

Name _____

Verify that the values of the variables listed are solutions of the system of equations.

1)

$$\begin{cases} 3x + y = -3 \\ 4x + 3y = 6 \end{cases}$$

$$x = -3, y = -6$$

Objective: (11.1) Solve Systems of Equations by Substitution

1) _____

Solve the system of equations by substitution.

2)

$$\begin{cases} \frac{1}{2}x + \frac{2}{3}y = 32 \\ \frac{1}{4}x - \frac{5}{9}y = 40 \end{cases}$$

Objective: (11.1) Solve Systems of Equations by Substitution

2) _____

Solve the system of equations by elimination.

3)

$$\begin{cases} 6x + 3y = 51 \\ 2x - 6y = 38 \end{cases}$$

Objective: (11.1) Solve Systems of Equations by Elimination

3) _____

4)

$$\begin{cases} \frac{7}{12}x - y = 10 \\ \frac{5}{9}x + 2y = 11 \end{cases}$$

Objective: (11.1) Solve Systems of Equations by Elimination

4) _____

Solve the system of equations. [Hint: Let $u = \frac{1}{x}$ and $v = \frac{1}{y}$, and solve for u and v . Then let $x = \frac{1}{u}$, and $y = \frac{1}{v}$.]

5)

$$\begin{cases} \frac{2}{x} + \frac{4}{y} = 7 \\ \frac{1}{x} - \frac{2}{y} = 4 \end{cases}$$

5) _____

Objective: (11.1) Solve Systems of Equations by Elimination

Solve the problem.

- 6) A flat rectangular piece of aluminum has a perimeter of 64 inches. The length is 16 inches longer than the width. Find the width. 6) _____

Objective: (11.1) Solve Systems of Equations by Elimination

- 7) The Family Fine Arts Center charges \$22 per adult and \$12 per senior citizen for its performances. On a recent weekend evening when 557 people paid admission, the total receipts were \$8334. How many who paid were senior citizens? 7) _____

Objective: (11.1) Solve Systems of Equations by Elimination

- 8) The perimeter of a parking lot is 500 yards. Find the dimensions of the lot if the length is 50 yards more than three times the width. 8) _____

Objective: (11.1) Solve Systems of Equations by Elimination

- 9) A store has a sale on workout gear. Mark bought three pairs of shorts and three T-shirts for \$70.35 (before tax). Later, he went back and bought two more pairs of shorts and four more T-shirts for \$63.90 (before tax). How much did the shorts and T-shirts cost? 9) _____

Objective: (11.1) Solve Systems of Equations by Elimination

Solve the system of equations. If the system has no solution, say that it is inconsistent.

10)

$$\begin{cases} x - 4y = -10 \\ 2x - 8y = -17 \end{cases}$$

Objective: (11.1) Identify Inconsistent Systems of Equations Containing Two Variables

10) _____

11)

$$\begin{cases} x + 4y = 5 \\ 5x + 20y = 25 \end{cases}$$

Objective: (11.1) Express the Solution of a System of Dependent Equations Containing Two Variables

11) _____

12)

$$\begin{cases} 4x + y = 7 \\ -20x - 5y = -35 \end{cases}$$

Objective: (11.1) Express the Solution of a System of Dependent Equations Containing Two Variables

12) _____

Verify that the values of the variables listed are solutions of the system of equations.

13)

$$\begin{cases} x + y + z = 7 \\ x - y + 5z = 7 \\ 5x + y + z = 11 \end{cases}$$

$$x = 2, y = 4, z = 1$$

Objective: (11.1) Solve Systems of Three Equations Containing Three Variables

13) _____

14)

$$\begin{cases} x - y + 4z = 18 \\ 4x + z = 5 \\ x + 2y + z = 9 \end{cases}$$

$$x = 0, y = 2, z = 5$$

Objective: (11.1) Solve Systems of Three Equations Containing Three Variables

14) _____

Solve the system of equations.

15)

$$\begin{cases} x + 4y + 4z = 15 \\ 3y + 5z = 19 \\ z = 5 \end{cases}$$

Objective: (11.1) Solve Systems of Three Equations Containing Three Variables

15) _____

Solve the problem.

- 16) The Family Arts Center charges \$21 for adults, \$17 for senior citizens, and \$6 for children under 12 for their live performances on Sunday afternoon. This past Sunday, the paid revenue was \$12,001 for 842 tickets sold. There were 48 more children than adults. How many children attended?

Objective: (11.1) Solve Systems of Three Equations Containing Three Variables

16) _____

Solve the system of equations. If the system has no solution, say that it is inconsistent.

