94 and $2A_D + 6O_D$ is at least 58.
    e. $5A_P + O_P$ is at least $A_D + 3O_D$ and $A_D + 3O_D$ is at least $5A_P + O_P$.

Difficulty:
Correct Answer: b

14. Suppose that Paul and David from Problem 7 have utility functions $U = 3A_P + O_P$ and $U = A_D + 2O_D$, respectively, where A_P and O_P are Paul's consumptions of apples and oranges and A_D and O_D are David's consumptions of apples and oranges. The total supply of apples and oranges to be divided between them is 10 apples and 20 oranges. The "fair" allocations consist of all allocations satisfying
    a. $A_D = A_P$ and $O_D = O_P$.
    b. $6A_P + 2O_P$ is at least 50 and $2A_D + 4O_D$ is at least 50.
    c. $3A_P + O_P$ is at least 50 and $2A_D + 2O_D$ is at least 50.
    d. $A_D + O_D$ is at least 15 and $A_S + O_S$ is at least 15.
    e. $3A_P + O_P$ is at least $A_D + 2O_D$ and $A_D + 2O_D$ is at least $3A_P + O_P$.

Difficulty:
Correct Answer: c

15. Suppose that Paul and David from Problem 7 have utility functions $U = 5A_P + O_P$ and $U = A_D + 3O_D$, respectively, where A_P and O_P are Paul's consumptions of apples and oranges and A_D and O_D are David's consumptions of apples and oranges. The total supply of apples and oranges to be divided between them is 12 apples and 20 oranges. The "fair" allocations consist of all allocations satisfying
    a. $A_D = A_P$ and $O_D = O_P$.
    b. $A_D + O_D$ is at least 16 and $A_S + O_S$ is at least 16.
    c. $10A_P + 2O_P$ is at least 80 and $2A_D + 6O_D$ is at least 72.
    d. $5A_P + O_P$ is at least 80 and $2A_D + 3O_D$ is at least 72.
    e. $5A_P + O_P$ is at least $A_D + 3O_D$ and $A_D + 3O_D$ is at least $5A_P + O_P$.

Difficulty:
Correct Answer: e

16. Suppose that Romeo in Problem 8 has the utility function $U = S^8{}_R S^4{}_J$ and Juliet has the utility function $U = S^4{}_R S^8{}_J$, where S_R is Romeo's spaghetti consumption and S_J is Juliet's. They have 120 units of spaghetti to divide between them.
    a. Romeo would want to give Juliet some spaghetti if he had more than 60 units of spaghetti.
    b. Juliet would want to give Romeo some spaghetti if she has more than 78 units.
    c. Romeo and Juliet would never disagree about how to divide the spaghetti.
    d. Romeo would want to give Juliet some spaghetti if he has more than 76 units of spaghetti.
    e. Juliet would want to give Romeo some spaghetti if she has more than 80 units of spaghetti.

Difficulty:
Correct Answer: e

17. Suppose that Romeo in Problem 8 has the utility function $U = S^6{}_R S^4{}_J$ and Juliet has the utility function $U = S^4{}_R S^6{}_J$, where S_R is Romeo's spaghetti consumption and S_J is Juliet's. They have 70 units of spaghetti to divide between them.
    a. Romeo would want to give Juliet some spaghetti if he had more than 35 units of spaghetti.
    b. Juliet would want to give Romeo some spaghetti if she has more than 40 units.
    c. Romeo and Juliet would never disagree about how to divide the spaghetti.
    d. Romeo would want to give Juliet some spaghetti if he has more than 38 units of spaghetti.
    e. Juliet would want to give Romeo some spaghetti if she has more than 42 units of spaghetti.

Difficulty:
Correct Answer: e

18. Suppose that Romeo in Problem 8 has the utility function $U = S^3{}_R S^1{}_J$ and Juliet has the utility function $U = S^1{}_R S^3{}_J$, where S_R is Romeo's spaghetti consumption and S_J is Juliet's. They have 36 units of spaghetti to divide between them.
    a. Romeo and Juliet would never disagree about how to divide the spaghetti.
    b. Romeo would want to give Juliet some spaghetti if he had more than 18 units of spaghetti.
    c. Juliet would want to give Romeo some spaghetti if she has more than 25 units.
    d. Romeo would want to give Juliet some spaghetti if he has more than 23 units of spaghetti.
    e. Juliet would want to give Romeo some spaghetti if she has more than 27 units of spaghetti.

Difficulty:
Correct Answer: e

19. Suppose that Romeo in Problem 8 has the utility function $U = S^5{}_R S^2{}_J$ and Juliet has the utility function $U = S^2{}_R S^5{}_J$, where S_R is Romeo's spaghetti consumption and S_J is Juliet's. They have 70 units of spaghetti to divide between them.
    a. Romeo and Juliet would never disagree about how to divide the spaghetti.
    b. Romeo would want to give Juliet some spaghetti if he has more than 46 units of spaghetti.
    c. Romeo would want to give Juliet some spaghetti if he had more than 35 units of spaghetti.
    d. Juliet would want to give Romeo some spaghetti if she has more than 48 units.
    e. Juliet would want to give Romeo some spaghetti if she has more than 50 units of spaghetti.

Difficulty:
Correct Answer: e

20. Suppose that Romeo in Problem 8 has the utility function $U = S^5{}_R S^2{}_J$ and Juliet has the utility function $U = S^2{}_R S^5{}_J$, where S_R is Romeo's spaghetti consumption and S_J is Juliet's. They have 42 units of spaghetti to divide between them.
    a. Romeo would want to give Juliet some spaghetti if he had more than 21 units of spaghetti.
    b. Romeo would want to give Juliet some spaghetti if he has more than 26 units of spaghetti.
    c. Juliet would want to give Romeo some spaghetti if she has more than 28 units.
    d. Romeo and Juliet would never disagree about how to divide the spaghetti.
    e. Juliet would want to give Romeo some spaghetti if she has more than 30 units of spaghetti.

Difficulty:
Correct Answer: b

21. Hatfield and McCoy burn with hatred for each other. They both consume corn whisky. Hatfield's utility function is $U = W_H - W^2{}_M/8$ and McCoy's utility is $U = W_M - W^2{}_H/8$, where W_H is Hatfield's whisky consumption and W_M is McCoy's whisky consumption, measured in gallons. The sheriff has a total of 48 gallons of confiscated whisky which he could give back to them. For some reason, the sheriff wants them both to be as happy as possible and he wants to treat them equally. The sheriff should give them each
    a. 24 gallons.
    b. 4 gallons and spill 40 gallons in the creek.
    c. 2 gallons and spill 44 gallons in the creek.
    d. 8 gallons and spill the rest in the creek.
    e. 1 gallon and spill the rest in the creek.

Difficulty:
Correct Answer: a

22. Hatfield and McCoy burn with hatred for each other. They both consume corn whisky. Hatfield's utility function is $U = W_H - W^2{}_M/32$ and McCoy's utility is $U = W_M - W^2{}_H/32$, where W_H is Hatfield's whisky consumption and W_M is McCoy's whisky consumption, measured in gallons. The sheriff has a total of 52 gallons of confiscated whisky which he could give back to them. For some reason, the sheriff wants them both to be as happy as possible and he wants to treat them equally. The sheriff should give them each
    a. 16 gallons and spill 20 gallons in the creek.
    b. 20 gallons and spill the rest in the creek.
    c. 8 gallons and spill 36 gallons in the creek.
    d. 26 gallons.
    e. 4 gallons and spill the rest in the creek.

Difficulty:
Correct Answer: a

23. Hatfield and McCoy burn with hatred for each other. They both consume corn whisky. Hatfield's utility function is $U = W_H - W^2{}_M/16$ and McCoy's utility is $U = W_M - W^2{}_H/16$, where W_H is Hatfield's whisky consumption and W_M is McCoy's whisky consumption, measured in gallons. The sheriff has a total of 66 gallons of confiscated whisky which he could give back to them. For some reason, the sheriff wants them both to be as happy as possible and he wants to treat them equally. The sheriff should give them each
    a. 8 gallons and spill 50 gallons in the creek.
    b. 33 gallons.
    c. 12 gallons and spill the rest in the creek.
    d. 4 gallons and spill 58 gallons in the creek.
    e. 2 gallons and spill the rest in the creek.

