Solving Systems of Linear Equations in Two Variables by Substitution Method

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How to Solve Systems of Linear Equations Using the Substitution Method?

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1. Solve one equation for one variable in terms of the other variable.

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2. Substitute the expression obtained in STEP 1 into the other equation.

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3. Solve the resulting equation in one variable.

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1. Solve one equation for one variable in terms of the other variable.
2. Substitute the expression obtained in STEP 1 into the other equation.
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4. Find the value of the other variable by substituting the solution found in STEP 3 into any equation containing both variables.

How to Solve Systems of Linear Equations Using the Substitution Method?

1. Solve one equation for one variable in terms of the other variable.
2. Substitute the expression obtained in STEP 1 into the other equation.
3. Solve the resulting equation in one variable.
4. Find the value of the other variable by substituting the solution found in STEP 3 into any equation containing both variables.
5. Check the solution in the original equations.

Example 1

Solve the following system using the substitution method:

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

Example 1

Step 1: Solve one equation for one variable in terms of the other variable.

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

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First equation

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First equation $\boldsymbol{x + y = 4}$

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First equation $\boldsymbol{x + y = 4}$

Use Subtraction Property

Example 1

Step 1: Solve one equation for one variable in terms of the other variable.

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

First equation $\boldsymbol{x + y = 4}$

Use Subtraction Property $x + y - y = -y + 4$

Example 1

Step 1: Solve one equation for one variable in terms of the other variable.

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

First equation	$\boldsymbol{x + y = 4}$
Use Subtraction Property	$x + y - y = -y + 4$
Simplify	

Example 1

Step 1: Solve one equation for one variable in terms of the other variable.

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

First equation	$\boldsymbol{x + y = 4}$
Use Subtraction Property	$x + y - y = -y + 4$
Simplify	$x = -y + 4$

Example 1

Step 1: Solve one equation for one variable in terms of the other variable.

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

First equation	$\boldsymbol{x + y = 4}$
Use Subtraction Property	$x + y - y = -y + 4$
Simplify	$x = -y + 4$
Equation 3	

Example 1

Step 1: Solve one equation for one variable in terms of the other variable.

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

First equation	$\boldsymbol{x + y = 4}$
Use Subtraction Property	$x + y - y = -y + 4$
Simplify	$x = -y + 4$
Equation 3	$x = -y + 4$

Example 1

Step 2: Substitute the expression obtained in step 1 into the other equation.

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

Example 1

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Second equation

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

Second equation $\boldsymbol{x - y = 2}$

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Step 2: Substitute the expression obtained in step 1 into the other equation.

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

Second equation $\boldsymbol{x - y = 2}$

Substitute Eq. 3: $x = -y + 4$

Example 1

Step 3: Solve the resulting equation in one variable.

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

Second equation	$\boldsymbol{x - y = 2}$
Substitute Eq. 3: $x = -y + 4$	$-y + 4 - y = 2$

Example 1

Step 3: Solve the resulting equation in one variable.

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

Second equation	$\boldsymbol{x - y = 2}$
Substitute Eq. 3: $x = -y + 4$	$-y + 4 - y = 2$
Simplify	

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Step 3: Solve the resulting equation in one variable.

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

Second equation	$\boldsymbol{x - y = 2}$
Substitute Eq. 3: $x = -y + 4$	$-y + 4 - y = 2$
Simplify	$-2y + 4 = 2$

Example 1

Step 3: Solve the resulting equation in one variable.

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

Second equation	$\boldsymbol{x - y = 2}$
Substitute Eq. 3: $x = -y + 4$	$-y + 4 - y = 2$
Simplify	$-2y + 4 = 2$
Use Subtraction Property	

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Second equation	$\boldsymbol{x - y = 2}$
Substitute Eq. 3: $x = -y + 4$	$-y + 4 - y = 2$
Simplify	$-2y + 4 = 2$
Use Subtraction Property	$-2y + 4 - 4 = 2 - 4$

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Step 3: Solve the resulting equation in one variable.

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Substitute Eq. 3: $x = -y + 4$	$-y + 4 - y = 2$
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$$\begin{cases} x + y = 4 \\ x - y = 2 \end{cases}$$

Second equation	$\boldsymbol{x - y = 2}$
Substitute Eq. 3: $x = -y + 4$	$-y + 4 - y = 2$
Simplify	$-2y + 4 = 2$
Use Subtraction Property	$-2y + 4 - 4 = 2 - 4$
Simplify	$-2y = -2$

Example 1

Step 3: Solve the resulting equation in one variable.

