This Review is comprehensive but should not be the only material used to study for the Final Exam. It should not be considered a preview of the Final Exam. Studying your previous tests, quizzes, homework, class notes, text discussions, etc. will prepare you to do well on the Final Exam. There may be questions on the Final Exam that are unlike questions on this Review, and vice versa. No question on this Review will be duplicated exactly on the Final Exam. This Review is much longer than the Final Exam. You may obtain help working on this Review in the Center for Math and Statistics Support located in the Academic Support Center, OMB N925.

1. Solve for x. Express your answer as an integer or simplified fraction.

   $-3(2x+2)-5=-4(x+3)+2x$

   - **A.** $-\frac{3}{2}$
   - **B.** $\frac{1}{8}$
   - **C.** $\frac{9}{4}$
   - **D.** $\frac{1}{4}$

2. Solve for x. Express your answer as an integer or simplified fraction.

   $\frac{x}{16}-\frac{5}{8}=\frac{x+6}{8}$

   - **A.** -22
   - **B.** -17
   - **C.** -16
   - **D.** -11

3. Assume that the price per unit d of a certain item to the consumer is given by the equation $d = 35 - 0.10x$, where x is the number of units in demand. The price per unit from the supplier is given by the equation $s = 0.2x + 20$, where x is the number of units supplied. Find the equilibrium price and the equilibrium quantity.

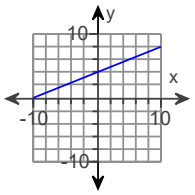
   - **A.** equilibrium price: \$50 per unit; equilibrium quantity: 30 units
   - **B.** equilibrium price: \$30 per unit; equilibrium quantity: 50 units
   - **C.** equilibrium price: \$35 per unit; equilibrium quantity: 50 units
   - **D.** equilibrium price: \$20 per unit; equilibrium quantity: 50 units

4. A piece of equipment was purchased by a company for \$10,000 and is assumed to have a salvage value of \$3,000 in 10 years. If its value is depreciated linearly from \$10,000 to \$3,000, find a linear equation in the form $V = mt + b$, t time in years, that will give the salvage value V at any time t, $0 \le t \le 10$.

   - **A.** $V = 700t + 3{,}000$
   - **B.** $V = -700t + 10{,}000$
   - **C.** $V = 700t - 3{,}000$
   - **D.** $V = -700t - 10{,}000$

5. Graph the linear equation $2x - 5y = 20$

A.



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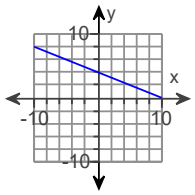

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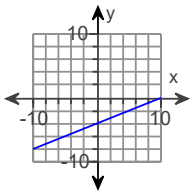

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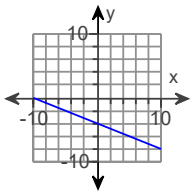


6. Find the slope and y-intercept of the graph of the equation.

$y = 2x - 6$

A. Slope = 2, y-intercept = -6

B. Slope = 2, y-intercept = 6

C. Slope = -6, y-intercept = 2

D. Slope = 6, y-intercept = 2

7. Write an equation of the line with the indicated slope and y-intercept.

Slope = 2, y-intercept = -4

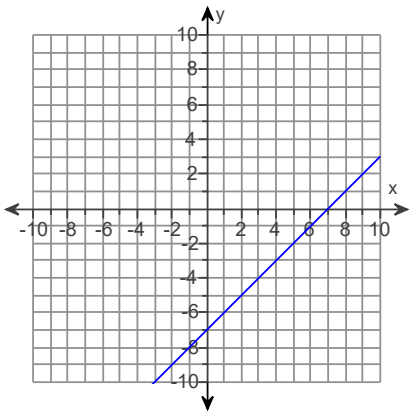
A. $y = -2x - 4$

B. $y = 4x + 2$

C. $y = 2x - 4$

D. $y = 4x - 2$

8. Use the graph to find the slope, x-intercept, and y-intercept of the line.



A. slope = 7
x-intercept = (6, 0)
y-intercept = (− 8, 0)

B. slope = − 7
x-intercept = (6, 0)
y-intercept = (0, − 8)

C. slope = 1
x-intercept = (7, 0)
y-intercept = (0, − 7)

D. slope = − 1
x-intercept = (− 7, 0)
y-intercept = (0, 7)

9. Write the standard equation (Ax + By = C) for a line with the given characteristics.

m = − 4, y-intercept (0, − 7)

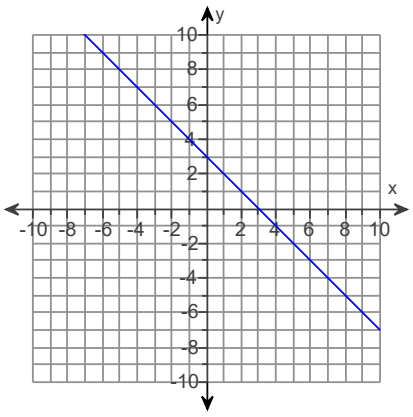
- **A.** 7x − 4y = 0
- **B.** −4x − y = − 7
- **C.** 4x + y = − 7
- **D.** − 4x + y = 7

10. Write the slope-intercept equation (y = mx + b) for a line with the given characteristics.

m = 3, passing through (1, − 2)