Difficulty:
Correct Answer: b

24. Hatfield and McCoy burn with hatred for each other. They both consume corn whisky. Hatfield's utility function is $U = W_H - W^2{}_M/32$ and McCoy's utility is $U = W_M - W^2{}_H/32$, where W_H is Hatfield's whisky consumption and W_M is McCoy's whisky consumption, measured in gallons. The sheriff has a total of 82 gallons of confiscated whisky which he could give back to them. For some reason, the sheriff wants them both to be as happy as possible and he wants to treat them equally. The sheriff should give them each
    a. 8 gallons and spill 66 gallons in the creek.
    b. 16 gallons and spill 50 gallons in the creek.
    c. 41 gallons.
    d. 20 gallons and spill the rest in the creek.
    e. 4 gallons and spill the rest in the creek.

Difficulty:
Correct Answer: c

25. Hatfield and McCoy burn with hatred for each other. They both consume corn whisky. Hatfield's utility function is $U = W_H - W^2{}_M/8$ and McCoy's utility is $U = W_M - W^2{}_H/8$, where W_H is Hatfield's whisky consumption and W_M is McCoy's whisky consumption, measured in gallons. The sheriff has a total of 48 gallons of confiscated whisky which he could give back to them. For some reason, the sheriff wants them both to be as happy as possible and he wants to treat them equally. The sheriff should give them each
    a. 24 gallons.
    b. 2 gallons and spill 44 gallons in the creek.
    c. 4 gallons and spill 40 gallons in the creek.
    d. 8 gallons and spill the rest in the creek.
    e. 1 gallon and spill the rest in the creek.

CHAPTER 34 Externalities

MULTIPLE CHOICE

Difficulty:
Correct Answer: c

1. Suppose that in Horsehead, Massachusetts, the cost of operating a lobster boat is $2,000 per month. Suppose that if x lobster boats operate in the bay, the total monthly revenue from lobster boats in the bay is $1,000($10x - x^2$). If there are no restrictions on entry and new boats come into the bay until there is no profit to be made by a new entrant, then the number of boats who enter will be X_1. If the number of boats that operate in the bay is regulated to maximize total profits, the number of boats in the bay will be X_2.
   a. $X_1 = 8$ and $X_2 = 8$.
   b. $X_1 = 4$ and $X_2 = 2$.
   c. $X_1 = 8$ and $X_2 = 4$.
   d. $X_1 = 12$ and $X_2 = 8$.
   e. None of the above.

Difficulty:
Correct Answer: c

2. Suppose that in Horsehead, Massachusetts, the cost of operating a lobster boat is $5,000 per month. Suppose that if x lobster boats operate in the bay, the total monthly revenue from lobster boats in the bay is $1,000($21x - x^2$). If there are no restrictions on entry and new boats come into the bay until there is no profit to be made by a new entrant, then the number of boats who enter will be X_1. If the number of boats that operate in the bay is regulated to maximize total profits, the number of boats in the bay will be X_2.
   a. $X_1 = 16$ and $X_2 = 16$.
   b. $X_1 = 20$ and $X_2 = 12$.
   c. $X_1 = 16$ and $X_2 = 8$.
   d. $X_1 = 8$ and $X_2 = 6$.
   e. None of the above.

Difficulty:
Correct Answer: b

3. Suppose that in Horsehead, Massachusetts, the cost of operating a lobster boat is $6,000 per month. Suppose that if x lobster boats operate in the bay, the total monthly revenue from lobster boats in the bay is $1,000($18x - x^2$). If there are no restrictions on entry and new boats come into the bay until there is no profit to be made by a new entrant, then the number of boats who enter will be X_1. If the number of boats that operate in the bay is regulated to maximize total profits, the number of boats in the bay will be X_2.
   a. $X_1 = 6$ and $X_2 = 4$.
   b. $X_1 = 12$ and $X_2 = 6$.
   c. $X_1 = 16$ and $X_2 = 10$.
   d. $X_1 = 12$ and $X_2 = 12$.
   e. None of the above.

Difficulty:
Correct Answer: c

4. Suppose that in Horsehead, Massachusetts, the cost of operating a lobster boat is $6,000 per month. Suppose that if x lobster boats operate in the bay, the total monthly revenue from lobster boats in the bay is $1,000($18x - x^2$). If there are no restrictions on entry and new boats come into the bay until there is no profit to be made by a new entrant, then the number of boats who enter will be X_1. If the number of boats that operate in the bay is regulated to maximize total profits, the number of boats in the bay will be X_2.
   a. $X_1 = 6$ and $X_2 = 4$.
   b. $X_1 = 12$ and $X_2 = 12$.
   c. $X_1 = 12$ and $X_2 = 6$.
   d. $X_1 = 16$ and $X_2 = 10$.
   e. None of the above.

Difficulty:
Correct Answer: a

5. Suppose that in Horsehead, Massachusetts, the cost of operating a lobster boat is \$2,000 per month. Suppose that if x lobster boats operate in the bay, the total monthly revenue from lobster boats in the bay is \$1,000$(26x - x^2)$. If there are no restrictions on entry and new boats come into the bay until there is no profit to be made by a new entrant, then the number of boats who enter will be X_1. If the number of boats that operate in the bay is regulated to maximize total profits, the number of boats in the bay will be X_2.
   a. $X_1 = 24$ and $X_2 = 12$.
   b. $X_1 = 24$ and $X_2 = 24$.
   c. $X_1 = 12$ and $X_2 = 10$.
   d. $X_1 = 28$ and $X_2 = 16$.
   e. None of the above.

Difficulty:
Correct Answer: d

6. In Problem 2, suppose that the cost function of the honey farm is $C_H(H, A) = H^2/100 - 3A$ and the cost function of the apple orchard is $C_A(H, A) = A^2/100$, where H and A are the number of units of honey and apples produced respectively. The price of honey is \$7 and the price of apples is \$5 per unit. Let A_1 be the output of apples if the firms operate independently, and let A_2 be the output of apples if the firms are operated by a profit-maximizing single owner.
   a. $A_1 = 125$ and $A_2 = 250$.
   b. $A_1 = A_2 = 250$.
   c. $A_1 = 200$ and $A_2 = 250$.
   d. $A_1 = 250$ and $A_2 = 400$.
   e. $A_1 = 350$ and $A_2 = 250$.

Difficulty:
Correct Answer: c

7. In Problem 2, suppose that the cost function of the honey farm is $C_H(H, A) = H^2/100 - 1A$ and the cost function of the apple orchard is $C_A(H, A) = A^2/100$, where H and A are the number of units of honey and apples produced respectively. The price of honey is \$8 and the price of apples is \$6 per unit. Let A_1 be the output of apples if the firms operate independently, and let A_2 be the output of apples if the firms are operated by a profit-maximizing single owner.
   a. $A_1 = 175$ and $A_2 = 300$.
   b. $A_1 = 150$ and $A_2 = 300$.
   c. $A_1 = 300$ and $A_2 = 350$.
   d. $A_1 = A_2 = 300$.
   e. $A_1 = 400$ and $A_2 = 300$.

Difficulty:
Correct Answer: d

8. In Problem 2, suppose that the cost function of the honey farm is $C_H(H, A) = H^2/100 - 3A$ and the cost function of the apple orchard is $C_A(H, A) = A^2/100$, where H and A are the number of units of honey and apples produced respectively. The price of honey is \$2 and the price of apples is \$7 per unit. Let A_1 be the output of apples if the firms operate independently, and let A_2 be the output of apples if the firms are operated by a profit-maximizing single owner.
   a. $A_1 = 250$ and $A_2 = 350$.
   b. $A_1 = A_2 = 350$.
   c. $A_1 = 175$ and $A_2 = 350$.
   d. $A_1 = 350$ and $A_2 = 500$.
   e. $A_1 = 100$ and $A_2 = 350$.

Difficulty:
Correct Answer: d

9. In Problem 2, suppose that the cost function of the honey farm is $C_H(H, A) = H^2/100 - 1A$ and the cost function of the apple orchard is $C_A(H, A) = A^2/100$, where H and A are the number of units of honey and apples produced respectively. The price of honey is \$2 and the price of apples is \$4 per unit. Let A_1 be the output of apples if the firms operate independently, and let A_2 be the output of apples if the firms are operated by a profit-maximizing single owner.
   a. $A_1 = A_2 = 200$.
   b. $A_1 = 100$ and $A_2 = 200$.
   c. $A_1 = 125$ and $A_2 = 200$.
   d. $A_1 = 200$ and $A_2 = 250$.
   e. $A_1 = 100$ and $A_2 = 200$.