17)

$$\begin{cases} x + y + z = -1 \\ x - y + 2z = -6 \\ 2x + 2y + 2z = -6 \end{cases}$$

Objective: (11.1) Identify Inconsistent Systems of Equations Containing Three Variables

17) _____

Solve the system of equations.

18)

$$\begin{cases} -x + y + 2z = 0 \\ x + 2y + z = 6 \\ -2x - y + z = -6 \end{cases}$$

Objective: (11.1) Express the Solutions of a System of Dependent Equations Containing Three Variables

18) _____

Write the augmented matrix for the system.

19)
$$\begin{cases} 7x + 3y = 74 \\ 4x + 6y = 68 \end{cases}$$

Objective: (11.2) Write the Augmented Matrix of a System of Linear Equations

19) _____

$$20) \begin{cases} 6x - 2y = 22 \\ 7y = 7 \end{cases}$$

20) _____

Objective: (11.2) Write the Augmented Matrix of a System of Linear Equations

$$21) \begin{cases} 3x + 6z = 48 \\ 3y + 7z = 59 \\ 9x - 2y + 9z = 83 \end{cases}$$

21) _____

Objective: (11.2) Write the Augmented Matrix of a System of Linear Equations

Write the system of equations associated with the augmented matrix. Do not solve.

$$22) \left[\begin{array}{ccc|c} -8 & 5 & -3 & -9 \\ 6 & 7 & 0 & 4 \\ 2 & 0 & 6 & -4 \end{array} \right]$$

22) _____

Objective: (11.2) Write the System of Equations from the Augmented Matrix

Determine whether the system corresponding to the given augmented matrix is consistent or inconsistent. If it is consistent, give the solution.

$$23) \left[\begin{array}{ccc|c} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 9 \end{array} \right]$$

23) _____

Objective: (11.2) Write the System of Equations from the Augmented Matrix

$$24) \left[\begin{array}{ccc|c} 1 & 2 & 2 & 13 \\ 0 & 2 & 5 & 22 \\ 0 & 0 & 1 & 4 \end{array} \right]$$

24) _____

Objective: (11.2) Write the System of Equations from the Augmented Matrix

25)

$$\left[\begin{array}{ccc|c} 1 & 0 & -6 & 7 \\ 0 & 1 & 3 & -6 \\ 0 & 0 & 0 & 0 \end{array} \right]$$

Objective: (11.2) Write the System of Equations from the Augmented Matrix

25) _____

26)

$$\left[\begin{array}{cccc|c} 1 & 0 & 0 & 1 & 1 \\ 0 & 1 & 0 & 8 & -7 \\ 0 & 0 & 1 & -3 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{array} \right]$$

Objective: (11.2) Write the System of Equations from the Augmented Matrix

26) _____

Perform the row operation(s) on the given augmented matrix.27) $R_2 = -4r_1 + r_2$

$$\left[\begin{array}{cc|c} 1 & 3 & 10 \\ 4 & 2 & -8 \end{array} \right]$$

Objective: (11.2) Perform Row Operations on a Matrix

27) _____

28) $R_3 = 4r_1 + r_3$

$$\left[\begin{array}{ccc|c} -7 & -5 & -1 & -10 \\ 6 & -2 & 9 & 5 \\ 28 & -6 & 6 & 18 \end{array} \right]$$

Objective: (11.2) Perform Row Operations on a Matrix

28) _____

29) $R_2 = -2r_1 + r_2$

$$\left[\begin{array}{ccc|c} 5 & -5 & 1 & 1 \\ -4 & 0 & 2 & -3 \\ -1 & 4 & -2 & -1 \end{array} \right]$$

Objective: (11.2) Perform Row Operations on a Matrix

29) _____

30) (a) $R_2 = -4r_1 + r_2$

(b) $R_3 = -2r_1 + r_3$

(c) $R_3 = 6r_2 + r_3$

$$\left[\begin{array}{ccc|c} 1 & -3 & -5 & -2 \\ 4 & -5 & -4 & 5 \\ 2 & 5 & 4 & 6 \end{array} \right]$$

30) _____

Objective: (11.2) Perform Row Operations on a Matrix

Solve the system of equations using matrices (row operations). If the system has no solution, say that it is inconsistent.