- **A.** y = 3x + 5
- **B.** y = 3x − 2
- **C.** y = 3x + 1
- **D.** y = 3x − 5

11. Use the graph to find the slope-intercept form of the equation of the line.



- **A.** y = x − 3
- **B.** y = − x + 3
- **C.** y = −3x + 3
- **D.** y = x + 3

12. Find the line passing through the two points (10,9) and (10,1). Write the equation in standard form.

- **A.** x = 10
- **B.** x + 8y = 0
- **C.** x + y = 10
- **D.** y = 8

13. Find the line passing through the two points (− 3,6) and (6,6). Write the equation in standard form.

- **A.** x − y = 6
- **B.** y = 6
- **C.** 3x + y = 0
- **D.** x = 3

14. Find the slope of the line containing the given points.

(4, − 7) and (− 7,1)

- **A.** $-\frac{1}{2}$
- **B.** $-\frac{8}{11}$
- **C.** $\frac{8}{3}$
- **D.** $\frac{3}{4}$

15. Find the standard form of the equation of the line passing through the two points.

(2, − 6) and (− 9,6)

- **A.** $12x + 11y = -42$
- **B.** $8x - 15y = -18$
- **C.** $-8x + 15y = -18$
- **D.** $-12x + 11y = -42$

16. The cost equation for a widget is given by C(x) = 0.97x + 500, while the revenue equation for the widget is given by R(x) = 5.97x where x represents the quantity in hundreds. Find the number of widgets that must be produced and sold to break-even.

- **A.** 100
- **B.** 500
- **C.** 5,000
- **D.** 10,000

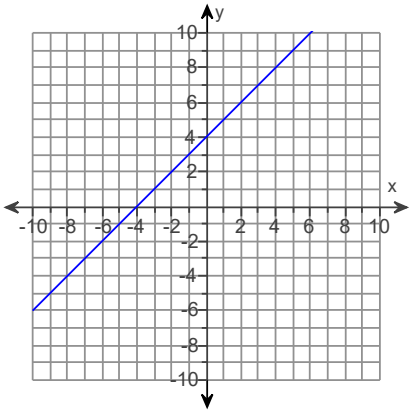
17. The cost for labor associated with fixing a washing machine is computed as follows: There is a fixed charge of $25 for the repairman to come to the house, to which a charge of $20 per hour is added. Find an equation that can be used to determine the labor cost, C, of a repair that takes x hours. Write the final answer in the form C = mx + b.

- **A.** $C = -20x + 25$
- **B.** $C = 20x + 25$
- **C.** $C = 45x$
- **D.** $C = 25x + 20$

18. The mathematical model C = 600x + 30,000 represents the cost in dollars a company has in manufacturing x items during a month. Using this model, how items can be produced for a total cost of $390,000?

- **A.** 50
- **B.** 3,000
- **C.** 600
- **D.** 36,000

19. Use the graph to find the average rate of change.



- **A.** 4
- **B.** 1
- **C.** − 1
- **D.** − 4

20. Suppose the sales of a particular brand of MP3 player satisfy the relationship S = 200x + 3800, where S represents the number of sales in year x, with x = 0 corresponding to 2002. Find the number of sales in 2005.

- **A.** 12,600
- **B.** 6,400
- **C.** 4,400
- **D.** 4,200

21. Solve the system of equations by graphing.

$$y = x + 7$$
$$y = 2x + 10$$

- **A.** (− 3 , 4)
- **B.** (4, − 3)
- **C.** (3, − 4)
- **D.** no solution

22. Solve the system of equations by substitution.

$$x - 2y = -2$$
$$y = 3$$

- **A.** (4, 3)
- **B.** (− 8 , 3)
- **C.** (− 4, 3)
- **D.** (3, 4)

23. Solve the system of equations by elimination.

$$x - 5y = 35$$
$$5x - 4y = 28$$

- **A.** (1 , − 7)
- **B.** (7, 0)
- **C.** (0, − 7)
- **D.** (1, − 8)

24. Solve the system of equations by elimination.

$x + y = 6$

$x - y = 6$

- **A.** $(-6, 0)$
- **B.** $(0, -6)$
- **C.** $(6, 0)$
- **D.** Infinite solutions

25. Sam and Chad are ticket-sellers at their class play. Sam is selling student tickets for $2.00 each, and Chad selling adult tickets for $5.50 each. If their total income for 24 tickets was $83.00, how many tickets did Sam sell?

- **A.** 14 tickets
- **B.** 15 tickets
- **C.** 10 tickets
- **D.** 16 tickets

26. Write the augmented matrix for the system.

$8x_1 + 9x_2 = 117$

$4x_1 + 6x_2 = 66$

- **A.** $\left[\begin{array}{cc|c} 8 & 4 & 117 \\ 9 & 6 & 66 \end{array}\right]$
- **B.** $\left[\begin{array}{cc|c} 8 & 9 & 66 \\ 6 & 4 & 117 \end{array}\right]$
- **C.** $\left[\begin{array}{cc|c} 117 & 9 & 8 \\ 66 & 4 & 6 \end{array}\right]$
- **D.** $\left[\begin{array}{cc|c} 8 & 9 & 117 \\ 4 & 6 & 66 \end{array}\right]$

27. Perform the indicated row operations on the following matrix.

$\left[\begin{array}{cc|c} 1 & -5 & 4 \\ 2 & 2 & 5 \end{array}\right]; \; -3R_1 \rightarrow R_1$

- **A.** $\left[\begin{array}{cc|c} 1 & -5 & 4 \\ -1 & 17 & 7 \end{array}\right]$
- **B.** $\left[\begin{array}{cc|c} 1 & -5 & 4 \\ -6 & -6 & -15 \end{array}\right]$
- **C.** $\left[\begin{array}{cc|c} -3 & 15 & -12 \\ 2 & 2 & 5 \end{array}\right]$
- **D.** $\left[\begin{array}{cc|c} -3 & -5 & 4 \\ -6 & 2 & 5 \end{array}\right]$