Difficulty:
Correct Answer: a

10. In Problem 2, suppose that the cost function of the honey farm is $C_H(H, A) = H^2/100 - 2A$ and the cost function of the apple orchard is $C_A(H, A) = A^2/100$, where H and A are the number of units of honey and apples produced respectively. The price of honey is \$5 and the price of apples is \$4 per unit. Let A_1 be the output of apples if the firms operate independently, and let A_2 be the output of apples if the firms are operated by a profit-maximizing single owner.
   a. $A_1 = 200$ and $A_2 = 300$.
   b. $A_1 = A_2 = 200$.
   c. $A_1 = 100$ and $A_2 = 200$.
   d. $A_1 = 150$ and $A_2 = 200$.
   e. $A_1 = 250$ and $A_2 = 200$.

Difficulty:
Correct Answer: a

11. In Problem 3, suppose Wilfred, a typical citizen, has the utility function $U(m, d, h) = m + 13d^2 - d^2 - 4h$, where d is the number of hours per day that he spends driving around, h is the average number of hours per day spent driving around by other people in his home town, and m is the amount of money he has left to spend on other stuff besides gasoline and auto repairs. Gas and auto repairs cost \$1 per hour of driving. If each citizen believes that their own driving will not affect the amount of driving done by others, they will all drive D_1 hours per day. If all citizens drive to maximize the utility of a typical citizen, they will all drive D_2 hours per day, where
    a. $D_1 = 6$ and $D_2 = 4$.
    b. $D_1 = D_2 = 6$.
    c. $D_1 = 8$ and $D_2 = 5$.
    d. $D_1 = 9$ and $D_2 = 0$.
    e. $D_1 = 6$ and $D_2 = 2$.

Difficulty:
Correct Answer: c

12. In Problem 3, suppose Lawrence, a typical citizen, has the utility function $U(m, d, h) = m + 7d^2 - d^2 - 4h$, where d is the number of hours per day that he spends driving around, h is the average number of hours per day spent driving around by other people in his home town, and m is the amount of money he has left to spend on other stuff besides gasoline and auto repairs. Gas and auto repairs cost \$1 per hour of driving. If each citizen believes that their own driving will not affect the amount of driving done by others, they will all drive D_1 hours per day. If all citizens drive to maximize the utility of a typical citizen, they will all drive D_2 hours per day, where
    a. $D_1 = 5$ and $D_2 = 2$.
    b. $D_1 = D_2 = 3$.
    c. $D_1 = 3$ and $D_2 = 1$.
    d. $D_1 = 6$ and $D_2 = 0$.
    e. $D_1 = 3$ and $D_2 = 0$.

Difficulty:
Correct Answer: b

13. In Problem 3, suppose Sam, a typical citizen, has the utility function $U(m, d, h) = m + 13d^2 - d^2 - 6h$, where d is the number of hours per day that he spends driving around, h is the average number of hours per day spent driving around by other people in his home town, and m is the amount of money he has left to spend on other stuff besides gasoline and auto repairs. Gas and auto repairs cost \$1 per hour of driving. If each citizen believes that their own driving will not affect the amount of driving done by others, they will all drive D_1 hours per day. If all citizens drive to maximize the utility of a typical citizen, they will all drive D_2 hours per day, where
    a. $D_1 = 8$ and $D_2 = 4$.
    b. $D_1 = 6$ and $D_2 = 3$.
    c. $D_1 = D_2 = 6$.
    d. $D_1 = 9$ and $D_2 = 0$.
    e. $D_1 = 6$ and $D_2 = 1$.

Difficulty:
Correct Answer: c

14. In Problem 3, suppose Albert, a typical citizen, has the utility function $U(m, d, h) = m + 5d^2 - d^2 - 2h$, where d is the number of hours per day that he spends driving around, h is the average number of hours per day spent driving around by other people in his home town, and m is the amount of money he has left to spend on other stuff besides gasoline and auto repairs. Gas and auto repairs cost \$1 per hour of driving. If each citizen believes that their own driving will not affect the amount of driving done by others, they will all drive D_1 hours per day. If all citizens drive to maximize the utility of a typical citizen, they will all drive D_2 hours per day, where
    a. $D_1 = 5$ and $D_2 = 0$.
    b. $D_1 = D_2 = 2$.
    c. $D_1 = 2$ and $D_2 = 1$.
    d. $D_1 = 4$ and $D_2 = 2$.
    e. $D_1 = 2$ and $D_2 = 0$.

Difficulty:
Correct Answer: d

15. In Problem 3, suppose Harry, a typical citizen, has the utility function $U(m, d, h) = m + 7d^2 - d^2 - 2h$, where d is the number of hours per day that he spends driving around, h is the average number of hours per day spent driving around by other people in his home town, and m is the amount of money he has left to spend on other stuff besides gasoline and auto repairs. Gas and auto repairs cost \$1 per hour of driving. If each citizen believes that their own driving will not affect the amount of driving done by others, they will all drive D_1 hours per day. If all citizens drive to maximize the utility of a typical citizen, they will all drive D_2 hours per day, where
    a. $D_1 = 6$ and $D_2 = 1$.
    b. $D_1 = 5$ and $D_2 = 3$.
    c. $D_1 = D_2 = 3$.
    d. $D_1 = 3$ and $D_2 = 2$.
    e. $D_1 = 3$ and $D_2 = 0$.

Difficulty:
Correct Answer: b

16. An airport is located next to a housing development. Where X is the number of planes that land per day and Y is the number of houses in the housing development, profits of the airport are $22X - X^2$ and profits of the developer are $26Y - Y^2 - XY$. Let H_1 be the number of houses built if a single profit-maximizing company owns the airport and the housing development. Let H_2 be the number of houses built if the airport and the housing development are operated independently and the airport has to pay the developer the total "damages" XY done by the planes to the developer's profits.
    a. $H_1 = H_2 = 10$.
    b. $H_1 = 10$ and $H_2 = 13$.
    c. $H_1 = 13$ and $H_2 = 10$.
    d. $H_1 = 12$ and $H_2 = 12$.
    e. $H_1 = 12$ and $H_2 = 16$.

Difficulty:
Correct Answer: a

17. An airport is located next to a housing development. Where X is the number of planes that land per day and Y is the number of houses in the housing development, profits of the airport are $20X - X^2$ and profits of the developer are $28Y - Y^2 - XY$. Let H_1 be the number of houses built if a single profit-maximizing company owns the airport and the housing development. Let H_2 be the number of houses built if the airport and the housing development are operated independently and the airport has to pay the developer the total "damages" XY done by the planes to the developer's profits.
    a. $H_1 = 12$ and $H_2 = 14$.
    b. $H_1 = H_2 = 12$.
    c. $H_1 = 14$ and $H_2 = 13$.
    d. $H_1 = 14$ and $H_2 = 12$.
    e. $H_1 = 13$ and $H_2 = 17$.

Difficulty:
Correct Answer: c

18. An airport is located next to a housing development. Where X is the number of planes that land per day and Y is the number of houses in the housing development, profits of the airport are $38X - X^2$ and profits of the developer are $28Y - Y^2 - XY$. Let H_1 be the number of houses built if a single profit-maximizing company owns the airport and the housing development. Let H_2 be the number of houses built if the airport and the housing development are operated independently and the airport has to pay the developer the total "damages" XY done by the planes to the developer's profits.
    a. $H_1 = H_2 = 6$.
    b. $H_1 = 14$ and $H_2 = 6$.
    c. $H_1 = 6$ and $H_2 = 14$.
    d. $H_1 = 8$ and $H_2 = 13$.
    e. $H_1 = 13$ and $H_2 = 17$.

Difficulty:
Correct Answer: c

19. An airport is located next to a housing development. Where X is the number of planes that land per day and Y is the number of houses in the housing development, profits of the airport are $22X - X^2$ and profits of the developer are $20Y - Y^2 - XY$. Let H_1 be the number of houses built if a single profit-maximizing company owns the airport and the housing development. Let H_2 be the number of houses built if the airport and the housing development are operated independently and the airport has to pay the developer the total "damages" XY done by the planes to the developer's profits.
    a. $H_1 = 10$ and $H_2 = 6$.
    b. $H_1 = 8$ and $H_2 = 9$.
    c. $H_1 = 6$ and $H_2 = 10$.
    d. $H_1 = H_2 = 6$.
    e. $H_1 = 9$ and $H_2 = 13$.

Difficulty:
Correct Answer: b

20. An airport is located next to a housing development. Where X is the number of planes that land per day and Y is the number of houses in the housing development, profits of the airport are $22X - X^2$ and profits of the developer are $32Y - Y^2 - XY$. Let H_1 be the number of houses built if a single profit-maximizing company owns the airport and the housing development. Let H_2 be the number of houses built if the airport and the housing development are operated independently and the airport has to pay the developer the total "damages" XY done by the planes to the developer's profits.
    a. $H_1 = 16$ and $H_2 = 15$.
    b. $H_1 = 14$ and $H_2 = 16$.
    c. $H_1 = 16$ and $H_2 = 14$.
    d. $H_1 = H_2 = 14$.
    e. $H_1 = 15$ and $H_2 = 19$.

