4.1 Answer Key

Practice 4.1-3-1:

Solve the following systems using substitution.

$$\begin{cases} -x + y = -3 \\ 2x + 3y = 1 \end{cases}$$

Answer: $(2, -1)$

1. Name your equation.

$$\begin{cases} -x + y = -3 \\ 2x + 3y = 1 \quad \text{ⓐ} \\ \qquad\qquad\quad \text{ⓑ} \end{cases}$$

2. Pick one equation and isolate for one of its variables. Choose the easiest variable to isolate—preferably one with a coefficient of 1 or -1.

Since the equation ⓐ is simpler and the variable y has a coefficient of 1, isolating y is easier.

$$-x + y = -3$$

$$y = -3 + x \quad \text{ⓐ}_{\text{new}}$$

3. Substitute this expression into the other equation, replacing the variable with your solution from the previous step.

Put ⓐ$_{\text{new}}$ in ⓑ

$$2x + 3\boldsymbol{y} = 1$$

$$2x + 3(\boldsymbol{-3 + x}) = 1$$

4. Solve the resulting equation. This will give you one of the coordinates.

$$2x - 9 + 3x = 1$$
$$-9 + 5x = 1$$
$$5x = 10$$
$$x = 2$$

5. Plug your solution into either of the original equations (preferably the simpler one) to find the other coordinate.

   Since equation ⓐ is simpler, thus use x=**2** and function ⓐ to find y.

$$-x + \ y = -3$$

$$-(2) + \ y = -3$$

$$-2 + \ y = -3$$

$$y = -1$$

6. Write your final answer as coordinate (a point).

   Solution: $(2, -1)$

Practice 4.1-3-2:

$$\begin{cases} -x + \ 2y = 5 \\ 2x - 4y = -10 \end{cases}$$

Answer: infinity solution

1. Name your equation.

$$\begin{cases} -x + \ 2y = 5 \ \ ⓐ \\ 2x - 4y = -10 \ \ ⓑ \end{cases}$$

2. Pick one equation and isolate for one of its variables. Choose the easiest variable to isolate—preferably one with a coefficient of 1 or -1.

   Since the equation ⓐ is simpler and the variable x has a coefficient of -1, isolating x is easier.

$$-x + \ 2y = 5$$

$$-x = 5 - 2y$$

$$x = -5 + 2y \quad ⓐ \ \ \text{new}$$

3. Substitute this expression into the other equation, replacing the variable with your solution from the previous step.

   ⓐ new

Put   in   ⓑ

$$2x - 4y = -10$$

$$2(\mathbf{-5 + 2y}) - 4y = -10$$

4. Solve the resulting equation. This will give you one of the coordinates.

$$-10 + 4y - 4y = -10$$
$$-10 = -10$$

True statement, the lines are the same (infinity solution).

Answer: infinity solution

Practice 4.1-4-1:

Solve the following systems using elimination.

$$\begin{cases} 4x - y = 6 \\ -12x + 3y = -18 \end{cases}$$

Answer: infinity solution

1. If necessary, rewrite both equations in the form $Ax + By = C$.

2. Name your equation.

$$\begin{cases} 4x - y = 6 & \text{ⓐ} \\ -12x + 3y = -18 & \text{ⓑ} \end{cases}$$

3. Multiply one or both equations by constants so that the coefficients of one variable are opposites.

$$3 \cdot \text{ⓐ}$$

$$3(4x - y) = 3(6)$$
$$12x - 3y = 18 \qquad \text{ⓐ new}$$

4. Add the equations to eliminate that variable.

$$12x - 3y = 18 \qquad \text{ⓐ new}$$

$$-12x + 3y = -18 \quad \textbf{(b)}^{+}$$

$$0 = 0$$

True statement, the lines are the same (infinity solution).

Answer: infinity solution