

Solving Linear Systems by Elimination (2)

Ex. 1 Solve by elimination.

$$\begin{array}{r}
 \cancel{3x - 4y = 14} \quad (1) \\
 \underline{-3x + 7y = -8} \quad (2) \\
 \hline
 3x - 4(-2) = 14 \quad -4y - (7y) = 14 - (-8) \\
 3x + 8 = 14 \quad -11y = 22 \\
 \frac{3x}{3} = \frac{6}{3} \quad \frac{-11y}{-11} = \frac{22}{-11} \\
 x = 2 \quad y = -2 \\
 \\
 3x + 7y = -8 \\
 3x + 7(-2) = -8 \\
 3x + -14 = -8 \\
 3x = -8 + 14 \\
 \frac{3x}{3} = \frac{6}{3} \quad x = 2
 \end{array}
 \qquad \text{POI} = (2, -2)$$

Ex. 2 Solve by elimination.

$$3x + 2y = 28$$

$$5x - 3y = 15$$

When this happens, we use multiplication to write a system of equivalent equations that will result in a variable being eliminated by addition or subtraction.

$$\begin{array}{rcl}
 3x + 2y = 28 & \xrightarrow{x5} & 15x + 10y = 140 \\
 5x - 3y = 15 & \xrightarrow{x3} & -15x - 9y = 45 \\
 \hline
 & \text{Subtract} & 10y - (-9y) = 140 - 45 \\
 & & 19y = 95 \\
 & & \frac{19y}{19} = \frac{95}{19} \\
 & & y = 5
 \end{array}$$

Sub $y = 5$ into (1)

$$3x + 2(5) = 28$$

$$3x + 10 = 28$$

$$3x = 28 - 10$$

\therefore The P.O.I. is

$$\frac{3x}{3} = \frac{18}{3}$$

$$x = 6$$

Ex. 3 Solve using elimination.

eliminate y by adding

$$\textcircled{1} \quad -2x + 5y = 3 \times 1 \rightarrow -2x + 5y = 3$$

$$\textcircled{2} \quad 3x - y = 2 \times 5 \rightarrow \underline{15x - 5y = 10}$$

$$\text{Add } -2x + 15x = 3 + 10$$

$$\frac{13x}{13} = \frac{13}{13}$$

$$\text{Sub } x=1 \text{ into } \textcircled{1} \quad x = 1$$

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

$$-2 + 5y = 3$$

$$5y = 3 + 2$$

$$\frac{5y}{5} = \frac{5}{5}$$

$$y = 1$$

\therefore The P.O.I is $(1, 1)$

Partner up and solve the last question on the white boards!

Ex. 4 Solve using elimination.

$$\begin{aligned} 4x + 5y &= 7 \quad \textcircled{1} \\ 2x - 3y &= 9 \quad \textcircled{2} \end{aligned}$$

$$\begin{aligned} \textcircled{1} \quad 4x + 5y &= 7 \\ \textcircled{2} \times 2 \quad 4x - 4y &= 18 \\ \hline \text{Subtract} \quad 5y - (-4y) &= 7 - 18 \\ 9y &= -9 \\ y &= -1 \end{aligned}$$

Sub $y = -1$ into $\textcircled{1}$

$$\begin{aligned} 4x + 5(-1) &= 7 \\ 4x - 5 &= 7 \\ 4x &= 7 + 5 \\ 4x &= 12 \\ x &= 3 \end{aligned}$$

\therefore The P.O.I is $(3, -1)$

Homework: Pg. 217 #3 all, 4 (a,c,d)