Difficulty: 2
Correct Answer: a

21. A clothing store and a jeweler are located side by side in a shopping mall. If the clothing store spends C dollars on advertising and the jeweler spends J dollars on advertising, then the profits of the clothing store will be $(6 + J)C - C^2$ and the profits of the jeweler will be $(6 + C)J - 2J^2$. The clothing store gets to choose its amount of advertising first, knowing that the jeweler will find out how much the clothing store advertised before deciding how much to spend. The amount spent by the clothing store will be
    a. 5.
    b. 10.
    c. 15.
    d. 2.50.
    e. 7.50.

Difficulty: 2
Correct Answer: d

22. A clothing store and a jeweler are located side by side in a shopping mall. If the clothing store spends C dollars on advertising and the jeweler spends J dollars on advertising, then the profits of the clothing store will be $(18 + J)C - C^2$ and the profits of the jeweler will be $(36 + C)J - 2J^2$. The clothing store gets to choose its amount of advertising first, knowing that the jeweler will find out how much the clothing store advertised before deciding how much to spend. The amount spent by the clothing store will be
    a. 54.
    b. 9.
    c. 36.
    d. 18.
    e. 27.

Difficulty: 2
Correct Answer: b

23. A clothing store and a jeweler are located side by side in a shopping mall. If the clothing store spends C dollars on advertising and the jeweler spends J dollars on advertising, then the profits of the clothing store will be $(18 + J)C - C^2$ and the profits of the jeweler will be $(24 + C)J - 2J^2$. The clothing store gets to choose its amount of advertising first, knowing that the jeweler will find out how much the clothing store advertised before deciding how much to spend. The amount spent by the clothing store will be
    a. 48.
    b. 16.
    c. 8.
    d. 32.
    e. 24.

Difficulty: 2
Correct Answer: d

24. A clothing store and a jeweler are located side by side in a shopping mall. If the clothing store spends C dollars on advertising and the jeweler spends J dollars on advertising, then the profits of the clothing store will be $(42 + J)C - C^2$ and the profits of the jeweler will be $(54 + C)J - 2J^2$. The clothing store gets to choose its amount of advertising first, knowing that the jeweler will find out how much the clothing store advertised before deciding how much to spend. The amount spent by the clothing store will be
    a. 74.
    b. 111.
    c. 18.50.
    d. 37.
    e. 55.50.

Difficulty: 2
Correct Answer: d

25. A clothing store and a jeweler are located side by side in a shopping mall. If the clothing store spends C dollars on advertising and the jeweler spends J dollars on advertising, then the profits of the clothing store will be $(24 + J)C - C^2$ and the profits of the jeweler will be $(66 + C)J - 2J^2$. The clothing store gets to choose its amount of advertising first, knowing that the jeweler will find out how much the clothing store advertised before deciding how much to spend. The amount spent by the clothing store will be
    a. 54.
    b. 81.
    c. 13.50.
    d. 27.
    e. 40.50.

CHAPTER 35 Information Technology

MULTIPLE CHOICE

Difficulty:
Correct Answer: d

1. If the demand function for the DoorKnobs operating system is related to perceived market share s and actual market share x by the equation $p = 512s(1 - x)$, then in the long run, the highest price at which DoorKnobs could sustain a market share of 3/4 is
   a. \$256.
   b. \$128.
   c. \$113.78.
   d. \$96.
   e. \$81.92.

Difficulty:
Correct Answer: e

2. If the demand function for the DoorKnobs operating system is related to perceived market share s and actual market share x by the equation $p = 512s(1 - x)$, then in the long run, the highest price at which DoorKnobs could sustain a market share of 4/5 is
   a. \$96.
   b. \$256.
   c. \$113.78.
   d. \$128.
   e. \$81.92.

Difficulty:
Correct Answer: d

3. If the demand function for the DoorKnobs operating system is related to perceived market share s and actual market share x by the equation $p = 512s(1 - x)$, then in the long run, the highest price at which DoorKnobs could sustain a market share of 3/4 is
   a. \$113.78.
   b. \$128.
   c. \$256.
   d. \$96.
   e. \$81.92.

Difficulty:
Correct Answer: a

4. If the demand function for the DoorKnobs operating system is related to perceived market share s and actual market share x by the equation $p = 512s(1 - x)$, then in the long run, the highest price at which DoorKnobs could sustain a market share of 3/4 is
   a. \$96.
   b. \$128.
   c. \$256.
   d. \$113.78.
   e. \$81.92.

Difficulty:
Correct Answer: c

5. If the demand function for the DoorKnobs operating system is related to perceived market share s and actual market share x by the equation $p = 512s(1 - x)$, then in the long run, the highest price at which DoorKnobs could sustain a market share of 3/4 is
   a. \$256.
   b. \$113.78.
   c. \$96.
   d. \$128.
   e. \$81.92.

Difficulty:
Correct Answer: e

6. Eleven consumers are trying to decide whether to connect to a new communications network. Consumer 1 is of type 1, consumer 2 is of type 2, consumer 3 is of type 3, and so on. Where k is the number of consumers connected to the network (including oneself), a consumer of type n has a willingness to pay to belong to this network equal to k times n. What is the highest price at which 4 consumers could all connect to the network and either make a profit or at least break even?
   a. \$24
   b. \$64
   c. \$40
   d. \$28
   e. \$32

Difficulty:
Correct Answer: e

7. Eleven consumers are trying to decide whether to connect to a new communications network. Consumer 1 is of type 1, consumer 2 is of type 2, consumer 3 is of type 3, and so on. Where k is the number of consumers connected to the network (including oneself), a consumer of type n has a willingness to pay to belong to this network equal to k times n. What is the highest price at which 5 consumers could all connect to the network and either make a profit or at least break even?
   a. \$49
   b. \$30
   c. \$42
   d. \$28
   e. \$35

Difficulty:
Correct Answer: e

8. Eleven consumers are trying to decide whether to connect to a new communications network. Consumer 1 is of type 1, consumer 2 is of type 2, consumer 3 is of type 3, and so on. Where k is the number of consumers connected to the network (including oneself), a consumer of type n has a willingness to pay to belong to this network equal to k times n. What is the highest price at which 4 consumers could all connect to the network and either make a profit or at least break even?
   a. \$24
   b. \$40
   c. \$64
   d. \$28
   e. \$32

Difficulty:
Correct Answer: e

9. Eleven consumers are trying to decide whether to connect to a new communications network. Consumer 1 is of type 1, consumer 2 is of type 2, consumer 3 is of type 3, and so on. Where k is the number of consumers connected to the network (including oneself), a consumer of type n has a willingness to pay to belong to this network equal to k times n. What is the highest price at which 9 consumers could all connect to the network and either make a profit or at least break even?
   a. \$30
   b. \$9
   c. \$18
   d. \$24
   e. \$27

Difficulty:
Correct Answer: e

10. Eleven consumers are trying to decide whether to connect to a new communications network. Consumer 1 is of type 1, consumer 2 is of type 2, consumer 3 is of type 3, and so on. Where k is the number of consumers connected to the network (including oneself), a consumer of type n has a willingness to pay to belong to this network equal to k times n. What is the highest price at which 11 consumers could all connect to the network and either make a profit or at least break even?
   a. \$12
   b. \$10
   c. \$1
   d. \$0
   e. \$11

Difficulty:
Correct Answer: d

11. Professor Kremepuff's new, user-friendly textbook has just been published. This book will be used in classes for two years, after which it will be replaced by a new edition. The publisher charges a price of p_1 in the first year and p_2 in the second year. After the first year, bookstores buy back used copies for $p_2/2$ and resell them to students in the second year for p_2. (Students are indifferent between new and used copies.) The cost to a student of owning the book during the first year is therefore $p_1 - p_2/2$. In the first year of publication, the number of students willing to pay \$$v$ to own a copy of the book for a year is $80{,}000 - 1{,}000v$. The number of students taking the course in the first year who are willing to pay \$$w$ to keep the book for reference rather than sell it at the end of the year is $80{,}000 - 5{,}000w$. The number of persons who are taking the course in the second year and are willing to pay at least \$$p$ for a copy of the book is $75{,}000 - 1{,}000p$. If the publisher sets a price of p_1 in the first year and $p_2 <= p_1$ in the second year, then the total number of copies of the book that the publisher sells over the two years will be
    a. $160{,}000 - 1{,}000p_1 - 1{,}000p_2$.
    b. $160{,}000 - 1{,}000(p_1 - p_2/2)$.
    c. $160{,}000 - 3{,}000p_2$.
    d. $155{,}000 - 1{,}000(p_1 + p_2/2)$.
    e. $155{,}000 - 1{,}500p_2$.