28. Identify the row operation that produces the resulting matrix.

$$\left[\begin{array}{cc|c} 1 & 0 & 2 \\ -1 & 1 & 3 \end{array}\right] \rightarrow \left[\begin{array}{cc|c} 1 & 0 & 2 \\ 0 & 1 & 5 \end{array}\right]$$

- **A.** $-R_1 + R_2 \rightarrow R_2$
- **B.** $-R_2 + R_1 \rightarrow R_2$
- **C.** $R_1 + R_2 \rightarrow R_2$
- **D.** $R_1 + R_2 \rightarrow R_1$

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29. Write a system of equations associated with the augmented matrix. Do not try to solve.

$$\left[\begin{array}{ccc|c} 3 & 3 & 5 & -2 \\ 5 & 0 & 7 & 4 \\ 3 & 6 & 0 & 2 \end{array}\right]$$

- **A.** $3x_1 + 3x_2 + 5x_3 = -2$
  $5x_1 + 7x_3 = -4$
  $3x_1 + 6x_2 = -2$
- **B.** $3x_1 + 3x_2 + 5x_3 = 2$
  $5x_1 + 7x_3 = 4$
  $3x_1 + 6x_2 = 2$
- **C.** $3x_1 - 3x_2 + 5x_3 = -2$
  $5x_1 + 7x_3 = 4$
  $3x_1 + 6x_2 = 2$
- **D.** $3x_1 + 3x_2 + 5x_3 = -2$
  $5x_1 + 7x_3 = 4$
  $3x_1 + 6x_2 = 2$

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30. Solve the linear system corresponding to the following augmented matrix.

$$\left[\begin{array}{cc|c} 3 & 6 & 24 \\ 2 & 3 & 11 \end{array}\right]$$

- **A.** $(0, 0)$
- **B.** $(-2, -5)$
- **C.** $(5, -2)$
- **D.** $(-2, 5)$

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31. The matrix is the final matrix form for a system of two linear equations in variables x_1 and x_2. Write the solution of the system.

$$\left[\begin{array}{cc|c} 1 & 0 & 5 \\ 0 & 1 & 3 \end{array}\right]$$

- **A.** $x_1 = -5$
  $x_2 = -3$
- **B.** $x_1 = 5$
  $x_2 = 3$
- **C.** $x_1 = 3$
  $x_2 = 5$
- **D.** $x_1 = 5$
  $x_2 = t$ for any real number t

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32. Use row operations to change the matrix to reduced form.

$$\left[\begin{array}{ccc|c} 1 & -1 & 0 & 1 \\ 0 & 4 & 8 & 4 \\ 0 & 0 & 0 & 0 \end{array}\right]$$

A. $\left[\begin{array}{ccc|c} 1 & 0 & 2 & 0 \\ 0 & 1 & 2 & 1 \\ 0 & 0 & 0 & 0 \end{array}\right]$

B. $\left[\begin{array}{ccc|c} 1 & 0 & 2 & 2 \\ 0 & 1 & 2 & 1 \\ 0 & 0 & 0 & 0 \end{array}\right]$

C. $\left[\begin{array}{ccc|c} 1 & -1 & 0 & 1 \\ 0 & 1 & 2 & 1 \\ 0 & 0 & 0 & 0 \end{array}\right]$

D. $\left[\begin{array}{ccc|c} 1 & 0 & 2 & 2 \\ 0 & 1 & 2 & 0 \\ 0 & 0 & 0 & 0 \end{array}\right]$

33. Solve using Gauss-Jordan elimination.

$x_1 + x_2 = 0$
$x_1 - x_2 = 12$

A. $x_1 = -5$ and $x_2 = -6$

B. $x_1 = 6$ and $x_2 = -6$

C. $x_1 = -6$ and $x_2 = -5$

D. $x_1 = 5$ and $x_2 = -5$

34. Solve using Gauss-Jordan elimination.

$x + y + z = 0$
$x - y + 3z = 16$
$2x + y + z = 2$

A. $x = 3, y = -5, z = 2$

B. $x = 3, y = 2, z = -5$

C. $x = 2, y = -5, z = 3$

D. No solution

35. Find the system of equations to model the problem. DO NOT SOLVE THIS SYSTEM.

There were 35,000 people at a ball game in Atlanta. The day's receipts were $290,000. How many people paid $14 for reserved seats and how many paid $6 for general admission? Let x represent the number of reserved seats and y represent the number of general admission seats.

A. $15{,}000x + 14y = 20{,}000$
$x + y = 6, x \geq 0, y \geq 0$

B. $25{,}000x + 14y = 35{,}000$
$x + y = 290{,}000, \ x \geq 0, y \geq 0$

C. $14x + 6y = 290{,}000$
$x + y = 35{,}000, \ x \geq 0, y \geq 0$

D. $20{,}000x + 14y = 6$
$x + y = 15{,}000, \ x \geq 0, y \geq 0$

36. Find the system of equations to model the problem. DO NOT SOLVE THIS SYSTEM.

Hurst's Feed & Seed sold to one customer 5 bushels of wheat, 2 of corn, and 3 of rye, for $31.00. To another customer he sold 2 bushels of wheat, 3 of corn, and 5 of rye, for $27.60. To a third customer he sold 3 bushels of wheat, 5 of corn, and 2 of rye for $32.70. What was the price per bushel for each of the different grains? Let x represent the price per bushel for wheat, y the price per bushel for corn, and z the price per bushel for rye. Assume $x > 0$, $y > 0$, and $z \geq 0$ for all systems.