31) $\begin{cases} 6x + 4y = -4 \\ 2x - 1y = -13 \end{cases}$

31) _____

Objective: (11.2) Solve a System of Linear Equations Using Matrices

32) $\begin{cases} 2x - 9y - z = -23 \\ x + 9y - 5z = 2 \\ 3x + y + z = 24 \end{cases}$

32) _____

Objective: (11.2) Solve a System of Linear Equations Using Matrices

33) $\begin{cases} -3x - 9y + 5z = 23 \\ 15x + 45y - 25z = -115 \\ -12x - 36y + 20z = 92 \end{cases}$

33) _____

Objective: (11.2) Solve a System of Linear Equations Using Matrices

Write the partial fraction decomposition of the rational expression.

34) $\frac{x}{(x-4)(x-5)}$

34) _____

Objective: (11.5) Decompose P/Q, Where Q Has Only Nonrepeated Linear Factors

$$35) \frac{x - 4}{(x - 2)(x - 3)}$$

35) _____

Objective: (11.5) Decompose P/Q, Where Q Has Only Nonrepeated Linear Factors

$$36) \frac{11x^2 - x - 20}{x(x + 1)(x - 1)}$$

36) _____

Objective: (11.5) Decompose P/Q, Where Q Has Only Nonrepeated Linear Factors

$$37) \frac{-2x^2 - 1x + 5}{(x + 2)(x + 1)^2}$$

37) _____

Objective: (11.5) Decompose P/Q, Where Q Has Repeated Linear Factors

$$38) \frac{x + 3}{x^3 - 2x^2 + x}$$

38) _____

Objective: (11.5) Decompose P/Q, Where Q Has Repeated Linear Factors

$$39) \frac{10x + 2}{(x - 1)(x^2 + x + 1)}$$

39) _____

Objective: (11.5) Decompose P/Q, Where Q Has a Nonrepeated Irreducible Quadratic Factor

$$40) \frac{-28x - 92}{(x - 4)^2(x^2 + 1)}$$

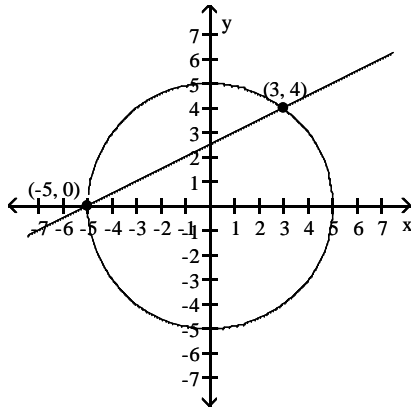
40) _____

Objective: (11.5) Decompose P/Q, Where Q Has a Nonrepeated Irreducible Quadratic Factor

The graph of two equations along with the points of intersection are given. Substitute the points of intersection into the systems of equations. Are the points of intersection solutions to the system of equations (Y/N)?

41)

41) _____



$$\begin{cases} x^2 + y^2 = 25 \\ 2y + x = 5 \end{cases}$$

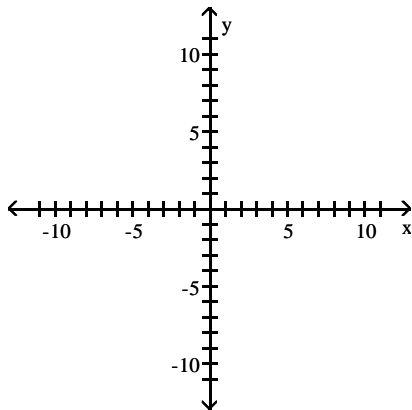
Objective: (11.6) Solve a System of Nonlinear Equations Using Substitution

Graph the equations of the system. Then solve the system to find the points of intersection.

42)

42) _____

$$\begin{cases} y = x^2 - 8x + 16 \\ y = -x + 6 \end{cases}$$

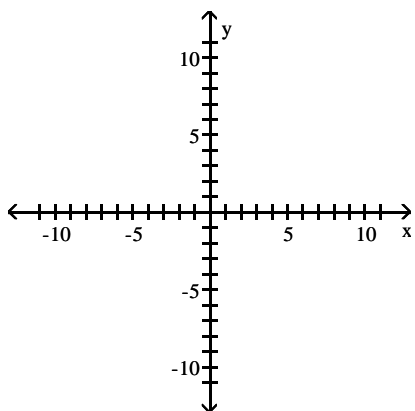


Objective: (11.6) Solve a System of Nonlinear Equations Using Substitution

43)