Difficulty:
Correct Answer: c

12. Professor Kremepuff's new, user-friendly textbook has just been published. This book will be used in classes for two years, after which it will be replaced by a new edition. The publisher charges a price of p_1 in the first year and p_2 in the second year. After the first year, bookstores buy back used copies for $p_2/2$ and resell

them to students in the second year for p_2. (Students are indifferent between new and used copies.) The cost to a student of owning the book during the first year is therefore $p_1 - p_2/2$. In the first year of publication, the number of students willing to pay \$$v$ to own a copy of the book for a year is $50{,}000 - 1{,}500v$. The number of students taking the course in the first year who are willing to pay \$$w$ to keep the book for reference rather than sell it at the end of the year is $50{,}000 - 7{,}500w$. The number of persons who are taking the course in the second year and are willing to pay at least \$$p$ for a copy of the book is $45{,}000 - 1{,}500p$. If the publisher sets a price of p_1 in the first year and $p_2 <= p_1$ in the second year, then the total number of copies of the book that the publisher sells over the two years will be

a. $100{,}000 - 1{,}500p_1 - 1{,}500p_2$.
b. $100{,}000 - 1{,}500(p_1 - p_2/2)$.
c. $95{,}000 - 1{,}500(p_1 + p_2/2)$.
d. $100{,}000 - 4{,}500p_2$.
e. $95{,}000 - 2{,}250p_2$.

Difficulty:
Correct Answer: b

13. Professor Kremepuff's new, user-friendly textbook has just been published. This book will be used in classes for two years, after which it will be replaced by a new edition. The publisher charges a price of p_1 in the first year and p_2 in the second year. After the first year, bookstores buy back used copies for $p_2/2$ and resell them to students in the second year for p_2. (Students are indifferent between new and used copies.) The cost to a student of owning the book during the first year is therefore $p_1 - p_2/2$. In the first year of publication, the number of students willing to pay \$$v$ to own a copy of the book for a year is $50{,}000 - 500v$. The number of students taking the course in the first year who are willing to pay \$$w$ to keep the book for reference rather than sell it at the end of the year is $50{,}000 - 2{,}500w$. The number of persons who are taking the course in the second year and are willing to pay at least \$$p$ for a copy of the book is $30{,}000 - 500p$. If the publisher sets a price of p_1 in the first year and $p_2 <= p_1$ in the second year, then the total number of copies of the book that the publisher sells over the two years will be

a. $100{,}000 - 500(p_1 - p_2/2)$.
b. $80{,}000 - 500(p_1 + p_2/2)$.
c. $100{,}000 - 500p_1 - 500p_2$.
d. $100{,}000 - 1{,}500p_2$.
e. $80{,}000 - 750p_2$.

Difficulty:
Correct Answer: d

14. Professor Kremepuff's new, user-friendly textbook has just been published. This book will be used in classes for two years, after which it will be replaced by a new edition. The publisher charges a price of p_1 in the first year and p_2 in the second year. After the first year, bookstores buy back used copies for $p_2/2$ and resell them to students in the second year for p_2. (Students are indifferent between new and used copies.) The cost to a student of owning the book during the first year is therefore $p_1 - p_2/2$. In the first year of publication, the number of students willing to pay \$$v$ to own a copy of the book for a year is $60{,}000 - 1{,}000v$. The number of students taking the course in the first year who are willing to pay \$$w$ to keep the book for reference rather than sell it at the end of the year is $60{,}000 - 5{,}000w$. The number of persons who are taking the course in the second year and are willing to pay at least \$$p$ for a copy of the book is $45{,}000 - 1{,}000p$. If the publisher sets a price of p_1 in the first year and $p_2 <= p_1$ in the second year, then the total number of copies of the book that the publisher sells over the two years will be

a. $120{,}000 - 3{,}000p_2$.
b. $120{,}000 - 1{,}000(p_1 - p_2/2)$.
c. $120{,}000 - 1{,}000p_1 - 1{,}000p_2$.
d. $105{,}000 - 1{,}000(p_1 + p_2/2)$.
e. $105{,}000 - 1{,}500p_2$.

Difficulty:
Correct Answer: d

15. Professor Kremepuff's new, user-friendly textbook has just been published. This book will be used in classes for two years, after which it will be replaced by a new edition. The publisher charges a price of p_1 in the first year and p_2 in the second year. After the first year, bookstores buy back used copies for $p_2/2$ and resell them to students in the second year for p_2. (Students are indifferent between new and used copies.) The cost to a student of owning the book during the first year is therefore $p_1 - p_2/2$. In the first year of publication, the number of students willing to pay \$$v$ to own a copy of the book for a year is $60{,}000 - 500v$. The number of students taking the course in the first year who are willing to pay \$$w$ to keep the book for reference rather than sell it at the end of the year is $60{,}000 - 2{,}500w$. The number of persons who are taking the course in the second year and are willing to pay at least \$$p$ for a copy of the book is $40{,}000 - 500p$. If the publisher sets a price of p_1 in the first year and $p_2 <= p_1$ in the second year, then the total number of copies of the book that the publisher sells over the two years will be

a. $120{,}000 - 1{,}500p_2$.
b. $120{,}000 - 500p_1 - 500p_2$.
c. $120{,}000 - 500(p_1 - p_2/2)$.
d. $100{,}000 - 500(p_1 + p_2/2)$.
e. $100{,}000 - 750p_2$.

CHAPTER 36 | Public Goods

MULTIPLE CHOICE

Difficulty:
Correct Answer: a

1. Just north of the town of Muskrat, Ontario, in Problem 1, is the town of Brass Monkey, population 4,500. Brass Monkey, like Muskrat, has a single public good, the town skating rink and a single private good, Labatt Ale. Everyone's utility function is $U_i(X_i, Y) = X_i - 81/Y$, where X_i is the number of bottles of ale consumed by i and Y is the size of the skating rink in square meters. The price of ale is \$1 per bottle. The cost of the skating rink to the city is \$5 per square meter. Everyone has an income of at least \$5,000. What is the Pareto efficient size for the town skating rink?
   a. 270 square meters.
   b. 390 square meters.
   c. 195 square meters.
   d. 545 square meters.
   e. None of the above.

Difficulty:
Correct Answer: b

2. Just north of the town of Muskrat, Ontario, in Problem 1, is the town of Brass Monkey, population 800. Brass Monkey, like Muskrat, has a single public good, the town skating rink and a single private good, Labatt Ale. Everyone's utility function is $U_i(X_i, Y) = X_i - 121/Y$, where X_i is the number of bottles of ale consumed by i and Y is the size of the skating rink in square meters. The price of ale is \$1 per bottle. The cost of the skating rink to the city is \$8 per square meter. Everyone has an income of at least \$5,000. What is the Pareto efficient size for the town skating rink?
   a. 230 square meters.
   b. 110 square meters.
   c. 225 square meters.
   d. 115 square meters.
   e. None of the above.

Difficulty:
Correct Answer: d

3. Just north of the town of Muskrat, Ontario, in Problem 1, is the town of Brass Monkey, population 12,800. Brass Monkey, like Muskrat, has a single public good, the town skating rink and a single private good, Labatt Ale. Everyone's utility function is $U_i(X_i, Y) = X_i - 121/Y$, where X_i is the number of bottles of ale consumed by i and Y is the size of the skating rink in square meters. The price of ale is \$1 per bottle. The cost of the skating rink to the city is \$8 per square meter. Everyone has an income of at least \$5,000. What is the Pareto efficient size for the town skating rink?
   a. 560 square meters.
   b. 885 square meters.
   c. 280 square meters.
   d. 440 square meters.
   e. None of the above.

Difficulty:
Correct Answer: a

4. Just north of the town of Muskrat, Ontario, in Problem 1, is the town of Brass Monkey, population 700. Brass Monkey, like Muskrat, has a single public good, the town skating rink and a single private good, Labatt Ale. Everyone's utility function is $U_i(X_i, Y) = X_i - 121/Y$, where X_i is the number of bottles of ale consumed by i and Y is the size of the skating rink in square meters. The price of ale is \$1 per bottle. The cost of the skating rink to the city is \$7 per square meter. Everyone has an income of at least \$5,000. What is the Pareto efficient size for the town skating rink?
   a. 110 square meters.
   b. 115 square meters.
   c. 230 square meters.
   d. 225 square meters.
   e. None of the above.