- **A.** $5x + 2y + 3z = 31.00$
  $2x - 3y + 5z = 27.60$
  $3x + 5y + 2z = 32.70$
- **B.** $5x + 2y - 3z = 31.00$
  $2x + 3y - 5z = 27.60$
  $3x + 5y - 2z = 32.70$
- **C.** $5x + 2y + 3z = 31.00$
  $2x + 3y - 5z = 27.60$
  $3x + 5y - 2z = 32.70$
- **D.** $5x + 2y + 3z = 31.00$
  $2x + 3y + 5z = 27.60$
  $3x + 5y + 2z = 32.70$

37. Perform the operation, if possible.

$$\begin{bmatrix} -9 & 1 \\ 2 & 5 \end{bmatrix} + \begin{bmatrix} 6 & 2 \\ 2 & -3 \end{bmatrix}$$

- **A.** $\begin{bmatrix} -3 & -3 \\ 4 & 2 \end{bmatrix}$
- **B.** $\begin{bmatrix} -3 & 3 \\ 4 & 2 \end{bmatrix}$
- **C.** $\begin{bmatrix} 3 & 3 \\ 4 & 2 \end{bmatrix}$
- **D.** $\begin{bmatrix} -3 & -7 \\ -7 & -12 \end{bmatrix}$

38. Perform the operation, if possible.

Let $B = \begin{bmatrix} -1 & 4 & 7 & -3 \end{bmatrix}$. Find $-3B$.

- **A.** $\begin{bmatrix} -3 & 2 & 5 & -5 \end{bmatrix}$
- **B.** $\begin{bmatrix} 3 & 4 & 7 & -3 \end{bmatrix}$
- **C.** $\begin{bmatrix} -3 & 12 & 21 & -9 \end{bmatrix}$
- **D.** $\begin{bmatrix} 3 & -12 & -21 & 9 \end{bmatrix}$

39. Perform the operation, if possible.

$$\begin{bmatrix} -1 & 0 \\ 3 & 1 \end{bmatrix} - \begin{bmatrix} -1 & 3 \\ 3 & 1 \end{bmatrix}$$

- **A.** $\begin{bmatrix} 0 & -3 \\ 0 & 0 \end{bmatrix}$
- **B.** $\begin{bmatrix} 0 & 3 \\ 0 & 0 \end{bmatrix}$
- **C.** $\begin{bmatrix} -3 \end{bmatrix}$
- **D.** $\begin{bmatrix} -2 & 3 \\ 6 & 2 \end{bmatrix}$

40. Perform the operation, if possible.

Let $C = \begin{bmatrix} 1 \\ -3 \\ 2 \end{bmatrix}$ and $D = \begin{bmatrix} -1 \\ 3 \\ -2 \end{bmatrix}$. Find $C - 4D$.

- **A.** $\begin{bmatrix} -3 \\ 9 \\ -6 \end{bmatrix}$
- **B.** $\begin{bmatrix} 5 \\ -6 \\ 4 \end{bmatrix}$
- **C.** $\begin{bmatrix} 5 \\ -15 \\ 10 \end{bmatrix}$
- **D.** $\begin{bmatrix} -5 \\ 15 \\ -10 \end{bmatrix}$

41. Perform the operation, if possible.

Let $A = \begin{bmatrix} -1 & 5 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} -6 & -2 & 9 \\ -5 & -7 & -3 \\ 6 & -8 & 2 \end{bmatrix}$. Find AB.

- **A.** $\begin{bmatrix} 13 & 41 & 22 \end{bmatrix}$
- **B.** $\begin{bmatrix} -13 & -41 & -22 \end{bmatrix}$
- **C.** $\begin{bmatrix} 6 & -10 & 9 \\ 5 & -35 & -3 \\ -6 & -40 & 2 \end{bmatrix}$
- **D.** $\begin{bmatrix} -13 \\ -41 \\ -22 \end{bmatrix}$

42. Find the matrix product.

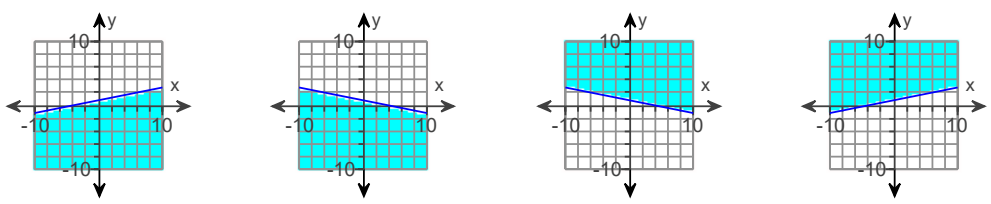
$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}\begin{bmatrix} 2 & 3 \\ 5 & 1 \end{bmatrix}$

- **A.** $\begin{bmatrix} \frac{1}{2} & \frac{1}{3} \\ \frac{1}{5} & 1 \end{bmatrix}$
- **B.** $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$
- **C.** $\begin{bmatrix} 2 & 3 \\ 5 & 1 \end{bmatrix}$
- **D.** $\begin{bmatrix} 3 & 2 \\ 1 & 5 \end{bmatrix}$

43. Graph the inequality.

$x + 5y \geq 4$

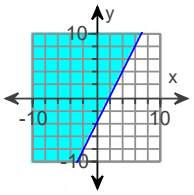
- **A.**
- **B.**
- **C.**
- **D.**



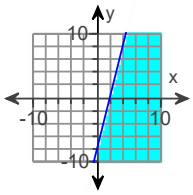
44. Graph the inequality.

$4x - 2y \leq 8$

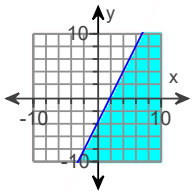
A.



