

Solve Linear Systems by Elimination

- Elimination involves the addition or subtraction of the equations in order to eliminate one variable.
- Once one variable is found, substitution is used to find the other.
- Multiplication can be used to rewrite an equation so that one variable may be eliminated.

Steps leading up to Elimination:

$$\begin{array}{r} \text{Recall,} \qquad 783 \qquad \qquad 783 \\ \qquad \qquad \underline{-241} \qquad \qquad \underline{+423} \end{array}$$

For the following linear system, would you start by adding or subtracting? Explain your choice.

$$\begin{array}{l} 6x+3y = -4 \\ \underline{5x +3y = -9} \end{array} \qquad \begin{array}{l} 3x - 12y = 12 \\ \underline{-3x + 10y = -16} \end{array}$$

Example 1

Solve the following systems of equations using the elimination method.

$$3x - 12y = 12 \text{ and } -3x + 10y = -16$$

$$\begin{array}{l} 3x - 12y = 12 \\ \underline{-3x + 10y = -16} \end{array}$$

Therefore the solution is (,)

Example 2

$$x + 2y = 0 \quad \text{and} \quad x - y = 3$$

Therefore the solution is (,)

Elimination with “No Match”

It is possible to use elimination when there are no matching variables.

By multiplying every term in one or both equations by any number that will create a match.

For the following linear system, show the multiplication step(s) that you must perform before you add or subtract.

a) eliminate x

$$8x - 2y = 6$$

$$2x - 3y = 4$$

b) eliminate y

$$8x - 2y = 6$$

$$2x - 3y = 4$$

Example 3

Solve the following systems of equations using the elimination method.

$$x - 3y = 0 \quad \text{and} \quad 3x - 2y = -7$$

Therefore the solution is (,)

Example 4

$$2x - 3y = -19$$

$$4x + 6y = 28$$

Therefore the solution is (,)