Difficulty:
Correct Answer: d

5. Just north of the town of Muskrat, Ontario, in Problem 1, is the town of Brass Monkey, population 700. Brass Monkey, like Muskrat, has a single public good, the town skating rink and a single private good, Labatt Ale. Everyone's utility function is $U_i(X_i, Y) = X_i - 144/Y$, where X_i is the number of bottles of ale consumed by i and Y is the size of the skating rink in square meters. The price of ale is $1 per bottle. The cost of the skating rink to the city is $7 per square meter. Everyone has an income of at least $5,000. What is the Pareto efficient size for the town skating rink?
   a. 120 square meters.
   b. 245 square meters.
   c. 240 square meters.
   d. 120 square meters.
   e. None of the above.

Difficulty:
Correct Answer: d

6. Recall Bob and Ray in Problem 4. They are thinking of buying a sofa. Bob's utility function is $U_B(S, M_B) = (1 + S)M_B$ and Ray's utility function is $U_R(S, M_R) = (3 + S)M_R$, where $S = 0$ if they don't get the sofa and $S = 1$ if they do and where M_B and M_R are the amounts of money they have respectively to spend on their private consumptions. Bob has a total of $2,000 to spend on the sofa and other stuff. Ray has a total of $1,600 to spend on the sofa and other stuff. The maximum amount that they could pay for the sofa and still arrange to both be better off than without it is
   a. $2,100.
   b. $533.33.
   c. $750.
   d. $1,400.
   e. $2,800.

Difficulty:
Correct Answer: c

7. Recall Bob and Ray in Problem 4. They are thinking of buying a sofa. Bob's utility function is $U_B(S, M_B) = (1 + S)M_B$ and Ray's utility function is $U_R(S, M_R) = (2 + S)M_R$, where $S = 0$ if they don't get the sofa and $S = 1$ if they do and where M_B and M_R are the amounts of money they have respectively to spend on their private consumptions. Bob has a total of $2,000 to spend on the sofa and other stuff. Ray has a total of $3,000 to spend on the sofa and other stuff. The maximum amount that they could pay for the sofa and still arrange to both be better off than without it is
   a. $3,000.
   b. $1,500.
   c. $2,000.
   d. $1,050.
   e. $4,000.

Difficulty:
Correct Answer: b

8. Recall Bob and Ray in Problem 4. They are thinking of buying a sofa. Bob's utility function is $U_B(S, M_B) = (1 + S)M_B$ and Ray's utility function is $U_R(S, M_R) = (3 + S)M_R$, where $S = 0$ if they don't get the sofa and $S = 1$ if they do and where M_B and M_R are the amounts of money they have respectively to spend on their private consumptions. Bob has a total of $1,200 to spend on the sofa and other stuff. Ray has a total of $4,000 to spend on the sofa and other stuff. The maximum amount that they could pay for the sofa and still arrange to both be better off than without it is
   a. $1,333.33.
   b. $1,600.
   c. $850.
   d. $2,400.
   e. $3,200.

Difficulty:
Correct Answer: b

9. Recall Bob and Ray in Problem 4. They are thinking of buying a sofa. Bob's utility function is $U_B(S, M_B) = (1 + S)M_B$ and Ray's utility function is $U_R(S, M_R) = (4 + S)M_R$, where $S = 0$ if they don't get the sofa and $S = 1$ if they do and where M_B and M_R are the amounts of money they have respectively to spend on their private consumptions. Bob has a total of $800 to spend on the sofa and other stuff. Ray has a total of $4,000 to spend on the sofa and other stuff. The maximum amount that they could pay for the sofa and still arrange to both be better off than without it is
   a. $1,000.
   b. $1,200.
   c. $1,800.
   d. $650.
   e. $2,400.

Difficulty:
Correct Answer: c

10. Recall Bob and Ray in Problem 4. They are thinking of buying a sofa. Bob's utility function is $U_B(S, M_B) = (1 + S)M_B$ and Ray's utility function is $U_R(S, M_R) = (2 + S)M_R$, where $S = 0$ if they don't get the sofa and $S = 1$ if they do and where M_B and M_R are the amounts of money they have respectively to spend on their private consumptions. Bob has a total of $1,200 to spend on the sofa and other stuff. Ray has a total of $1,200 to spend on the sofa and other stuff. The maximum amount that they could pay for the sofa and still arrange to both be better off than without it is
   a. $1,500.
   b. $600.
   c. $1,000.
   d. $550.
   e. $2,000.

Difficulty:
Correct Answer: c

11. Recall Bonnie and Clyde from Problem 5. Suppose that their total profits are $160H$, where H is the number of hours they work per year. Their utility functions are, respectively, $U_B(C_B, H) = C_B - 0.01H^2$ and $U_C(C_C, H) = C_C - 0.04H^2$, where C_B and C_C are their private goods consumptions and H is the number of hours they work per year. If they find a Pareto optimal choice of hours of work and income distribution, the number of hours they work per year is
   a. 1,700.
   b. 2,400.
   c. 1,600.
   d. 750.
   e. 850.

Difficulty:
Correct Answer: b

12. Recall Bonnie and Clyde from Problem 5. Suppose that their total profits are $256H$, where H is the number of hours they work per year. Their utility functions are, respectively, $U_B(C_B, H) = C_B - 0.04H^2$ and $U_C(C_C, H) = C_C - 0.04H^2$, where C_B and C_C are their private goods consumptions and H is the number of hours they work per year. If they find a Pareto optimal choice of hours of work and income distribution, the number of hours they work per year is
   a. 2,400.
   b. 1,600.
   c. 1,700.
   d. 750.
   e. 850.

Difficulty:
Correct Answer: a

13. Recall Bonnie and Clyde from Problem 5. Suppose that their total profits are $72H$, where H is the number of hours they work per year. Their utility functions are, respectively, $U_B(C_B, H) = C_B - 0.03H^2$ and $U_C(C_C, H) = C_C - 0.03H^2$, where C_B and C_C are their private goods consumptions and H is the number of hours they work per year. If they find a Pareto optimal choice of hours of work and income distribution, the number of hours they work per year is
   a. 600.
   b. 700.
   c. 900.
   d. 250.
   e. 350.

Difficulty:
Correct Answer: d

14. Recall Bonnie and Clyde from Problem 5. Suppose that their total profits are $192H$, where H is the number of hours they work per year. Their utility functions are, respectively, $U_B(C_B, H) = C_B - 0.02H^2$ and $U_C(C_C, H) = C_C - 0.04H^2$, where C_B and C_C are their private goods consumptions and H is the number of hours they work per year. If they find a Pareto optimal choice of hours of work and income distribution, the number of hours they work per year is
   a. 750.
   b. 2,400.
   c. 1,700.
   d. 1,600.
   e. 850.

Difficulty:
Correct Answer: a

15. Recall Bonnie and Clyde from Problem 5. Suppose that their total profits are $140H$, where H is the number of hours they work per year. Their utility functions are, respectively, $U_B(C_B, H) = C_B - 0.03H^2$ and $U_C(C_C, H) = C_C - 0.02H^2$, where C_B and C_C are their private goods consumptions and H is the number of hours they work per year. If they find a Pareto optimal choice of hours of work and income distribution, the number of hours they work per year is
   a. 1,400.
   b. 2,100.
   c. 1,500.
   d. 650.
   e. 750.

Difficulty:
Correct Answer: b

16. Recall Lucy and Melvin from Problem 6. Lucy's utility function is $2X_L + G$ and Melvin's utility function is $X_M G$, where G is their expenditures on the public goods they share in their apartment and where X_L and X_M are their respective private consumption expenditures. The total amount they have to spend on private goods and public goods is $24,000. They agree on a Pareto optimal pattern of expenditures in which the amount that is spent on Lucy's private consumption is $9,000. How much do they spend on public goods?
   a. $5,000
   b. $10,000
   c. $7,050
   d. $2,500
   e. There is not enough information here to be able to determine the answer.

Difficulty:
Correct Answer: d

17. Recall Lucy and Melvin from Problem 6. Lucy's utility function is $2X_L + G$ and Melvin's utility function is $X_M G$, where G is their expenditures on the public goods they share in their apartment and where X_L and X_M are their respective private consumption expenditures. The total amount they have to spend on private goods and public goods is \$33,000. They agree on a Pareto optimal pattern of expenditures in which the amount that is spent on Lucy's private consumption is \$9,000. How much do they spend on public goods?
    a. \$8,550
    b. \$4,000
    c. \$8,000
    d. \$16,000
    e. There is not enough information here to be able to determine the answer.