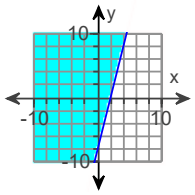
B.



C.



D.



45. Define the variable(s) and translate the sentence into an inequality. Student enrollment minus the withdrawal after the official class day is below 8000 students.

A. Let e = student enrollment and w = student withdrawals; $e + w > 8000$

B. Let e = student enrollment and w = student withdrawals; $e - w < 8000$

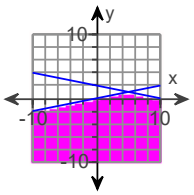
C. Let e = student enrollment and w = student withdrawals; $e - w \geq 8000$

D. Let e = student enrollment and w = student withdrawals; $e + w \leq 8000$

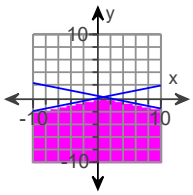
46. Graph the solution set of the system of linear inequalities and indicate whether the solution region is bounded or unbounded.

$$x \geq 5y$$
$$x + 5y \leq 2$$

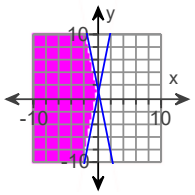
A. Unbounded



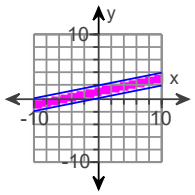
B. Unbounded



C. Unbounded



D. Bounded



47. Use graphical methods to solve the linear programming problem.

Minimize $z = 4x + 5y$ subject to $2x - 4y \leq 10$, $2x + y \geq 15$, $x \geq 0$, and $y \geq 0$.

A. Minimum of 39 when $x = 1$ and $y = 7$

B. Minimum of 33 when $x = 7$ and $y = 1$

C. Minimum of 75 when $x = 0$ and $y = 15$

D. Minimum of 20 when $x = 5$ and $y = 0$

48. Use graphical methods to solve the linear programming problem.

Maximize $z = 8x + 12y$ subject to $40x + 80y \leq 560$, $6x + 8y \leq 72$, $x \geq 0$, and $y \geq 0$.

A. Maximum of 96 when $x = 9$ and $y = 2$

B. Maximum of 120 when $x = 3$ and $y = 8$

C. Maximum of 92 when $x = 4$ and $y = 5$

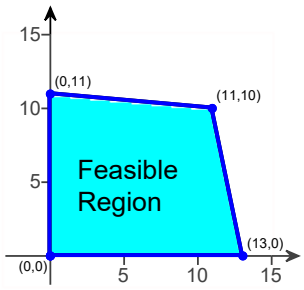
D. Maximum of 100 when $x = 8$ and $y = 3$

49. The WeR3D Company designs and sells two styles of 3D printed key chains: a double-sided logo and a single-sided logo. They can produce up to 24 key chains each day using up to 60 total man-hours of labor. It takes 3 man-hours to make one double-sided key chain and 2 man-hours to make one single-sided key chain. How many of each style of key chain should be made daily to maximize the company's profit, if the profit on a double-sided key chain is $4 and on an single-sided key chain is $3?

- **A.** 10 Double-Sided and 14 Single-Sided
- **B.** 12 Double-Sided and 12 Single-Sided
- **C.** 14 Double-Sided and 10 Single-Sided
- **D.** 14 Double-Sided and 14 Single-Sided

50. The graph shows the feasible region for a system of constrains with an objective function given by P = 5x + 2y.

Identify the corner point(s), and determine the maximum profit.



The coordinates of the corner point(s), and the maximum profit is

- **A.** (0, 11), (11, 10), (13, 0), (13, 11); maximum profit is P = 87
- **B.** (0,0), (0, 11), (11, 10), (13, 0); maximum profit is P = 75
- **C.** (0, 11), (13, 0); maximum profit is P = 65
- **D.** (0, 11), (11, 10), (13, 0); maximum profit is P = 95

51. Determine the domain of the function.

$$f(x) = \frac{x}{x-2}$$

- **A.** $x < 2$
- **B.** All real numbers
- **C.** All real numbers except 2
- **D.** No solution

52. Find $f(-9)$ when $f(x) = 5 - 6x^2$.

- **A.** 59
- **B.** -481
- **C.** 491
- **D.** 113

53. The point at which a company's costs equals its revenue is the break-even. C represents cost, in dollars, of x units of a product. R represents the revenue, in dollars, for the sale of x units. Find the number of units that must be produced and sold in order to break even.

$C = 15x + 12{,}000$
$R = 18x - 6000$

- **A.** 800
- **B.** 12,000
- **C.** 6000
- **D.** 545

54. Give the domain and range of the function.

$f(x) = x^2 + 6$

- **A.** Domain: $[6, \infty)$; Range: all real numbers
- **B.** Domain: $[0, \infty)$; Range: $[0, \infty)$
- **C.** Domain: all real numbers; Range: $[-5, \infty)$
- **D.** Domain: all real numbers; Range: $[6, \infty)$

55. How can the graph of $f(x) = 6 - (x - 1)^2$ be obtained from the graph of $y = x^2$?

- **A.** Shift it horizontally 1 unit to the right. Reflect it across the x-axis. Shift it 6 units up.
- **B.** Shift it horizontally 1 unit to the right. Reflect it across the y-axis. Shift it 6 units up.
- **C.** Shift it horizontally 1 unit to the right. Reflect it across the y-axis. Shift it 6 units down.
- **D.** Shift it horizontally 1 unit to the left. Reflect it across the x-axis. Shift it 6 units up.

56. Write an equation for a function that has a graph with the given transformations.

The shape of $y = \sqrt{x}$ is shifted 5 units to the left. Then the graph is shifted 7 units upward.