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

Second equation	$\boldsymbol{x - y = 2}$
Substitute Eq. 3: $x = -y + 4$	$-y + 4 - y = 2$
Simplify	$-2y + 4 = 2$
Use Subtraction Property	$-2y + 4 - 4 = 2 - 4$
Simplify	$-2y = -2$
Use Division Property	

Example 1

Step 3: Solve the resulting equation in one variable.

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

Second equation	$\boldsymbol{x - y = 2}$
Substitute Eq. 3: $x = -y + 4$	$-y + 4 - y = 2$
Simplify	$-2y + 4 = 2$
Use Subtraction Property	$-2y + 4 - 4 = 2 - 4$
Simplify	$-2y = -2$
Use Division Property	$\frac{-2y}{-2} = \frac{-2}{-2}$

Example 1

Step 3: Solve the resulting equation in one variable.

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

Second equation	$\boldsymbol{x - y = 2}$
Substitute Eq. 3: $x = -y + 4$	$-y + 4 - y = 2$
Simplify	$-2y + 4 = 2$
Use Subtraction Property	$-2y + 4 - 4 = 2 - 4$
Simplify	$-2y = -2$
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Simplify	

Example 1

Step 3: Solve the resulting equation in one variable.

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

Second equation	$\boldsymbol{x - y = 2}$
Substitute Eq. 3: $x = -y + 4$	$-y + 4 - y = 2$
Simplify	$-2y + 4 = 2$
Use Subtraction Property	$-2y + 4 - 4 = 2 - 4$
Simplify	$-2y = -2$
Use Division Property	$\frac{-2y}{-2} = \frac{-2}{-2}$
Simplify	$y = 1$

Example 1

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

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

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Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

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

First equation

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Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

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

First equation $\boldsymbol{x + y = 4}$

Example 1

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

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

First equation $\boldsymbol{x + y = 4}$

Substitute $y = 1$

Example 1

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

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

First equation $\boldsymbol{x + y = 4}$

Substitute $y = 1$ $x + 1 = 4$

Example 1

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

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

First equation	$\boldsymbol{x + y = 4}$
Substitute $y = 1$	$x + 1 = 4$
Use Subtraction Property	

Example 1

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

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

First equation	$\boldsymbol{x + y = 4}$
Substitute $y = 1$	$x + 1 = 4$
Use Subtraction Property	$x + 1 - 1 = 4 - 1$

Example 1

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

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

First equation	$\boldsymbol{x + y = 4}$
Substitute $y = 1$	$x + 1 = 4$
Use Subtraction Property	$x + 1 - 1 = 4 - 1$
Simplify	

Example 1

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

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

First equation	$\boldsymbol{x + y = 4}$
Substitute $y = 1$	$x + 1 = 4$
Use Subtraction Property	$x + 1 - 1 = 4 - 1$
Simplify	$x = 3$

Example 1

Step 5: Check the solution in the original equations.

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

Check: $x = 3, y = 1$

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

Check: $x = 3, y = 1$

$x + y = 4$

Example 1

Step 5: Check the solution in the original equations.

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

Check: $x = 3, y = 1$

$x + y = 4$
$3 + 1 = 4$

Example 1

Step 5: Check the solution in the original equations.

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

Check: $x = 3, y = 1$

$x + y = 4$
$3 + 1 = 4$
$4 = 4$

Example 1

Step 5: Check the solution in the original equations.

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

Check: $x = 3, y = 1$

$x + y = 4$
$3 + 1 = 4$
$4 = 4$ ✓

Example 1

Step 5: Check the solution in the original equations.

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

Check: $x = 3, y = 1$

$x + y = 4$

$3 + 1 = 4$

$4 = 4$ ✓

$x - y = 2$

Example 1

Step 5: Check the solution in the original equations.

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

Check: $x = 3, y = 1$

$x + y = 4$
$3 + 1 = 4$
$4 = 4$ ✓

$x - y = 2$
$3 - 1 = 2$

Example 1

Step 5: Check the solution in the original equations.

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

Check: $x = 3, y = 1$

$x + y = 4$
$3 + 1 = 4$
$4 = 4$ ✓

$x - y = 2$
$3 - 1 = 2$
$2 = 2$

Example 1

Step 5: Check the solution in the original equations.