Difficulty:
Correct Answer: b

18. Recall Lucy and Melvin from Problem 6. Lucy's utility function is $2X_L + G$ and Melvin's utility function is $X_M G$, where G is their expenditures on the public goods they share in their apartment and where X_L and X_M are their respective private consumption expenditures. The total amount they have to spend on private goods and public goods is \$39,000. They agree on a Pareto optimal pattern of expenditures in which the amount that is spent on Lucy's private consumption is \$9,000. How much do they spend on public goods?
    a. \$9,550
    b. \$20,000
    c. \$5,000
    d. \$10,000
    e. There is not enough information here to be able to determine the answer.

Difficulty:
Correct Answer: b

19. Recall Lucy and Melvin from Problem 6. Lucy's utility function is $2X_L + G$ and Melvin's utility function is $X_M G$, where G is their expenditures on the public goods they share in their apartment and where X_L and X_M are their respective private consumption expenditures. The total amount they have to spend on private goods and public goods is \$21,000. They agree on a Pareto optimal pattern of expenditures in which the amount that is spent on Lucy's private consumption is \$6,000. How much do they spend on public goods?
    a. \$5,550
    b. \$10,000
    c. \$2,500
    d. \$5,000
    e. There is not enough information here to be able to determine the answer.

Difficulty:
Correct Answer: d

20. Recall Lucy and Melvin from Problem 6. Lucy's utility function is $2X_L + G$ and Melvin's utility function is $X_M G$, where G is their expenditures on the public goods they share in their apartment and where X_L and X_M are their respective private consumption expenditures. The total amount they have to spend on private goods and public goods is \$24,000. They agree on a Pareto optimal pattern of expenditures in which the amount that is spent on Lucy's private consumption is \$6,000. How much do they spend on public goods?
    a. \$6,000
    b. \$3,000
    c. \$6,050
    d. \$12,000
    e. There is not enough information here to be able to determine the answer.

CHAPTER 37 Asymmetric Information

MULTIPLE CHOICE

Difficulty:
Correct Answer: a

1. Suppose that low-productivity workers all have marginal products of 10 and high-productivity workers all have marginal products of 15. The community has equal numbers of each type of worker. The local community college offers a course in microeconomics. High-productivity workers think taking this course is as bad as a wage cut of $2, and low-productivity workers think it is as bad as a wage cut of $4.
   a. There is a separating equilibrium in which high-productivity workers take the course and are paid $15 and low-productivity workers do not take the course and are paid $10.
   b. There is no separating equilibrium and no pooling equilibrium.
   c. There is no separating equilibrium, but there is a pooling equilibrium in which everybody is paid $12.50.
   d. There is a separating equilibrium in which high-productivity workers take the course and are paid $17 and low-productivity workers do not take the course and are paid $10.
   e. There is a separating equilibrium in which high-productivity workers take the course and are paid $15 and low-productivity workers are paid $12.50.

Difficulty:
Correct Answer: d

2. Suppose that low-productivity workers all have marginal products of 10 and high-productivity workers all have marginal products of 16. The community has equal numbers of each type of worker. The local community college offers a course in microeconomics. High-productivity workers think taking this course is as bad as a wage cut of $2, and low-productivity workers think it is as bad as a wage cut of $6.
   a. There is no separating equilibrium, but there is a pooling equilibrium in which everybody is paid $13.
   b. There is a separating equilibrium in which high-productivity workers take the course and are paid $18 and low-productivity workers do not take the course and are paid $10.
   c. There is no separating equilibrium and no pooling equilibrium.
   d. There is a separating equilibrium in which high-productivity workers take the course and are paid $16 and low-productivity workers do not take the course and are paid $10.
   e. There is a separating equilibrium in which high-productivity workers take the course and are paid $16 and low productivity workers are paid $13.

Difficulty:
Correct Answer: c

3. Suppose that low-productivity workers all have marginal products of 10 and high-productivity workers all have marginal products of 16. The community has equal numbers of each type of worker. The local community college offers a course in microeconomics. High-productivity workers think taking this course is as bad as a wage cut of $3, and low-productivity workers think it is as bad as a wage cut of $5.
   a. There is a separating equilibrium in which high-productivity workers take the course and are paid $19 and low-productivity workers do not take the course and are paid $10.
   b. There is no separating equilibrium and no pooling equilibrium.
   c. There is a separating equilibrium in which high-productivity workers take the course and are paid $16 and low-productivity workers do not take the course and are paid $10.
   d. There is no separating equilibrium, but there is a pooling equilibrium in which everybody is paid $13.
   e. There is a separating equilibrium in which high-productivity workers take the course and are paid $16 and low-productivity workers are paid $13.

Difficulty:
Correct Answer: b

4. Suppose that low-productivity workers all have marginal products of 10 and high-productivity workers all have marginal products of 16. The community has equal numbers of each type of worker. The local community college offers a course in microeconomics. High-productivity workers think taking this course is as bad as a wage cut of $2, and low-productivity workers think it is as bad as a wage cut of $4.
   a. There is a separating equilibrium in which high-productivity workers take the course and are paid $18 and low-productivity workers do not take the course and are paid $10.
   b. There is a separating equilibrium in which high-productivity workers take the course and are paid $16 and low-productivity workers do not take the course and are paid $10.
   c. There is no separating equilibrium and no pooling equilibrium.
   d. There is no separating equilibrium, but there is a pooling equilibrium in which everybody is paid $13.
   e. There is a separating equilibrium in which high-productivity workers take the course and are paid $16 and low-productivity workers are paid $13.

Difficulty:
Correct Answer: a

5. Suppose that low-productivity workers all have marginal products of 10 and high-productivity workers all have marginal products of 12. The community has equal numbers of each type of worker. The local community college offers a course in microeconomics. High-productivity workers think taking this course is as bad as a wage cut of $5, and low-productivity workers think it is as bad as a wage cut of $9.
   a. There is no separating equilibrium, but there is a pooling equilibrium in which everybody is paid $11.
   b. There is a separating equilibrium in which high-productivity workers take the course and are paid $12 and low-productivity workers do not take the course and are paid $10.
   c. There is no separating equilibrium and no pooling equilibrium.
   d. There is a separating equilibrium in which high-productivity workers take the course and are paid $17 and low-productivity workers do not take the course and are paid $10.
   e. There is a separating equilibrium in which high-productivity workers take the course and are paid $12 and low-productivity workers are paid $11.

Difficulty:
Correct Answer: a

6. Suppose that in Enigma, Ohio, klutzes have a productivity of $1,000 and kandos have a productivity of $4,000 per month. You can't tell klutzes from kandos by looking at them or asking them, and it is too expensive to monitor individual productivity. Kandos, however, have more patience than klutzes. Listening to an hour of dull lectures is as bad losing $200 for a klutz and $150 for a kando. There will be a separating equilibrium in which anybody who attends a course of H hours of lectures is paid $4,000 per month and anybody who does not is paid $1,000 per month
   a. if $15 < H < 20$.
   b. if $15 < H < 40$.
   c. for all positive values of H.
   d. only in the limit as H approaches infinity.
   e. if $12.50 < H < 16.67$.

Difficulty:
Correct Answer: c

7. Suppose that in Enigma, Ohio, klutzes have a productivity of $1,000 and kandos have a productivity of $5,000 per month. You can't tell klutzes from kandos by looking at them or asking them, and it is too expensive to monitor individual productivity. Kandos, however, have more patience than klutzes. Listening to an hour of dull lectures is as bad as losing $300 for a klutz and $150 for a kando. There will be a separating equilibrium in which anybody who attends a course of H hours of lectures is paid $5,000 per month and anybody who does not is paid $1,000 per month
   a. if $13.33 < H < 53.33$.
   b. only in the limit as H approaches infinity.
   c. if $13.33 < H < 26.67$.
   d. for all positive values of H.
   e. if $11.67 < H < 23.33$.

Difficulty:
Correct Answer: a

8. Suppose that in Enigma, Ohio, klutzes have a productivity of $1,000 and kandos have a productivity of $4,000 per month. You can't tell klutzes from kandos by looking at them or asking them, and it is too expensive to monitor individual productivity. Kandos, however, have more patience than klutzes. Listening to an hour of dull lectures is as bad as losing $150 for a klutz and $50 for a kando. There will be a separating equilibrium in which anybody who attends a course of H hours of lectures is paid $4,000 per month and anybody who does not is paid $1,000 per month
   a. if $20 < H < 60$.
   b. if $20 < H < 120$.
   c. only in the limit as H approaches infinity.
   d. for all positive values of H.
   e. if $16.67 < H < 50$.