- **A.** $f(x) = 7\sqrt{x + 5}$
- **B.** $f(x) = \sqrt{x + 7} + 5$
- **C.** $f(x) = \sqrt{x - 5} + 7$
- **D.** $f(x) = \sqrt{x + 5} + 7$

57. Find the x-intercept(s) if they exist.

$x^2 + 6x + 5 = 0$

- **A.** $-1, -5$
- **B.** $\sqrt{5}, -\sqrt{5}$
- **C.** $10, -5$
- **D.** $1, 5$

---

58. Find the vertex form for the quadratic function. Then find each of the following:
(A) Intercepts
(B) Vertex
(C) Maximum or minimum
(D) Range

$f(x) = x^2 + 10x + 21$

- **A.** Standard form: $f(x) = (x-5)^2 - 4$
(A) x-intercepts: 3, 7; y-intercept: 21
(B) Vertex $(-5, -4)$
(C) Minimum: -4
(D) $y \geq -4$
- **B.** Standard form: $f(x) = (x+5)^2 - 4$
(A) x-intercepts: $-7, -3$; y-intercept: 21
(B) Vertex $(5, -4)$
(C) Minimum: -4
(D) $y \geq -4$
- **C.** Standard form: $f(x) = (x-5)^2 - 4$
(A) x-intercepts: $-7, -3$; y-intercept: 21
(B) Vertex $(-5, -4)$
(C) Maximum: -4
(D) $y \leq -4$
- **D.** Standard form: $f(x) = (x+5)^2 - 4$
(A) x-intercepts: $-7, -3$; y-intercept: 21
(B) Vertex $(-5, -4)$
(C) Minimum: -4
(D) $y \geq -4$

---

59. In economics, functions that involve revenue, cost and profit are used. Suppose R(x) and C(x) denote the total revenue and the total cost, respectively, of producing a new high-tech widget. The difference $P(x) = R(x) - C(x)$ represents the total profit for producing x widgets. Given $R(x) = 60x - 0.4x^2$ and $C(x) = 3x + 13$, find the equation for P(x).

- **A.** $P(x) = 3x + 13$
- **B.** $P(x) = -0.4x^2 + 57x - 13$
- **C.** $P(x) = -0.4x^2 + 63x + 13$
- **D.** $P(x) = 60x - 0.4x^2$

---

60. In economics, functions that involve revenue, cost and profit are used. Suppose R(x) and C(x) denote the total revenue and the total cost, respectively, of producing a new high-tech widget. The difference $P(x) = R(x) - C(x)$ represents the total profit for producing x widgets. Given $R(x) = 60x - 0.4x^2$ and $C(x) = 3x + 13$, find P(100).

- **A.** 313
- **B.** 2000
- **C.** 55,687
- **D.** 1687

61. Determine whether there is a maximum or minimum value for the given function, and find that value.

$f(x) = x^2 - 20x + 104$

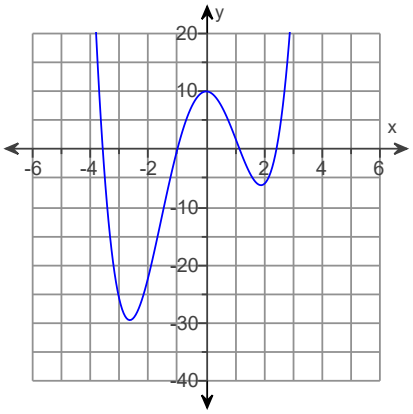
- **A.** Minimum: 4
- **B.** Maximum: 10
- **C.** Minimum: 0
- **D.** Maximum: -4

62. Find the range of the given function. Express your answer in interval notation.

$f(x) = 4x^2 + 16x + 19$

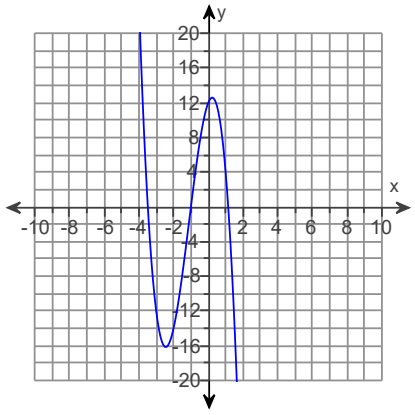
- **A.** $(-\infty, 2]$
- **B.** $[-2, \infty)$
- **C.** $[3, \infty)$
- **D.** $(-\infty, -3]$

63. The graph that follows is of a polynomial function. (i) What is the minimum degree of a polynomial function that could have the graph? (ii) Is the leading coefficient of the polynomial negative or positive?



- **A.** (i) 3
  (ii) Negative
- **B.** (i) 4
  (ii) Positive
- **C.** (i) 4
  (ii) Negative
- **D.** (i) 3
  (ii) Positive

64. The graph that follows is of a polynomial function. (i) What is the minimum degree of a polynomial function that could have the graph? (ii) Is the leading coefficient of the polynomial negative or positive?