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

Check: $x = 3, y = 1$

$x + y = 4$
$3 + 1 = 4$
$4 = 4$ ✓

$x - y = 2$
$3 - 1 = 2$
$2 = 2$ ✓

Example 1

Step 5: Check the solution in the original equations.

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

Check: $x = 3, y = 1$

$x + y = 4$
$3 + 1 = 4$
$4 = 4$ ✓

$x - y = 2$
$3 - 1 = 2$
$2 = 2$ ✓

$\therefore$ the solution set is $(3, 1)$.

Example 2

Solve the following system using the substitution method:

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

Example 2

Step 1: Solve one equation for one variable in terms of the other variable.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

Example 2

Step 1: Solve one equation for one variable in terms of the other variable.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

Second equation

Example 2

Step 1: Solve one equation for one variable in terms of the other variable.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

Second equation $\boldsymbol{4x + y = -2}$

Example 2

Step 1: Solve one equation for one variable in terms of the other variable.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

Second equation $\boldsymbol{4x + y = -2}$

Use Subtraction Property

Example 2

Step 1: Solve one equation for one variable in terms of the other variable.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

Second equation	$\boldsymbol{4x + y = -2}$
Use Subtraction Property	$4x - 4x + y = -4x - 2$

Example 2

Step 1: Solve one equation for one variable in terms of the other variable.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

Second equation	$\boldsymbol{4x + y = -2}$
Use Subtraction Property	$4x - 4x + y = -4x - 2$
Simplify	

Example 2

Step 1: Solve one equation for one variable in terms of the other variable.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

Second equation	$\boldsymbol{4x + y = -2}$
Use Subtraction Property	$4x - 4x + y = -4x - 2$
Simplify	$y = -4x - 2$

Example 2

Step 1: Solve one equation for one variable in terms of the other variable.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

Second equation	$\boldsymbol{4x + y = -2}$
Use Subtraction Property	$4x - 4x + y = -4x - 2$
Simplify	$y = -4x - 2$
Equation 3	

Example 2

Step 1: Solve one equation for one variable in terms of the other variable.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

Second equation	$\boldsymbol{4x + y = -2}$
Use Subtraction Property	$4x - 4x + y = -4x - 2$
Simplify	$y = -4x - 2$
Equation 3	$y = -4x - 2$

Example 2

Step 2: Substitute the expression obtained in step 1 into the other equation.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

Example 2

Step 2: Substitute the expression obtained in step 1 into the other equation.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

First equation

Example 2

Step 2: Substitute the expression obtained in step 1 into the other equation.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

First equation $\mathbf{3x + 2y = 1}$

Example 2

Step 2: Substitute the expression obtained in step 1 into the other equation.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

First equation $\mathbf{3x + 2y = 1}$

Substitute Eq. 3: $y = -4x - 2$

Example 2

Step 3: Solve the resulting equation in one variable.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

First equation $\quad$ $\mathbf{3x + 2y = 1}$

Substitute Eq. 3: $y = -4x - 2$ $\quad$ $3x + 2(-4x - 2) = 1$

Example 2

Step 3: Solve the resulting equation in one variable.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

First equation $\quad$ $\mathbf{3x + 2y = 1}$

Substitute Eq. 3: $y = -4x - 2$ $\quad$ $3x + 2(-4x - 2) = 1$

Use Distributive Property

Example 2

Step 3: Solve the resulting equation in one variable.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

First equation	$\mathbf{3x + 2y = 1}$
Substitute Eq. 3: $y = -4x - 2$	$3x + 2(-4x - 2) = 1$
Use Distributive Property	$3x - 8x - 4 = 1$

Example 2

Step 3: Solve the resulting equation in one variable.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

First equation	$\mathbf{3x + 2y = 1}$
Substitute Eq. 3: $y = -4x - 2$	$3x + 2(-4x - 2) = 1$
Use Distributive Property	$3x - 8x - 4 = 1$
Simplify	

Example 2

Step 3: Solve the resulting equation in one variable.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

First equation	$\mathbf{3x + 2y = 1}$
Substitute Eq. 3: $y = -4x - 2$	$3x + 2(-4x - 2) = 1$
Use Distributive Property	$3x - 8x - 4 = 1$
Simplify	$-5x - 4 = 1$

Example 2

Step 3: Solve the resulting equation in one variable.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

First equation	$\mathbf{3x + 2y = 1}$
Substitute Eq. 3: $y = -4x - 2$	$3x + 2(-4x - 2) = 1$
Use Distributive Property	$3x - 8x - 4 = 1$
Simplify	$-5x - 4 = 1$
Use Addition Property	

