#1-6: Verify that the given values are solutions to the system of equations.

1) $\begin{array}{l} 3x + 2y = 11 \\ 2x - y = 5 \end{array}$ (3,1)

2) $\begin{array}{l} 4x - 3y = 10 \\ 2x + y = 10 \end{array}$ (4,2)

3) $\begin{array}{l} \dfrac{2}{3}x + \dfrac{1}{2}y = 3 \\ 2x - y = 4 \end{array}$ (3, 2)

4) $\begin{array}{l} \dfrac{4}{5}x - \dfrac{3}{7}y = 1 \\ 2x + y = 17 \end{array}$ (5,7)

5) $\begin{array}{l} x - y + z = 2 \\ 2x - 3y + 2z = 2 \\ x + y - 2z = 3 \end{array}$ (3,2,1)

6) $\begin{array}{l} 2x - y + 2z = 2 \\ 3x - y + z = 3 \\ x + y + z = 7 \end{array}$ (2,4,1)

#7 – 20: Solve each system of equations using the substitution method. If the system has no solutions say, that it is inconsistent. If the system has infinitely many solutions write your answer in the form $\{(x,y)|y = mx + b, x \text{ is any real number}\}$

7) $\begin{array}{l} y = 2x - 4 \\ -2x + 3y = 0 \end{array}$

8) $\begin{array}{l} x = 2y - 3 \\ 4x + y = 24 \end{array}$

9) $\begin{array}{l} 3x + 2y = 11 \\ 2x + y = 5 \end{array}$

10) $\begin{array}{l} 4x - 3y = 5 \\ 2x + y = 5 \end{array}$

11) $\begin{array}{l} \dfrac{2}{3}x + \dfrac{1}{2}y = 3 \\ 2x - y = 4 \end{array}$

12) $\begin{array}{l} \dfrac{2}{5}x + \dfrac{1}{2}y = 3 \\ 2x - y = 8 \end{array}$

13) $\dfrac{4}{3}x + \dfrac{1}{5}y = 5$

$x - y = -2$

14) $\dfrac{4}{7}x + \dfrac{1}{3}y = 5$

$x - y = 4$

15) $x - 2y = 7$

$2x - 4y = -3$

16) $x - 3y = 7$

$5x - 15y = 9$

17) $4x + 2y = 6$

$12x + 6y = 15$

18) $6x + 2y = 3$

$12x + 4y = 15$

19) $4x + 2y = 6$

$12x + 6y = 18$

20) $6x + 2y = 3$

$12x + 4y = 6$

#21 – 36: Solve each system of equations using the elimination method. If the system has no solutions say, that it is inconsistent. If the system has infinitely many solutions write your answer in the form $\{(x,y)|y = mx + b, x\ is\ any\ real\ number\}$

21)
$$3x + 2y = 11$$
$$2x - y = 5$$

22)
$$4x - 3y = 10$$
$$2x + y = 10$$

23)
$$4x - 2y = 7$$
$$2x - 5y = -3$$

24)
$$6x + 2y = 26$$
$$2x - 7y = 24$$

25)
$$5x + 2y = 3$$
$$3x - 5y = 15$$

26)
$$4x + 2y = 3$$
$$3x - 5y = 1$$

27)
$$\frac{2}{4}x + \frac{1}{2}y = 2$$
$$x - y = 4$$

28)

$$\frac{2}{3}x + \frac{1}{2}y = 12$$
$$2x - 3y = 0$$

29)
$$\frac{4}{3}x + \frac{1}{5}y = 5$$
$$x - y = -2$$

30)
$$\frac{4}{7}x + \frac{1}{3}y = 5$$
$$x - y = 4$$

31)
$$x - 2y = 7$$
$$5x - 10y = -3$$

32) $x - 3y = 7$
$3x - 9y = 4$

33) $4x - 2y = 6$
$8x - 4y = 12$

34) $6x + 2y = 3$
$-18x - 6y = -9$

35) $4x + 2y = 6$
$2x + y = 3$

36) $x - 2y = 3$
$5x - 10y = 15$

Solving systems with 3 equations and 3 unknowns.