- **A.** (i) 4
  (ii) Positive
- **B.** (i) 3
  (ii) Positive
- **C.** (i) 3
  (ii) Negative
- **D.** (i) 4
  (ii) Negative

65. Find the equation of any horizontal asymptote.

$$f(x) = \frac{5x^2 - 7x - 3}{3x^2 - 5x + 6}$$

- **A.** $y = 0$
- **B.** $y = \frac{7}{5}$
- **C.** $y = \frac{5}{3}$
- **D.** None

66. Find the equation of any horizontal asymptote.

$$f(x) = \frac{x^2 + 4x - 6}{x - 6}$$

- **A.** $y = -4$
- **B.** $y = 6$
- **C.** $y = 4$
- **D.** None

67. Find the equations of any vertical asymptotes.

$$f(x) = \frac{x^2 - 100}{(x - 4)(x + 9)}$$

- **A.** $x = -4$
- **B.** $y = 4, y = -9$
- **C.** $x = 4, x = -9$
- **D.** $x = 10, x = -10$

68. Find the equations of any vertical asymptotes.

$$f(x) = \frac{6x - 11}{x^2 + 2x - 15}$$

- **A.** $y = 3, y = -5$
- **B.** $x = -3, x = 5$
- **C.** $x = 3, x = -5$
- **D.** $y = 6$

---

69. Solve the equation for x.

$$2^{4x} = 2^{3x + 15}$$

- **A.** 15
- **B.** 5
- **C.** -15
- **D.** -5

---

70. Solve the equation for x.

$$e^{-0.05x} - e^{4} = 0$$

- **A.** 0.8
- **B.** -20
- **C.** -80
- **D.** 0.2

---

71. An initial investment of $12,000 is invested for 2 years in an account that earns 4% interest, compounded quarterly. Find the amount of money in the account at the end of the period.

- **A.** $994.28
- **B.** $12,979.20
- **C.** $12,865.62
- **D.** $12,994.28

---

72. An initial investment of $10,000 is invested for 3 years in an account that earns 3% continuous interest. Find the amount of money in the account at the end of the period.

- **A.** $27,182.82
- **B.** $20,085.54
- **C.** $10,941.74
- **D.** $24,596.03

---

73. Solve the equation for t.

$e^t = 7$

- **A.** $\ln 7$
- **B.** $\log_7 7$
- **C.** $7 \ln e$
- **D.** e^7

74. Solve for x.

$\log_6(4x - 5) = 1$

- **A.** 7
- **B.** $\frac{11}{4}$
- **C.** $\frac{\log 5}{4}$
- **D.** $\frac{11}{6}$

75. If \$1250 is invested at a rate of $8\frac{1}{4}$% compounded monthly, what is the balance after 10 years? Round to the nearest cent. Hint: $A=P(1+i)^n$

- **A.** \$1594.31
- **B.** \$1031.25
- **C.** \$2281.25
- **D.** \$2844.31

76. Use I = Prt for simple interest to find the indicated quantity.

I = \$750; r = 6%; t = 6 months; Find P.

- **A.** \$25,000
- **B.** \$24,250
- **C.** \$25,750
- **D.** \$22.50

77. Use the formula A = P(1 + rt) to find the indicated quantity.

A = \$16,400; r = 10%; 90 days; Find P. (Use 360 days in a year.)

- **A.** \$400.00
- **B.** \$16,400
- **C.** \$16,000
- **D.** \$16,810

78. Use the formula $A = P(1 + rt)$ to find the indicated quantity.

$P = \$7996$; $r = 6\%$; $t = 10$ months; Find A.

- **A.** $8475.76
- **B.** $8395.80
- **C.** $399.80
- **D.** $6663.33

---

79. Find the amount that will be accumulated in the account under the given conditions.

The principal $15,400 is accumulated with simple interest of 16% for 5 years.

- **A.** $27,720
- **B.** $20,212.50
- **C.** $12,320
- **D.** $15,892.80

---

80. Find the compound interest earned. Round to the nearest cent.

$700 at 8% compounded semiannually for 4 years

- **A.** $252.34
- **B.** $258.00
- **C.** $595.65
- **D.** $118.90

---

81. Find the compound amount for the deposit. Round to the nearest cent.

$1100 at 3% compounded quarterly for 2 years

- **A.** $1166.00
- **B.** $1166.99
- **C.** $1116.56
- **D.** $1167.76

---

82. What is the annual percentage yield (APY) for money invested at the given annual rate? Round results to the nearest hundredth of a percent.

5% compounded semiannually

- **A.** 5.13%
- **B.** 5.09%
- **C.** 5.00%
- **D.** 5.06%

---

83. Cara knows that she will need to buy a new car in 3 years. The car will cost $15,000 by then. How much should she invest now at 12%, compounded quarterly, so that she will have enough to buy a new car? Round to the nearest cent as needed.

- **A.** $11,957.91
- **B.** $12.594.29
- **C.** $10,520.70
- **D.** $9532.77

84. Use the future value formula to find the indicated value. Round to the nearest cent.

n = 15; i = 0.04; PMT = $1; FV = ?

- **A.** $21.82
- **B.** $45.02
- **C.** $20.02
- **D.** $18.29

85. Find the future value of the ordinary annuity. Interest is compounded annually, unless otherwise indicated.

PMT = $7,500, interest is 5% compounded semiannually for 2 years. Round the answer to nearest cent.

- **A.** $157,500.00
- **B.** $331,143.87
- **C.** $31,143.87
- **D.** $23,067.19

86. If $300,000 is to be saved over 25 years, how much should be deposited monthly if the investment earns 8% interest compounded monthly? Round the answer to the nearest cent.

- **A.** $260.87
- **B.** $216.62
- **C.** $315.45
- **D.** $180.48

87. Cara needs $9,000 in 8 years. What amount can she deposit at the end of each quarter at 8% interest compounded quarterly so she will have her $9,000? Round to the nearest cent.

- **A.** $212.37
- **B.** $195.18
- **C.** $203.50
- **D.** $846.13

88. Find the present value of the ordinary annuity. Round the answer to the nearest cent.

Payments of $53 made quarterly for 10 years at 8% compounded quarterly

- **A.** $1,459.38
- **B.** $1,425.84
- **C.** $520.36
- **D.** $1,449.84

89. Find the payment necessary to amortize the loan. Round the answer to nearest cent.

$9,700; 12% compounded monthly; 48 monthly payments

- **A.** $255.62
- **B.** $251.37
- **C.** $1,169.07
- **D.** $255.44

---

90. In order to purchase a home, a family borrows $70,000 at 12% for 15 years. What is the monthly house payment to amortize the loan? Round the answer to the nearest cent.