Example 2

Step 3: Solve the resulting equation in one variable.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

First equation	$\mathbf{3x + 2y = 1}$
Substitute Eq. 3: $y = -4x - 2$	$3x + 2(-4x - 2) = 1$
Use Distributive Property	$3x - 8x - 4 = 1$
Simplify	$-5x - 4 = 1$
Use Addition Property	$-5x - 4 + 4 = 1 + 4$

Example 2

Step 3: Solve the resulting equation in one variable.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

First equation	$\mathbf{3x + 2y = 1}$
Substitute Eq. 3: $y = -4x - 2$	$3x + 2(-4x - 2) = 1$
Use Distributive Property	$3x - 8x - 4 = 1$
Simplify	$-5x - 4 = 1$
Use Addition Property	$-5x - 4 + 4 = 1 + 4$
Simplify	

Example 2

Step 3: Solve the resulting equation in one variable.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

First equation	$\mathbf{3x + 2y = 1}$
Substitute Eq. 3: $y = -4x - 2$	$3x + 2(-4x - 2) = 1$
Use Distributive Property	$3x - 8x - 4 = 1$
Simplify	$-5x - 4 = 1$
Use Addition Property	$-5x - 4 + 4 = 1 + 4$
Simplify	$-5x = 5$

Example 2

Step 3: Solve the resulting equation in one variable.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

First equation	$\mathbf{3x + 2y = 1}$
Substitute Eq. 3: $y = -4x - 2$	$3x + 2(-4x - 2) = 1$
Use Distributive Property	$3x - 8x - 4 = 1$
Simplify	$-5x - 4 = 1$
Use Addition Property	$-5x - 4 + 4 = 1 + 4$
Simplify	$-5x = 5$
Use Division Property	

Example 2

Step 3: Solve the resulting equation in one variable.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

First equation	$\mathbf{3x + 2y = 1}$
Substitute Eq. 3: $y = -4x - 2$	$3x + 2(-4x - 2) = 1$
Use Distributive Property	$3x - 8x - 4 = 1$
Simplify	$-5x - 4 = 1$
Use Addition Property	$-5x - 4 + 4 = 1 + 4$
Simplify	$-5x = 5$
Use Division Property	$\frac{-5x}{-5} = \frac{5}{-5}$

Example 2

Step 3: Solve the resulting equation in one variable.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

First equation	$\mathbf{3x + 2y = 1}$
Substitute Eq. 3: $y = -4x - 2$	$3x + 2(-4x - 2) = 1$
Use Distributive Property	$3x - 8x - 4 = 1$
Simplify	$-5x - 4 = 1$
Use Addition Property	$-5x - 4 + 4 = 1 + 4$
Simplify	$-5x = 5$
Use Division Property	$\frac{-5x}{-5} = \frac{5}{-5}$
Simplify	

Example 2

Step 3: Solve the resulting equation in one variable.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

First equation	$\mathbf{3x + 2y = 1}$
Substitute Eq. 3: $y = -4x - 2$	$3x + 2(-4x - 2) = 1$
Use Distributive Property	$3x - 8x - 4 = 1$
Simplify	$-5x - 4 = 1$
Use Addition Property	$-5x - 4 + 4 = 1 + 4$
Simplify	$-5x = 5$
Use Division Property	$\frac{-5x}{-5} = \frac{5}{-5}$
Simplify	$x = -1$

Example 2

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

Example 2

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

First equation

Example 2

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

First equation $\mathbf{3x + 2y = 1}$

Example 2

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

First equation $\mathbf{3x + 2y = 1}$

Substitute $x = -1$

Example 2

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

First equation $\qquad$ $\mathbf{3x + 2y = 1}$

Substitute $x = -1$ $\qquad$ $3(-1) + 2y = 1$

Example 2

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

First equation	$\mathbf{3x + 2y = 1}$
Substitute $x = -1$	$3(-1) + 2y = 1$
Simplify	

Example 2

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

First equation	$\mathbf{3x + 2y = 1}$
Substitute $x = -1$	$3(-1) + 2y = 1$
Simplify	$-3 + 2y = 1$

Example 2

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

First equation	$\mathbf{3x + 2y = 1}$
Substitute $x = -1$	$3(-1) + 2y = 1$
Simplify	$-3 + 2y = 1$
Use Addition Property	