$$\begin{cases} x^2 + y^2 = 16 \\ y = x^2 - 4 \end{cases}$$

43) _____

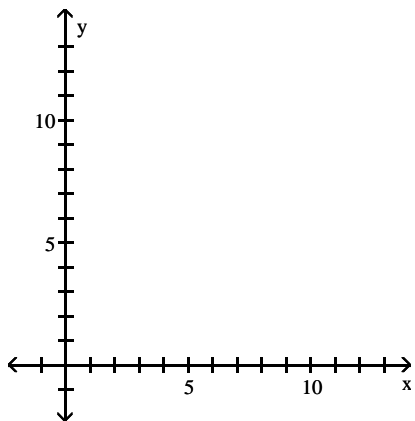


Objective: (11.6) Solve a System of Nonlinear Equations Using Substitution

44)

$$\begin{cases} y = \sqrt{x} \\ y = 6 - x \end{cases}$$

44) _____



Objective: (11.6) Solve a System of Nonlinear Equations Using Substitution

Solve the system of equations using substitution.

45)

$$\begin{cases} xy = 6 \\ x + y = -5 \end{cases}$$

Objective: (11.6) Solve a System of Nonlinear Equations Using Substitution

45) _____

46)

$$\begin{cases} \ln x = 3 \ln y \\ 3^x = 27^y \end{cases}$$

Objective: (11.6) Solve a System of Nonlinear Equations Using Substitution

46) _____

Solve using elimination.

47)

$$\begin{cases} x^2 + y^2 = 145 \\ x^2 - y^2 = 17 \end{cases}$$

Objective: (11.6) Solve a System of Nonlinear Equations Using Elimination

47) _____

48)

$$\begin{cases} 3x^2 - 3y^2 = -15 \\ 5x^2 + 4y^2 = 56 \end{cases}$$

Objective: (11.6) Solve a System of Nonlinear Equations Using Elimination

48) _____

Solve the problem.

49) Find the dimensions of a rectangle whose perimeter is 38 feet and whose area is 60 square feet.

Objective: (11.6) Solve a System of Nonlinear Equations Using Elimination

49) _____

Answer Key

Testname: MATH2_CH11_HW_8

- 1) not a solution
- 2) $x = 100, y = -27; (100, -27)$
- 3) $x = 10, y = -3; (10, -3)$
- 4) $x = 18, y = \frac{1}{2}; \left(18, \frac{1}{2}\right)$
- 5) $x = \frac{4}{15}, y = -8; \left(\frac{4}{15}, -8\right)$
- 6) 8 in.
- 7) 392 senior citizens
- 8) 200 yd by 50 yd
- 9) shorts: \$14.95; T-shirts: \$8.50
- 10) inconsistent
- 11) $y = -\frac{x}{4} + \frac{5}{4}$, where x is any real number
or $\{(x, y) \mid y = -\frac{x}{4} + \frac{5}{4}, \text{ where } x \text{ is any real number}\}$
- 12) $y = -4x + 7$, where x is any real number
or $\{(x, y) \mid y = -4x + 7, \text{ where } x \text{ is any real number}\}$
- 13) not a solution
- 14) solution
- 15) $x = 3, y = -2, z = 5; (3, -2, 5)$
- 16) 303 children
- 17) inconsistent
- 18) $x = z + 2$, and $y = 2 - z$, where z is any real number
or $\{(x, y, z) \mid x = z + 2, \text{ and } y = 2 - z, \text{ where } z \text{ is any real number}\}$
- 19) $\left[\begin{array}{cc|c} 7 & 3 & 74 \\ 4 & 6 & 68 \end{array} \right]$
- 20) $\left[\begin{array}{cc|c} 6 & -2 & 22 \\ 0 & 7 & 7 \end{array} \right]$
- 21) $\left[\begin{array}{ccc|c} 3 & 0 & 6 & 48 \\ 0 & 3 & 7 & 59 \\ 9 & -2 & 9 & 83 \end{array} \right]$
- 22)
$$\begin{cases} -8x + 5y - 3z = -9 \\ 6x + 7y = 4 \\ 2x + 6z = -4 \end{cases}$$
- 23) inconsistent
- 24) consistent; $x = 3, y = 1, z = 4; (3, 1, 4)$
- 25) consistent; $x = 7 + 6z, y = -6 - 3z, z$ any real number
or $\{(x, y, z) \mid x = 7 + 6z, y = -6 - 3z, z \text{ any real number}\}$
- 26) consistent; $x_1 = 1 - x_4, x_2 = -7 - 8x_4, x_3 = 3x_4, x_4$ any real number
or $\{(x, y, z) \mid x_1 = 1 - x_4, x_2 = -7 - 8x_4, x_3 = 3x_4, x_4 \text{ any real number}\}$
- 27) $\left[\begin{array}{cc|c} 1 & 3 & 10 \\ 0 & -10 & -48 \end{array} \right]$
- 28) $\left[\begin{array}{ccc|c} -7 & -5 & -1 & -10 \\ 6 & -2 & 9 & 5 \\ 0 & -26 & 2 & -22 \end{array} \right]$

