

Homework 1.2

Date

Solve each system by substitution. Note: All answers are integers.

$$1) \begin{cases} 5x + 7y = -8 \\ y = -4x - 11 \end{cases}$$

$$\begin{aligned} 5x + 7(-4x - 11) &= -8 \\ 5x - 28x - 77 &= -8 \\ -23x - 77 &= -8 \\ -23x &= 69 \\ \underline{-23} \quad \underline{-23} \\ x &= -3 \end{aligned}$$

$$\begin{aligned} y &= -4(-3) - 11 \\ y &= 12 - 11 \\ y &= 1 \end{aligned}$$

$\therefore \text{PoI is } (-3, 1)$

$$2) \begin{cases} -4x - 2y = -24 \\ -8x + y = -8 \end{cases}$$

$$\begin{aligned} -4x - 2(8x - 8) &= -24 \\ -4x - 16x + 16 &= -24 \\ -20x + 16 &= -24 \\ -20x &= -40 \\ \underline{-20} \quad \underline{-20} \\ x &= 2 \end{aligned}$$

$$\begin{aligned} y &= 8(2) - 8 \\ y &= 16 - 8 \\ y &= 8 \end{aligned}$$

$\therefore \text{PoI is } (2, 8)$

$$3) \begin{cases} y = 7x - 16 \\ y = -5x + 20 \end{cases}$$

$$\begin{aligned} -5x + 20 &= 7x - 16 \\ -7x + 20 &= 7x - 16 \\ -12x &= -36 \\ \underline{-12} \quad \underline{-12} \\ x &= 3 \end{aligned}$$

$$\begin{aligned} y &= -5(3) + 20 \\ y &= -15 + 20 \\ y &= 5 \end{aligned}$$

$\therefore \text{PoI is } (3, 5)$

$$4) \begin{cases} 9x - 10y = -26 \\ 4x - 5y = -11 \end{cases} \rightarrow \begin{cases} -10y = -9x - 26 \\ -10y = -9x - 26 \end{cases}$$

$$\begin{aligned} 4x - 5(0.9x + 2.6) &= -11 \\ 4x - 4.5x - 13 &= -11 \\ -0.5x - 13 &= -11 \\ -0.5x &= 2 \\ \underline{-0.5} \quad \underline{-0.5} \\ x &= -4 \end{aligned}$$

$$\begin{aligned} y &= 0.9(-4) + 2.6 \\ y &= -3.6 + 2.6 \\ y &= -1 \end{aligned}$$

$\therefore \text{PoI is } (-4, -1)$

$$5) \begin{cases} -4x - 5y = -13 \\ 2x + 5y = 29 \end{cases}$$

$$\begin{aligned} 2x + 5y &= 29 \rightarrow \frac{2x}{2} = \frac{-5y + 29}{2} \\ x &= -2.5y + 14.5 \end{aligned}$$

$$\begin{aligned} -4(-2.5y + 14.5) - 5y &= -13 \\ 10y - 58 - 5y &= -13 \\ 5y - 58 &= -13 \\ 5y &= 45 \\ y &= 9 \end{aligned}$$

$$\begin{aligned} x &= -2.5(9) + 14.5 \\ x &= -22.5 + 14.5 \\ x &= -8 \end{aligned}$$

$\therefore \text{PoI is } (-8, 9)$

$$6) \begin{cases} y = -2x - 10 \\ -x - 4y = 19 \end{cases}$$

$$\begin{aligned} -x - 4(-2x - 10) &= 19 \\ -x + 8x + 40 &= 19 \\ 7x + 40 &= 19 \\ 7x &= -21 \\ x &= -3 \end{aligned}$$

$$\begin{aligned} y &= -2(-3) - 10 \\ y &= 6 - 10 \\ y &= -4 \end{aligned}$$

$\therefore \text{PoI is } (-3, -4)$

$$7) \begin{cases} x - y = 6 \\ 7x - 6y = 41 \end{cases} \rightarrow x = y + 6$$

$$\begin{aligned} 7(y+6) - 6y &= 41 \\ 7y + 42 - 6y &= 41 \\ y + 42 - 42 &= 41 - 42 \\ y &= -1 \end{aligned}$$

$$\begin{cases} x = -1 + 6 \\ x = 5 \end{cases}$$

$\therefore \text{PoI is } (5, -1)$

$$8) \begin{cases} y = -4x - 30 \\ y = -7x - 42 \end{cases}$$

$$\begin{aligned} -4x - 30 &= -7x - 42 \\ +7x \quad +30 \quad +7x \quad +30 \\ 3x &= -12 \\ x &= -4 \end{aligned}$$

$$\begin{cases} y = -7(-4) - 42 \\ y = 28 - 42 \\ y = -14 \end{cases}$$

$\therefore \text{PoI is } (-4, -14)$

$$9) \begin{cases} -8x + 8y = -8 \\ -5x - 11y = 11 \end{cases} \rightarrow \frac{8}{8}y = \frac{8}{8}x - \frac{8}{8}$$

$$y = x - 1$$

$$\begin{aligned} -5x - 11(x-1) &= 11 \\ -5x - 11x + 11 &= 11 \\ -16x + 11 - 11 &= 11 - 11 \\ -16x &= 0 \\ x &= 0 \end{aligned}$$

$$\begin{cases} y = 0 - 1 \\ y = -1 \end{cases}$$

$\therefore \text{PoI } (0, -1)$

$$10) \begin{cases} y = 7 \\ 6x + 9y = 9 \end{cases}$$

$$\begin{aligned} 6x + 9(7) &= 9 \\ 6x + 63 &= 9 \\ 6x &= -54 \\ x &= -9 \end{aligned}$$

$\therefore \text{PoI is } (-9, 7)$

These next two have "funny" answers. Do what you can with them. We will discuss next class. What do you think the answers mean?

$$11) \begin{cases} y = 4x - 7 \\ 12x - 3y = 6 \end{cases}$$

$$\begin{aligned} 12x - 3(4x - 7) &= 6 \\ 12x - 12x + 21 &= 6 \\ 0 + 21 - 21 &= 6 - 21 \\ 0 &= -15 \end{aligned}$$

False

$\therefore \text{no solution}$
 $\therefore \text{parallel lines}$

$$\begin{cases} 0x = -15 \\ x = \frac{-15}{0} \\ x = \text{undefined} \end{cases}$$

$$12) \begin{cases} y = -2x + 2 \\ 4x + 2y = 4 \end{cases}$$

$$\begin{aligned} 4x + 2(-2x + 2) &= 4 \\ 4x - 4x + 4 &= 4 \\ 0 + 4 - 4 &= 4 - 4 \\ 0 &= 0 \end{aligned}$$

True.

$\therefore \text{same lines}$
 $\therefore \text{infinite solutions}$