Example 2

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

First equation	$\mathbf{3x + 2y = 1}$
Substitute $x = -1$	$3(-1) + 2y = 1$
Simplify	$-3 + 2y = 1$
Use Addition Property	$-3 + 3 + 2y = 1 + 3$

Example 2

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

First equation	$\mathbf{3x + 2y = 1}$
Substitute $x = -1$	$3(-1) + 2y = 1$
Simplify	$-3 + 2y = 1$
Use Addition Property	$-3 + 3 + 2y = 1 + 3$
Simplify	

Example 2

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

First equation	$\mathbf{3x + 2y = 1}$
Substitute $x = -1$	$3(-1) + 2y = 1$
Simplify	$-3 + 2y = 1$
Use Addition Property	$-3 + 3 + 2y = 1 + 3$
Simplify	$2y = 4$

Example 2

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

First equation	$\mathbf{3x + 2y = 1}$
Substitute $x = -1$	$3(-1) + 2y = 1$
Simplify	$-3 + 2y = 1$
Use Addition Property	$-3 + 3 + 2y = 1 + 3$
Simplify	$2y = 4$
Use Division Property	

Example 2

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

First equation	$\mathbf{3x + 2y = 1}$
Substitute $x = -1$	$3(-1) + 2y = 1$
Simplify	$-3 + 2y = 1$
Use Addition Property	$-3 + 3 + 2y = 1 + 3$
Simplify	$2y = 4$
Use Division Property	$\frac{2y}{2} = \frac{4}{2}$

Example 2

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

First equation	$\mathbf{3x + 2y = 1}$
Substitute $x = -1$	$3(-1) + 2y = 1$
Simplify	$-3 + 2y = 1$
Use Addition Property	$-3 + 3 + 2y = 1 + 3$
Simplify	$2y = 4$
Use Division Property	$\frac{2y}{2} = \frac{4}{2}$
Simplify	

Example 2

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

First equation	$\mathbf{3x + 2y = 1}$
Substitute $x = -1$	$3(-1) + 2y = 1$
Simplify	$-3 + 2y = 1$
Use Addition Property	$-3 + 3 + 2y = 1 + 3$
Simplify	$2y = 4$
Use Division Property	$\frac{2y}{2} = \frac{4}{2}$
Simplify	$y = 2$

Example 2

Step 5: Check the solution in the original equations.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

Check: $x = -1, y = 2$

Example 2

Step 5: Check the solution in the original equations.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

Check: $x = -1, y = 2$

$3x + 2y = 1$

Example 2

Step 5: Check the solution in the original equations.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

Check: $x = -1, y = 2$

$3x + 2y = 1$
$3(-1) + 2(2) = 1$

Example 2

Step 5: Check the solution in the original equations.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

Check: $x = -1, y = 2$

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

Example 2

Step 5: Check the solution in the original equations.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

Check: $x = -1, y = 2$

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

Example 2

Step 5: Check the solution in the original equations.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

Check: $x = -1, y = 2$

$3x + 2y = 1$
$3(-1) + 2(2) = 1$
$-3 + 4 = 1$
$1 = 1$ ✓

Example 2

Step 5: Check the solution in the original equations.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

Check: $x = -1, y = 2$

$3x + 2y = 1$

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

$-3 + 4 = 1$

$1 = 1$ ✓

$4x + y = -2$

Example 2

Step 5: Check the solution in the original equations.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

Check: $x = -1, y = 2$

$3x + 2y = 1$
$3(-1) + 2(2) = 1$
$-3 + 4 = 1$
$1 = 1$ ✓

$4x + y = -2$
$4(-1) + 2 = -2$

Example 2

Step 5: Check the solution in the original equations.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

Check: $x = -1, y = 2$

$3x + 2y = 1$
$3(-1) + 2(2) = 1$
$-3 + 4 = 1$
$1 = 1$ ✓

$4x + y = -2$
$4(-1) + 2 = -2$
$-4 + 2 = -2$

Example 2

Step 5: Check the solution in the original equations.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

Check: $x = -1, y = 2$

$3x + 2y = 1$
$3(-1) + 2(2) = 1$
$-3 + 4 = 1$
$1 = 1$ ✓

$4x + y = -2$
$4(-1) + 2 = -2$
$-4 + 2 = -2$
$-2 = -2$

Example 2

Step 5: Check the solution in the original equations.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