Answer Key

Testname: MATH2_CH11_HW_8

29)

$$\left[\begin{array}{ccc|c} 5 & -5 & 1 & 1 \\ -14 & 10 & 0 & -5 \\ -1 & 4 & -2 & -1 \end{array} \right]$$

30)

$$\left[\begin{array}{ccc|c} 1 & -3 & -5 & -2 \\ 0 & 7 & 16 & 13 \\ 0 & 53 & 110 & 88 \end{array} \right]$$

31) $x = -4, y = 5; (-4, 5)$

32) $x = 5, y = 3, z = 6; (5, 3, 6)$

33) $x = -3y + \frac{5}{3}z - \frac{23}{3}$, y is any real number, z is any real number

$$\text{or } \left\{ (x, y, z) \mid x = -3y + \frac{5}{3}z - \frac{23}{3}, y \text{ is any real number, } z \text{ is any real number} \right\}$$

34) $\frac{-4}{x-4} + \frac{5}{x-5}$

35) $\frac{2}{x-2} + \frac{-1}{x-3}$

36) $\frac{20}{x} + \frac{-4}{x+1} + \frac{-5}{x-1}$

37) $\frac{-1}{x+2} + \frac{-1}{x+1} + \frac{4}{(x+1)^2}$

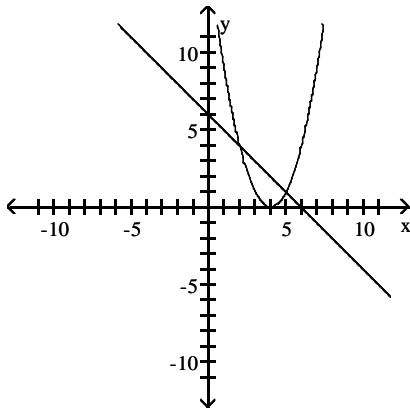
38) $\frac{3}{x} + \frac{-3}{x-1} + \frac{4}{(x-1)^2}$

39) $\frac{4}{x-1} + \frac{-4x+2}{x^2+x+1}$

40) $\frac{4}{x-4} + \frac{-12}{(x-4)^2} + \frac{-4x-4}{x^2+1}$

41) No

42)

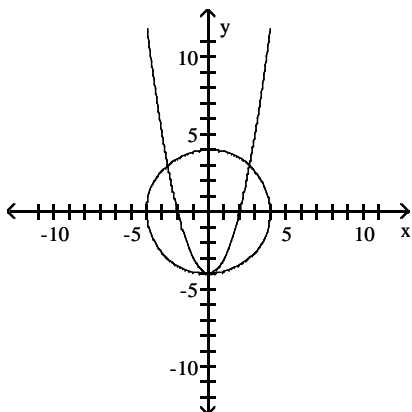


(2, 4), (5, 1)

Answer Key

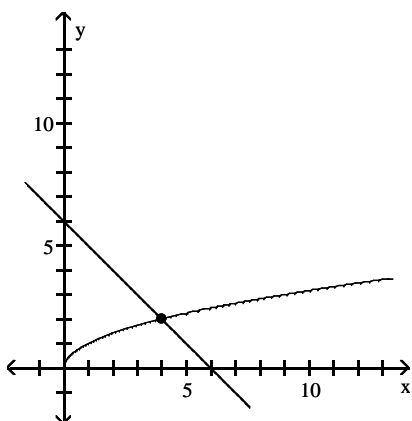
Testname: MATH2_CH11_HW_8

43)



$(0, -4), (\sqrt{7}, 3), (-\sqrt{7}, 3)$

44)



$(4, 2)$

45) $x = -2, y = -3; x = -3, y = -2$

or $(-2, -3), (-3, -2)$

46) $x = 3\sqrt{3}, y = \sqrt{3}$ or $(3\sqrt{3}, \sqrt{3})$

47) $x = 9, y = 8; x = -9, y = 8; x = 9, y = -8; x = -9, y = -8$

or $(9, 8), (-9, 8), (9, -8), (-9, -8)$

48) $x = 2, y = 3; x = -2, y = 3; x = 2, y = -3; x = -2, y = -3$

or $(2, 3), (-2, 3), (2, -3), (-2, -3)$

49) 4 ft by 15 ft