- **A.** $700.00
- **B.** $902.99
- **C.** $840.12
- **D.** $46.67

1. D. $\left\{\frac{1}{4}\right\}$

---

2. A. -22

---

3. B. equilibrium price: $30 per unit; equilibrium quantity: 50 units

---

4. B. $V = -700t + 10{,}000$

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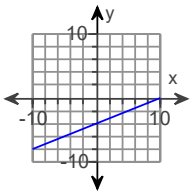
5. 

C. slope = $\frac{2}{5}$

---

6. A. Slope = 2, y-intercept = -6

---

7. C. $y = 2x - 4$

---

8. C. slope = 1x-intercept = (7,0)y-intercept = (0, − 7)

---

9. C. $4x + y = -7$

---

10. D. $y = 3x - 5$

---

11. B. $y = -x + 3$

---

12. A. $x = 10$

---

13. B. $y = 6$

---

14. B. $-\frac{8}{11}$

---

15. A. $12x + 11y = -42$

---

16. D. 10,000

---

17. B. $C = 20x + 25$

---

18. C. 600

19. B. 1

20. C.4,400

21. A. $(-3,4)$

22. A. (4,3)

23. C. $(0,-7)$

24. C. (6,0)

25. A. 14 tickets

26. D. $\left[\begin{array}{cc|c} 8 & 9 & 117 \\ 4 & 6 & 66 \end{array}\right]$

27. C. $\left[\begin{array}{cc|c} -3 & 15 & -12 \\ 2 & 2 & 5 \end{array}\right]$

28. C. $R_1 + R_2 \rightarrow R_2$

29. D. $3x_1 + 3x_2 + 5x_3 = -25x_1 + 7x_3 = 43x_1 + 6x_2 = 2$

30. D. $(-2,5)$

31. B. $x_1 = 5x_2 = 3$

32. B. $\left[\begin{array}{ccc|c} 1 & 0 & 2 & 2 \\ 0 & 1 & 2 & 1 \\ 0 & 0 & 0 & 0 \end{array}\right]$

33. B. $(6,-6)$

34. C. $(2,-5,3)$

35. C. $14x + 6y = 290{,}000x + y = 35{,}000$

36. D. $5x + 2y + 3z = 31.00$ $2x + 3y + 5z = 27.60$ $3x + 5y + 2z = 32.70$

---

37. B. $\begin{bmatrix} -3 & 3 \\ 4 & 2 \end{bmatrix}$

---

38. D. $\begin{bmatrix} 3 & -12 & -21 & 9 \end{bmatrix}$

---

39. A. $\begin{bmatrix} 0 & -3 \\ 0 & 0 \end{bmatrix}$

---

40. C. $\begin{bmatrix} 5 \\ -15 \\ 10 \end{bmatrix}$

---

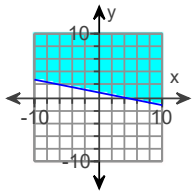
41. B. $\begin{bmatrix} -13 & -41 & -22 \end{bmatrix}$

---

42. C. $\begin{bmatrix} 2 & 3 \\ 5 & 1 \end{bmatrix}$

---

43. C.



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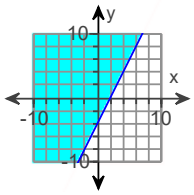
44. A.



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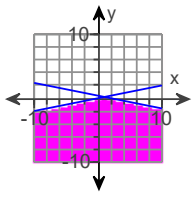
45. B. Let e = student enrollment; $e - w < 8000$

---

46. B. Unbounded



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47. B. Minimum of 33 when x = 7 and y = 1

---

48. D. Maximum of 100 when $x = 8$ and $y = 3$

49. B. 12 Double-Sided and 12 Single-Sided

50. B. (0,0), (0, 11), (11,10), (13, 0);
maximum profit $P = 75$

51. C. All real numbers except 2

52. B. -481

53. C. 6000

54. D. Domain: all real numbers; Range: $[6,\infty)$

55. A. Shift it horizontally 1 unit to the right. Reflect it across the x-axis. Shift it 6 units up.

56. D. $f(x) = \sqrt{x+5} + 7$

57. A. $-1, -5$

58. D. Standard form: $f(x) = (x+5)^2 - 4$(A) x-intercepts: $-7, -3$; y-intercept: 21(B) Vertex $(-5, -4)$(C) Minimum: -4(D) $y \geq -4$

59. B. $P(x) = -0.4x^2 + 57x - 13$

60. D. 1687

61. A. Minimum: 4

62. C. $[3,\infty)$

63. B. (i) 4(ii) Positive

64. C. (i) 3 (ii) Negative

65. C. $y = \frac{5}{3}$

66. D. None

67. C. $x = 4, x = -9$

68. C. $x = 3, x = -5$

69. A. 15

70. C. - 80

71. D. $12,994.28

72. C. $10,941.74

73. A. $\ln 7 = t$

74. B. $x = \frac{11}{4}$

75. D. $2844.31

76. A. $25,000

77. C. $16,000

78. B. $8395.80

79. A. $27,720

80. B. $258.00

81. D. $1167.76

82. D. 5.06%

83. C. $10,520.70

84. C. $20.02

85. C. $31,143.87

86. C. $315.45

87. C. $203.50

88. D. $1,449.84

89. D. $255.44

90. C. $840.12