Check: $x = -1, y = 2$

$3x + 2y = 1$
$3(-1) + 2(2) = 1$
$-3 + 4 = 1$
$1 = 1$ ✓

$4x + y = -2$
$4(-1) + 2 = -2$
$-4 + 2 = -2$
$-2 = -2$ ✓

Example 2

Step 5: Check the solution in the original equations.

$$\begin{cases} 3x + 2y = 1 \\ 4x + \ \ y = -2 \end{cases}$$

Check: $x = -1, y = 2$

$3x + 2y = 1$
$3(-1) + 2(2) = 1$
$-3 + 4 = 1$
$1 = 1$ ✓

$4x + y = -2$
$4(-1) + 2 = -2$
$-4 + 2 = -2$
$-2 = -2$ ✓

$\therefore$ the solution set is $(-1, 2)$.

Example 3

Solve the following system using the substitution method:

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Example 3

Step 1: Solve one equation for one variable in terms of the other variable.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Example 3

Step 1: Solve one equation for one variable in terms of the other variable.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Second equation

Example 3

Step 1: Solve one equation for one variable in terms of the other variable.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Second equation $\boldsymbol{x + 2y = 5}$

Example 3

Step 1: Solve one equation for one variable in terms of the other variable.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Second equation $\boldsymbol{x + 2y = 5}$

Use Subtraction Property

Example 3

Step 1: Solve one equation for one variable in terms of the other variable.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Second equation	$\boldsymbol{x + 2y = 5}$
Use Subtraction Property	$x + 2y - 2y = -2y + 5$

Example 3

Step 1: Solve one equation for one variable in terms of the other variable.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Second equation	$\boldsymbol{x + 2y = 5}$
Use Subtraction Property	$x + 2y - 2y = -2y + 5$
Simplify	

Example 3

Step 1: Solve one equation for one variable in terms of the other variable.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Second equation	$\boldsymbol{x + 2y = 5}$
Use Subtraction Property	$x + 2y - 2y = -2y + 5$
Simplify	$x = -2y + 5$

Example 3

Step 1: Solve one equation for one variable in terms of the other variable.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Second equation	$\boldsymbol{x + 2y = 5}$
Use Subtraction Property	$x + 2y - 2y = -2y + 5$
Simplify	$x = -2y + 5$
Equation 3	

Example 3

Step 1: Solve one equation for one variable in terms of the other variable.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Second equation	$\boldsymbol{x + 2y = 5}$
Use Subtraction Property	$x + 2y - 2y = -2y + 5$
Simplify	$x = -2y + 5$
Equation 3	$x = -2y + 5$

Example 3

Step 2: Substitute the expression obtained in step 1 into the other equation.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Example 3

Step 2: Substitute the expression obtained in step 1 into the other equation.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

First equation

Example 3

Step 2: Substitute the expression obtained in step 1 into the other equation.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

First equation $\mathbf{2x - 3y = -11}$

Example 3

Step 2: Substitute the expression obtained in step 1 into the other equation.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

First equation $\mathbf{2x - 3y = -11}$

Substitute Eq. 3: $x = -2y + 5$

Example 3

Step 3: Solve the resulting equation in one variable.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

First equation	$\mathbf{2x - 3y = -11}$
Substitute Eq. 3: $x = -2y + 5$	$2(-2y + 5) - 3y = -11$

Example 3

Step 3: Solve the resulting equation in one variable.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

First equation	$\mathbf{2x - 3y = -11}$
Substitute Eq. 3: $x = -2y + 5$	$2(-2y + 5) - 3y = -11$

Use Distributive Property

Example 3

Step 3: Solve the resulting equation in one variable.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

First equation	$\mathbf{2x - 3y = -11}$
Substitute Eq. 3: $x = -2y + 5$	$2(-2y + 5) - 3y = -11$
Use Distributive Property	$-4y + 10 - 3y = -11$

Example 3

Step 3: Solve the resulting equation in one variable.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

First equation	$\mathbf{2x - 3y = -11}$
Substitute Eq. 3: $x = -2y + 5$	$2(-2y + 5) - 3y = -11$
Use Distributive Property	$-4y + 10 - 3y = -11$
Simplify	

Example 3

Step 3: Solve the resulting equation in one variable.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

First equation	$\mathbf{2x - 3y = -11}$
Substitute Eq. 3: $x = -2y + 5$	$2(-2y + 5) - 3y = -11$
Use Distributive Property	$-4y + 10 - 3y = -11$
Simplify	$-7y + 10 = -11$

