

# Solving Systems by Substitution

$$\begin{aligned} 1) \begin{cases} y = 6x - 11 \\ -2x - 3y = -7 \end{cases} \\ -2x - 3(6x - 11) = -7 \\ -2x - 18x + 33 = -7 \\ -20x + 33 = -7 \\ -20x = -40 \\ x = 2 \end{aligned}$$

$$\begin{aligned} y &= 6x - 11 \\ y &= 6(2) - 11 \\ y &= 12 - 11 \\ y &= 1 \end{aligned}$$

(2, 1) is the solution

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

$$\begin{aligned} 2x - 3(x - 1) &= -1 \\ 2x - 3x + 3 &= -1 \\ -1x + 3 &= -1 \\ -1x &= -4 \\ x &= 4 \end{aligned}$$

(4, 3) is the solution

$$\begin{aligned} 3) \begin{cases} y = -3x + 5 \\ 5x - 4y = -3 \end{cases} \\ 5x - 4(-3x + 5) = -3 \\ 5x + 12x - 20 = -3 \\ 17x - 20 = -3 \\ 17x = 17 \\ x = 1 \end{aligned}$$

$$\begin{aligned} y &= -3x + 5 \\ y &= -3(1) + 5 \\ y &= -3 + 5 \\ y &= 2 \end{aligned}$$

(1, 2) is the solution

$$\begin{aligned} 4) \begin{cases} -3x - 3y = 3 \\ y = -5x - 17 \end{cases} \\ y = -5(-4) - 17 \\ y = 20 - 17 \\ y = 3 \end{aligned}$$

$$\begin{aligned} -3x - 3y &= 3 \\ -3x - 3(-5x - 17) &= 3 \\ -3x + 15x + 51 &= 3 \\ 12x + 51 &= 3 \\ 12x &= -48 \\ x &= -4 \end{aligned}$$

(-4, 3) is the solution

$$\begin{cases} y = -2 \\ 4x - 3y = 18 \end{cases}$$

$$\begin{aligned} 4x - 3(-2) &= 18 \\ 4x + 6 &= 18 \\ 4x &= 12 \\ x &= 3 \end{aligned}$$

$(3, -2)$  is  
the solution

$$\begin{cases} y = 5x - 7 \\ -3x - 2y = -12 \end{cases}$$

$$\begin{aligned} -3x - 2(5x - 7) &= -12 \\ -3x - 10x + 14 &= -12 \\ -13x + 14 &= -12 \\ -13x &= -26 \\ x &= 2 \end{aligned}$$

$$\begin{aligned} y &= 5(2) - 7 \\ y &= 10 - 7 \\ y &= 3 \end{aligned}$$

$(2, 3)$  is  
the solution

$$\begin{cases} -4x + y = 6 \\ -5x - y = 21 \end{cases}$$

$$y = 4x + 6$$

$$\begin{aligned} y &= 4(-3) + 6 \\ y &= -12 + 6 \\ y &= -6 \end{aligned}$$

$$\begin{aligned} -5x - (4x + 6) &= 21 \\ -5x - 4x - 6 &= 21 \\ -9x - 6 &= 21 \\ -9x &= 27 \\ x &= -3 \end{aligned}$$

$(-3, -6)$  is the  
solution

$$\begin{cases} -7x - 2y = -13 \\ x - 2y = 11 \Rightarrow x = 2y + 11 \end{cases}$$

$$\begin{aligned} x &= 2(-4) + 11 \\ x &= -8 + 11 \\ x &= 3 \end{aligned}$$

$$\begin{aligned} -7x - 2y &= -13 \\ -7(2y + 11) - 2y &= -13 \\ -14y - 77 - 2y &= -13 \\ -16y - 77 &= -13 \\ -16y &= 64 \\ y &= -4 \end{aligned}$$

$(3, -4)$  is the  
solution



$$9) \begin{cases} -5x + y = -2 \\ -3x + 6y = -12 \end{cases} \Rightarrow y = 5x - 2$$

$$y = 5(0) - 2$$

$$y = 0 - 2$$

$$y = -2$$

$$-3x + 6y = -12$$

$$-3x + 6(5x - 2) = -12$$

$$-3x + 30x - 12 = -12$$

$$27x - 12 = -12$$

$$27x = 0$$

$$x = 0$$

$(0, -2)$  is the solution

$$10) \begin{cases} -5x + y = -3 \\ 3x - 8y = 24 \end{cases} \Rightarrow y = 5x - 3$$

$$y = 5(0) - 3$$

$$y = 0 - 3$$

$$y = -3$$

$$3x - 8(5x - 3) = 24$$

$$3x - 40x + 24 = 24$$

$$-37x + 24 = 24$$

$$-37x = 0$$

$$x = 0$$

$(0, -3)$  is the solution