Note: If at any time all of the variables cancel out and you are left with:

a) 0= some number that is not 0, like 0 = 6,   you are done just write no solution.

b) 0=0 there are infinitely many solutions: do the following:

- Find or create an equation with y and z, solve for y
- Find or create an equation with x and z, solve for x
- Write solution (x,y,z) use the above bullets for the x and y

General solution strategy:

1) Pick an equation pair it with the other two. This creates two pairs of equations.

2) Pick a letter to drop then drop the same letter from each pair. This will create two equations with two unknowns.

3) Take the two equations created in the last step and solve them using the elimination method. This will give answers for 2 of the 3 variables.

4) Substitute the answers from part 3 into one of the original equations and solve for the remaining variable. Write your solution (x,y,z) but use numbers for the x, y and z.

#37-51: Solve each system of equations. If the system has no solutions say, that it is inconsistent. If the system has infinitely many solutions write your answer in the following form:

$$\{(x, y, z | x = equation\ with\ a\ z, y = equation\ with\ a\ z, z\ for\ any\ real\ number\ z\}$$

For example here is the solution to problem 50:
$$\{(x, y, z | x = -5 + 22, y = -3z + 7, z\ for\ any\ real\ number\ z\}$$

Solve the system of linear equations and check your solutions.

37)

$-x + 2y - z = -17$
$\quad 2x - y + z = 21$ (pair the middle equation with the other 2 and drop out the y's)
$\quad 3x + 2y + z = 19$

38)

$3x - 2y + z = 15$
$x + y + 2z = 0$ (pair the bottom equation with the other 2 and drop out the y's)
$\quad x - y - 4z = 14$ Answer (5, -1, -2)

39)

$\quad 2x + y - 5z = -11$
$-x + y + 2z = 7$ (pair the middle equation with the other 2 and drop out the x's)
$\quad x - 3y + z = -2$

40)

$\quad -5x - y + 3z = -14$
$-2x + 2y - 6z = 16$ start anyway you like
$\quad x + 7y + 2z = -5$ Answer (1, 0, -3)

41)

$2x + 2y - z = 2$
$x - 3y + z = -28$ start anyway your like
$-x + y\ + 5z\ = 24$

42)

$-x + y + 2z = 1$
$2x + 3y + z = -2$ start anyway you like
$5x + 4y + 2z = 4$ Answer (2, -3, 3)

43)
$4x + 4y + 4z = 12$
$4x - 2y - 8z = -12$ start anyway you like
$5x + 3y + 8z = 21$

44)

$2x - 3y - z = 0$
$-x + 2y + z = 5$ (pair the middle equation with the other 2 and drop out the z's)
$3x - 4y - z = 1$ Answer (no solution or inconsistent)

45)
$2x - 2y + 3z = 6$
$4x - 3y + 2z = 0$ (pair the bottom equation with the other 2 and drop out the x's)
$-2x + 3y - 7z = 1$

46)
$3x - 2y + 2z = 6$
$7x - 3y + 2z = -1$ (pair the top equation with the other 2 and drop out z's)
$2x - 3y + 4z = 0$

                        Answer (no solution or inconsistent)

47)
$2x + y - z = -2$
$x + 2y - z = -9$ (pair the bottom equation with the other 2 and drop out the z's)
$x - 4y + z = 1$

48)
$2x - 3y - z = 0$
$3x + 2y + 2z = 2$ (pair the top equation with the other 2 and drop out the z's)
$x + 5y + 3z = 2$
Answer:

$$\left\{ (x, y, z) \middle| x = -\frac{4}{13}z + \frac{6}{13}, y = -\frac{7}{13}z + \frac{4}{13}, z \text{ } for \text{ } any \text{ } real \text{ } number \text{ } z \right\}$$

49)
$x - y - z = 1$
$-x + 2y - 3z = -4$ (pair the middle equation with the other 2 and drop out the y's)
$3x - 2y - 7z = 0$

50)

$x - 2y - z = 8$

$2x - 3y + z = 23$ (pair the top equation with the other 2 and drop out the z's)

$4x - 5y + 5z = 53$

Answer

$$\{(x, y, z | x = -5 + 22, y = -3z + 7, z \text{ for any real number } z\}$$

51)

$x + 2y - z = 8$

$-x - 3y + z = 23$ (pair the middle equation with the other 2 and drop out the z's)

$x + y + 5z = 39$