Example 3

Step 3: Solve the resulting equation in one variable.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

First equation	$\mathbf{2x - 3y = -11}$
Substitute Eq. 3: $x = -2y + 5$	$2(-2y + 5) - 3y = -11$
Use Distributive Property	$-4y + 10 - 3y = -11$
Simplify	$-7y + 10 = -11$
Use Subtraction Property	

Example 3

Step 3: Solve the resulting equation in one variable.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

First equation	$\mathbf{2x - 3y = -11}$
Substitute Eq. 3: $x = -2y + 5$	$2(-2y + 5) - 3y = -11$
Use Distributive Property	$-4y + 10 - 3y = -11$
Simplify	$-7y + 10 = -11$
Use Subtraction Property	$-7y + 10 - 10 = -11 - 10$

Example 3

Step 3: Solve the resulting equation in one variable.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

First equation	$\mathbf{2x - 3y = -11}$
Substitute Eq. 3: $x = -2y + 5$	$2(-2y + 5) - 3y = -11$
Use Distributive Property	$-4y + 10 - 3y = -11$
Simplify	$-7y + 10 = -11$
Use Subtraction Property	$-7y + 10 - 10 = -11 - 10$
Simplify	

Example 3

Step 3: Solve the resulting equation in one variable.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

First equation	$\mathbf{2x - 3y = -11}$
Substitute Eq. 3: $x = -2y + 5$	$2(-2y + 5) - 3y = -11$
Use Distributive Property	$-4y + 10 - 3y = -11$
Simplify	$-7y + 10 = -11$
Use Subtraction Property	$-7y + 10 - 10 = -11 - 10$
Simplify	$-7y = -21$

Example 3

Step 3: Solve the resulting equation in one variable.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

First equation	$\mathbf{2x - 3y = -11}$
Substitute Eq. 3: $x = -2y + 5$	$2(-2y + 5) - 3y = -11$
Use Distributive Property	$-4y + 10 - 3y = -11$
Simplify	$-7y + 10 = -11$
Use Subtraction Property	$-7y + 10 - 10 = -11 - 10$
Simplify	$-7y = -21$
Use Division Property	

Example 3

Step 3: Solve the resulting equation in one variable.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

First equation	$\mathbf{2x - 3y = -11}$
Substitute Eq. 3: $x = -2y + 5$	$2(-2y + 5) - 3y = -11$
Use Distributive Property	$-4y + 10 - 3y = -11$
Simplify	$-7y + 10 = -11$
Use Subtraction Property	$-7y + 10 - 10 = -11 - 10$
Simplify	$-7y = -21$
Use Division Property	$\frac{-7y}{-7} = \frac{-21}{-7}$

Example 3

Step 3: Solve the resulting equation in one variable.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

First equation	$\mathbf{2x - 3y = -11}$
Substitute Eq. 3: $x = -2y + 5$	$2(-2y + 5) - 3y = -11$
Use Distributive Property	$-4y + 10 - 3y = -11$
Simplify	$-7y + 10 = -11$
Use Subtraction Property	$-7y + 10 - 10 = -11 - 10$
Simplify	$-7y = -21$
Use Division Property	$\frac{-7y}{-7} = \frac{-21}{-7}$
Simplify	

Example 3

Step 3: Solve the resulting equation in one variable.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

First equation	$\mathbf{2x - 3y = -11}$
Substitute Eq. 3: $x = -2y + 5$	$2(-2y + 5) - 3y = -11$
Use Distributive Property	$-4y + 10 - 3y = -11$
Simplify	$-7y + 10 = -11$
Use Subtraction Property	$-7y + 10 - 10 = -11 - 10$
Simplify	$-7y = -21$
Use Division Property	$\frac{-7y}{-7} = \frac{-21}{-7}$
Simplify	$y = 3$

Example 3

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Example 3

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Second equation

Example 3

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Second equation $\boldsymbol{x + 2y = 5}$

Example 3

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Second equation $\boldsymbol{x + 2y = 5}$

Substitute $y = 3$

Example 3

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Second equation	$\boldsymbol{x + 2y = 5}$
Substitute $y = 3$	$x + 2(3) = 5$

Example 3

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Second equation	$\boldsymbol{x + 2y = 5}$
Substitute $y = 3$	$x + 2(3) = 5$
Simplify	

