

(19)

Systems of Equations - Elimination

Steps:

- ① Both equations must be in Standard Form
($Ax + By = C$)
- ② Choose a variable to eliminate and find the LCM (if needed) in order to eliminate & solve.
- ③ Find the remaining variable by substituting the value into an original equation.
- ④ Identifying the solution.

3 Types of Solutions

- ① One solution (x, y) - lines that intersect
- ② No Solutions $\emptyset$ - Parallel lines are lines that never intersect (same slope)
- ③ Infinitely Many Solutions (IMS) - lines are identical (coinciding).

$$\begin{array}{rcl} \text{Ex 1)} & \begin{cases} 4x - 6y = -14 \\ -4x + y = -11 \end{cases} & \\ & \begin{array}{r} -5y = -25 \\ \hline y = 5 \end{array} & \end{array}$$

$$\begin{pmatrix} 4 \\ x \end{pmatrix}, \begin{pmatrix} 5 \\ y \end{pmatrix}$$

$$\begin{array}{rcl} 4x - 6(5) & = & -14 \\ 4x - 30 & = & -14 \\ +30 & +30 & \end{array}$$

$$\begin{array}{rcl} 4x & = & 16 \\ \hline 4x & = & 4 \end{array}$$

Ex 2) $\begin{cases} 2x + 3y = 6 \\ 3(2y - 4) = 6 \end{cases}$

$(3, 0)$
x, y

$\begin{aligned} 6y - 3y &= 18 \\ 3y &= 18 \\ y &= 6 \end{aligned}$

$y = 3$

$\begin{aligned} 2(3) + 3y &= 6 \\ 6 + 3y &= 6 \\ 3y &= 0 \\ y &= 0 \end{aligned}$

$y = 0$

Ex 3) $\begin{cases} -4x + 9y = -28 \\ 4(3x - 2y) = 2 \end{cases}$

$(-2, -4)$
x, y

$\begin{aligned} -12x + 27y &= -84 \\ + 12x - 8y &= 8 \\ \hline 19y &= -76 \\ y &= -4 \end{aligned}$

$y = -4$

$\begin{aligned} 3x - 2y &= 2 \\ 3x - 2(-4) &= 2 \\ 3x + 8 &= 2 \\ 3x &= -6 \\ x &= -2 \end{aligned}$

$\begin{aligned} 3x &= -6 \\ x &= -2 \end{aligned}$