

11-12-19

Solve the system of equations through elimination.

1. $5x + 3y = 5$
 $x - 3y = -17$

2. $4x + 5y = 22$
 $-4x + 13y = 14$

1. ~~$5x + 3y = 5$~~
 ~~$+ x - 3y = -17$~~

$$\begin{array}{r} 6x = -12 \\ \hline 6 \quad 6 \\ \hline x = -2 \end{array}$$

$$\begin{array}{r} 5(-2) + 3y = 5 \\ -10 + 3y = 5 \\ +10 \quad +10 \\ \hline 3y = 15 \\ \hline \frac{3y}{3} = \frac{15}{3} \\ y = 5 \end{array}$$

$(-2, 5)$

check

$$\begin{array}{l} -2 - 3(5) = -17 \\ -2 - 15 = -17 \\ -17 = -17 \checkmark \end{array}$$

$$2. \quad 4x + 5y = 22$$

$$+ \quad -4x + 13y = 14$$

$$\frac{18y = 36}{18} = \frac{36}{18}$$

$$y = 2$$

$$4x + 5(2) = 22$$

$$4x + 10 = 22$$

$$\underline{-10 \quad -10}$$

$$\frac{4x = 12}{4} = \frac{12}{4}$$

$$x = 3$$

$$(3, 2)$$

check

$$-4(3) + 13(2) = 14$$

$$-12 + 26 = 14$$

$$14 = 14 \checkmark$$

$$3 \begin{pmatrix} 2x + y = 6 \\ x - 3y = -11 \end{pmatrix} \begin{matrix} \longrightarrow \\ \dots \dots \longrightarrow \end{matrix} \begin{pmatrix} 6x + 3y = 18 \\ x - 3y = -11 \end{pmatrix}$$

1. Multiply so you can eliminate

2. Eliminate y and solve for x

3. Solve for y by replacing x

4. Check both solutions

$$\frac{7x = 7}{7} = \frac{7}{7}$$

$$x = 1$$

$$2(1) + y = 6$$

$$\underline{-2 \quad +y = 6 \quad -2}$$

$$y = 4$$

$$(1, 4)$$

$$1 - 3(4) = -11$$

$$1 - 12 = -11$$

$$-11 = -11 \checkmark$$

OR....

$$\begin{array}{r} 2x + y = 6 \\ -2(x - 3y = -11) \end{array} \begin{array}{l} \text{-----} \rightarrow \\ \text{-----} \rightarrow \end{array} \begin{array}{r} \cancel{2}x + y = 6 \\ -\cancel{2}x + 6y = 22 \end{array}$$

1. Multiply so you can eliminate
2. Eliminate x to solve for y
3. Solve for x by replacing y
4. Check both solutions

$$\begin{array}{r} 7y = 28 \\ \underline{-7} \quad \underline{7} \\ y = 4 \end{array}$$

$$\begin{array}{r} 2x + 4 = 6 \\ \underline{-4} \quad \underline{-4} \\ 2x = 2 \\ \underline{2} \quad \underline{2} \\ x = 1 \end{array}$$

(1, 4)

$$\begin{array}{l} 1 - 3(4) = -11 \\ 1 - 12 = -11 \\ -11 = -11 \checkmark \end{array}$$

$$\begin{array}{r} 4(3x + 2y = 4) \\ -3(4x + 7y = 1) \end{array} \begin{array}{l} \text{-----} \rightarrow \\ \text{-----} \rightarrow \end{array} \begin{array}{r} \cancel{12}x + 8y = 16 \\ +\cancel{12}x - 21y = -3 \end{array}$$

1. Choose which variable to eliminate and multiply to common multiple
2. Solve after eliminating x
3. Solve for x by putting y in original equation
4. Check solutions

$$\begin{array}{r} -13y = 13 \\ \underline{-13} \quad \underline{-13} \\ y = -1 \end{array}$$

$$\begin{array}{r} 3x + 2(-1) = 4 \\ 3x - 2 = 4 \\ \underline{+2} \quad \underline{+2} \\ 3x = 6 \\ \underline{3} \quad \underline{3} \\ x = 2 \end{array}$$

(2, -1)

$$\begin{array}{l} 4(2) + 7(-1) = 1 \\ 8 - 7 = 1 \\ 1 = 1 \checkmark \end{array}$$

OR.....

$$\begin{array}{l} 7(3x + 2y = 4) \longrightarrow 21x + 14y = 28 \\ -2(4x + 7y = 1) \longrightarrow -8x - 14y = -2 \\ \hline + \end{array}$$

1. Multiply both equations to get common multiple to eliminate

2. Eliminate y to solve for x

3. Solve for y by replacing x

4. Check solutions

$$\begin{array}{r} 13x = 26 \\ \hline 13 \quad 13 \\ \hline x = 2 \end{array}$$

$$4(2) + 7y = 1$$

$$8 + 7y = 1$$

$$\begin{array}{r} -8 \\ \hline \end{array}$$

$$\frac{7y = -7}{7}$$

$$y = -1$$

(2, -1)

$$3(2) + 2(-1) = 4$$

$$6 - 2 = 4$$

$$4 = 4 \checkmark$$

$$\begin{array}{l} 2(7x + 3y = 215) \longrightarrow 14x + 6y = 430 \\ -3(5x + 2y = 149) \longrightarrow -15x - 6y = -447 \\ \hline + \end{array}$$

$$\frac{-1x}{-1} = \frac{-17}{-1}$$

$$x = 17$$

$$7(17) + 3y = 215$$

$$119 + 3y = 215$$

$$\begin{array}{r} -119 \\ \hline \end{array}$$

$$\frac{3y = 96}{3 \quad 3}$$

$$y = 32$$

$$5(17) + 2(32) = 149$$

$$85 + 64 = 149$$

$$149 = 149 \checkmark$$

(17, 32)

$$\begin{array}{r}
 2(-5x + 11y = 53) \longrightarrow -10x + 22y = 106 \\
 -5(-2x + 6y = 26) \longrightarrow + 10x - 30y = -130 \\
 \hline
 -8y = -24 \\
 \frac{-8y}{-8} = \frac{-24}{-8} \\
 \hline
 y = 3
 \end{array}$$

$$\begin{array}{r}
 -5x + 11(3) = 53 \\
 -5x + 33 = 53 \\
 \underline{-33 \quad -33} \\
 -5x = 20 \\
 \frac{-5x}{-5} = \frac{20}{-5} \\
 \hline
 x = -4
 \end{array}$$

$(-4, 3)$

check

$$\begin{array}{l}
 -2(-4) + 6(3) = 26 \\
 8 + 18 = 26 \\
 26 = 26 \checkmark
 \end{array}$$