Example 3

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Second equation	$\boldsymbol{x + 2y = 5}$
Substitute $y = 3$	$x + 2(3) = 5$
Simplify	$x + 6 = 5$

Example 3

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Second equation	$\boldsymbol{x + 2y = 5}$
Substitute $y = 3$	$x + 2(3) = 5$
Simplify	$x + 6 = 5$
Use Subtraction Property	

Example 3

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Second equation	$\boldsymbol{x + 2y = 5}$
Substitute $y = 3$	$x + 2(3) = 5$
Simplify	$x + 6 = 5$
Use Subtraction Property	$x + 6 - 6 = 5 - 6$

Example 3

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Second equation	$\boldsymbol{x + 2y = 5}$
Substitute $y = 3$	$x + 2(3) = 5$
Simplify	$x + 6 = 5$
Use Subtraction Property	$x + 6 - 6 = 5 - 6$
Simplify	

Example 3

Step 4: Find the value of the other variable by substituting the solution found in step 3 into any equation containing both variables.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Second equation	$\boldsymbol{x + 2y = 5}$
Substitute $y = 3$	$x + 2(3) = 5$
Simplify	$x + 6 = 5$
Use Subtraction Property	$x + 6 - 6 = 5 - 6$
Simplify	$x = -1$

Example 3

Step 5: Check the solution in the original equations.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Check: $x = -1, y = 3$

Example 3

Step 5: Check the solution in the original equations.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Check: $x = -1, y = 3$

$2x - 3y = -11$

Example 3

Step 5: Check the solution in the original equations.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Check: $x = -1, y = 3$

$2x - 3y = -11$
$2(-1) - 3(3) = -11$

Example 3

Step 5: Check the solution in the original equations.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Check: $x = -1, y = 3$

$$2x - 3y = -11$$
$$2(-1) - 3(3) = -11$$
$$-2 - 9 = -11$$

Example 3

Step 5: Check the solution in the original equations.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Check: $x = -1, y = 3$

$$2x - 3y = -11$$
$$2(-1) - 3(3) = -11$$
$$-2 - 9 = -11$$
$$-11 = -11$$

Example 3

Step 5: Check the solution in the original equations.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Check: $x = -1, y = 3$

$$2x - 3y = -11$$
$$2(-1) - 3(3) = -11$$
$$-2 - 9 = -11$$
$$-11 = -11 \checkmark$$

Example 3

Step 5: Check the solution in the original equations.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Check: $x = -1, y = 3$

$2x - 3y = -11$

$2(-1) - 3(3) = -11$

$-2 - 9 = -11$

$-11 = -11$ ✓

$x + 2y = 5$

Example 3

Step 5: Check the solution in the original equations.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Check: $x = -1, y = 3$

$2x - 3y = -11$
$2(-1) - 3(3) = -11$
$-2 - 9 = -11$
$-11 = -11$ ✓

$x + 2y = 5$
$-1 + 2(3) = 5$

Example 3

Step 5: Check the solution in the original equations.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Check: $x = -1, y = 3$

$2x - 3y = -11$
$2(-1) - 3(3) = -11$
$-2 - 9 = -11$
$-11 = -11$ ✓

$x + 2y = 5$
$-1 + 2(3) = 5$
$-1 + 6 = 5$

Example 3

Step 5: Check the solution in the original equations.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Check: $x = -1, y = 3$

$2x - 3y = -11$
$2(-1) - 3(3) = -11$
$-2 - 9 = -11$
$-11 = -11$ ✓

$x + 2y = 5$
$-1 + 2(3) = 5$
$-1 + 6 = 5$
$5 = 5$

Example 3

Step 5: Check the solution in the original equations.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Check: $x = -1, y = 3$

$2x - 3y = -11$
$2(-1) - 3(3) = -11$
$-2 - 9 = -11$
$-11 = -11$ ✓

$x + 2y = 5$
$-1 + 2(3) = 5$
$-1 + 6 = 5$
$5 = 5$ ✓

Example 3

Step 5: Check the solution in the original equations.

$$\begin{cases} 2x - 3y = -11 \\ x + 2y = 5 \end{cases}$$

Check: $x = -1, y = 3$

$2x - 3y = -11$
$2(-1) - 3(3) = -11$
$-2 - 9 = -11$
$-11 = -11$ ✓

$x + 2y = 5$
$-1 + 2(3) = 5$
$-1 + 6 = 5$
$5 = 5$ ✓

$\therefore$ the solution set is $(-1, 3)$.

Thank you for watching.