Difficulty:
Correct Answer: a

9. Suppose that in Enigma, Ohio, klutzes have a productivity of $1,000 and kandos have a productivity of $5,000 per month. You can't tell klutzes from kandos by looking at them or asking them, and it is too expensive to monitor individual productivity. Kandos, however, have more patience than klutzes. Listening to an hour of dull lectures is as bad as losing $150 for a klutz and $50 for a kando. There will be a separating equilibrium in which anybody who attends a course of H hours of lectures is paid $5,000 per month and anybody who does not is paid $1,000 per month
   a. if $26.67 < H < 80$.
   b. if $26.67 < H < 160$.
   c. only in the limit as H approaches infinity.
   d. for all positive values of H.
   e. if $23.33 < H < 70$.

Difficulty:
Correct Answer: c

10. Suppose that in Enigma, Ohio, klutzes have a productivity of $1,000 and kandos have a productivity of $4,000 per month. You can't tell klutzes from kandos by looking at them or asking them, and it is too expensive to monitor individual productivity. Kandos, however, have more patience than klutzes. Listening to an hour of dull lectures is as bad as losing $300 for a klutz and $150 for a kando. There will be a separating equilibrium in which anybody who attends a course of H hours of lectures is paid $4,000 per month and anybody who does not is paid $1,000 per month
    a. for all positive values of H.
    b. if $10 < H < 40$.
    c. if $10 < H < 20$.
    d. only in the limit as H approaches infinity.
    e. if $8.33 < H < 16.67$.

Difficulty:
Correct Answer: a

11. In Rustbucket, Michigan, there are 200 used cars for sale, half of them are good and half of them are lemons. Owners of lemons are willing to sell them for $500. Owners of good used cars are willing to sell them for prices above $900 but will keep them if the price is lower than $900. There is a large number of potential buyers who are willing to pay $700 for a lemon and $1,900 for a good car. Buyers can't tell good cars from bad, but original owners know.
    a. There will be an equilibrium in which all used cars sell for $1,300.
    b. The only equilibrium is one in which all used cars on the market are lemons and they sell for $700.
    c. There will be an equilibrium in which lemons sell for $500 and good used cars sell for $900.
    d. There will be an equilibrium in which all used cars sell for $700.
    e. There will be an equilibrium in which lemons sell for $700 and good used cars sell for $1,900.

Difficulty:
Correct Answer: d

12. In Rustbucket, Michigan, there are 200 used cars for sale, half of them are good and half of them are lemons. Owners of lemons are willing to sell them for $100. Owners of good used cars are willing to sell them for prices above $1,100 but will keep them if the price is lower than $1,100. There is a large number of potential buyers who are willing to pay $200 for a lemon and $2,100 for a good car. Buyers can't tell good cars from bad, but original owners know.
    a. There will be an equilibrium in which lemons sell for $100 and good used cars sell for $1,100.
    b. There will be an equilibrium in which all used cars sell for $600.
    c. The only equilibrium is one in which all used cars on the market are lemons and they sell for $200.
    d. There will be an equilibrium in which all used cars sell for $1,150.
    e. There will be an equilibrium in which lemons sell for $200 and good used cars sell for $2,100.

Difficulty:
Correct Answer: d

13. In Rustbucket, Michigan, there are 200 used cars for sale, half of them are good and half of them are lemons. Owners of lemons are willing to sell them for $200. Owners of good used cars are willing to sell them for prices above $1,100 but will keep them if the price is lower than $1,100. There is a large number of potential buyers who are willing to pay $500 for a lemon and $1,500 for a good car. Buyers can't tell good cars from bad, but original owners know.
    a. There will be an equilibrium in which all used cars sell for $650.
    b. There will be an equilibrium in which lemons sell for $200 and good used cars sell for $1,100.
    c. There will be an equilibrium in which all used cars sell for $1,000.
    d. The only equilibrium is one in which all used cars on the market are lemons and they sell for $500.
    e. There will be an equilibrium in which lemons sell for $500 and good used cars sell for $1,500.

Difficulty:
Correct Answer: c

14. In Rustbucket, Michigan, there are 200 used cars for sale, half of them are good and half of them are lemons. Owners of lemons are willing to sell them for \$300. Owners of good used cars are willing to sell them for prices above \$1,300 but will keep them if the price is lower than \$1,300. There is a large number of potential buyers who are willing to pay \$600 for a lemon and \$2,100 for a good car. Buyers can't tell good cars from bad, but original owners know.
    a. There will be an equilibrium in which all used cars sell for \$800.
    b. There will be an equilibrium in which lemons sell for \$300 and good used cars sell for \$1,300.
    c. There will be an equilibrium in which all used cars sell for \$1,350.
    d. The only equilibrium is one in which all used cars on the market are lemons and they sell for \$600.
    e. There will be an equilibrium in which lemons sell for \$600 and good used cars sell for \$2,100.

Difficulty:
Correct Answer: c

15. In Rustbucket, Michigan, there are 200 used cars for sale, half of them are good and half of them are lemons. Owners of lemons are willing to sell them for \$100. Owners of good used cars are willing to sell them for prices above \$1,300 but will keep them if the price is lower than \$1,300. There is a large number of potential buyers who are willing to pay \$200 for a lemon and \$2,300 for a good car. Buyers can't tell good cars from bad, but original owners know.
    a. There will be an equilibrium in which all used cars sell for \$1,250.
    b. There will be an equilibrium in which all used cars sell for \$700.
    c. The only equilibrium is one in which all used cars on the market are lemons and they sell for \$200.
    d. There will be an equilibrium in which lemons sell for \$100 and good used cars sell for \$1,300.
    e. There will be an equilibrium in which lemons sell for \$200 and good used cars sell for \$2,300.

Difficulty:
Correct Answer: d

16. Suppose that in New Crankshaft, Pennsylvania, the quality distribution of the 4,000 used cars on the market is such that the number of used cars of value less than V is $V/2$. Original owners must sell their used cars. Original owners know what their cars are worth, but buyers can't determine a car's value until they buy it. An owner can either take his car to an appraiser and pay the appraiser \$400 to appraise the car (accurately and credibly) or sell the car unappraised. In equilibrium, car owners will have their cars appraised if and only if their value is at least
    a. \$400.
    b. \$2,000.
    c. \$1,200.
    d. \$800.
    e. \$1,600.

Difficulty:
Correct Answer: b

17. Suppose that in New Crankshaft, Pennsylvania, the quality distribution of the 8,000 used cars on the market is such that the number of used cars of value less than V is $V/2$. Original owners must sell their used cars. Original owners know what their cars are worth, but buyers can't determine a car's value until they buy it. An owner can either take his car to an appraiser and pay the appraiser \$300 to appraise the car (accurately and credibly) or sell the car unappraised. In equilibrium, car owners will have their cars appraised if and only if their value is at least
    a. \$300.
    b. \$600.
    c. \$4,000.
    d. \$900.
    e. \$1,200.

Difficulty:
Correct Answer: a

18. Suppose that in New Crankshaft, Pennsylvania, the quality distribution of the 3,000 used cars on the market is such that the number of used cars of value less than V is $V/2$. Original owners must sell their used cars. Original owners know what their cars are worth, but buyers can't determine a car's value until they buy it. An owner can either take his car to an appraiser and pay the appraiser \$100 to appraise the car (accurately and credibly) or sell the car unappraised. In equilibrium, car owners will have their cars appraised if and only if their value is at least
    a. \$200.
    b. \$300.
    c. \$1,500.
    d. \$100.
    e. \$400.

Difficulty:
Correct Answer: d

19. Suppose that in New Crankshaft, Pennsylvania, the quality distribution of the 2,000 used cars on the market is such that the number of used cars of value less than V is $V/2$. Original owners must sell their used cars. Original owners know what their cars are worth, but buyers can't determine a car's value until they buy it. An owner can either take his car to an appraiser and pay the appraiser \$500 to appraise the car (accurately and credibly) or sell the car unappraised. In equilibrium, car owners will have their cars appraised if and only if their value is at least
    a. \$1,500.
    b. \$1,000.
    c. \$500.
    d. \$1,000.
    e. \$2,000.

Difficulty:
Correct Answer: b

20. Suppose that in New Crankshaft, Pennsylvania, the quality distribution of the 5,000 used cars on the market is such that the number of used cars of value less than V is $V/2$. Original owners must sell their used cars. Original owners know what their cars are worth, but buyers can't determine a car's value until they buy it. An owner can either take his car to an appraiser and pay the appraiser \$200 to appraise the car (accurately and credibly) or sell the car unappraised. In equilibrium, car owners will have their cars appraised if and only if their value is at least
    a. \$2,500.
    b. \$400.
    c. \$200.
    d. \$600.
    e. \$800.