

3.2 Solving Systems by Elimination

Obj: 1. Solve a system of 2 linear eq. using elimination.

$$\begin{cases} 2x + 5y = 15 \\ -4x + 7y = -13 \end{cases}$$

$$\begin{array}{r} 4x + 10y = 30 \\ -4x + 7y = -13 \\ \hline 17y = 17 \\ y = 1 \end{array}$$

(5, 1)

$$\begin{array}{r} 2x + 5y = 15 \\ \underline{-5 \quad -5} \\ 2x = 10 \\ x = 5 \end{array}$$

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$$\begin{cases} 6r + 7s = -15 \\ -3r + s = -6 \end{cases}$$

$$\begin{array}{r} 6r + 7s = -15 \\ -6r + 2s = -12 \\ \hline 9s = -27 \\ s = -3 \end{array}$$

OR

$$\begin{array}{r} 6r + 7s = -15 \\ -7(-3r + s = -6) \\ \hline 6r + 7s = -15 \\ 21r - 7s = 42 \\ \hline 27r = 27 \\ r = 1 \end{array}$$

$$\begin{array}{r} -3r - s = -6 \\ +3 \quad +3 \\ \hline -3r = -3 \\ r = 1 \end{array}$$

$$\begin{array}{r} -3 + s = -6 \\ +3 \quad +3 \\ \hline s = -3 \end{array}$$

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$$\begin{cases} 4x - 3y = 15 \\ 8x + 2y = -10 \end{cases}$$

$$\begin{array}{r} -8x + 6y = -30 \\ 8x + 2y = -10 \\ \hline 8y = -40 \\ y = -5 \end{array}$$

$y = -5$

$$8x + 2(-5) = -10$$

$$8x - 10 = -10$$

$$\begin{array}{r} +10 \quad +10 \\ \hline 8x = 0 \\ x = 0 \end{array}$$

$(0, -5)$

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$$\begin{cases} 2x + 5y = 12 \\ 2x + 5y = 15 \end{cases}$$

$$\begin{array}{r} 2x + 5y = 12 \\ -2x - 5y = -15 \\ \hline 0 = -3 \\ \text{False} \end{array}$$

No Solution
Parallel Lines

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$$\begin{cases} 2x + 5y = 15 \\ -3x - 7.5y = -22.5 \end{cases} \quad \text{LCM: } -6$$

$$\begin{array}{r} 6x + 15y = 45 \\ -6x - 15y = -45 \\ \hline 0 = 0 \end{array}$$

Infinitely many Sol.
Same Line

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$$\begin{cases} 5x + 3y = 2 \\ 2x + 20 = 4y - 20 \end{cases} \quad \text{Line up the terms}$$

$$\begin{array}{r} 2(5x + 3y = 2) \\ -5(2x - 4y = -20) \\ \hline 10x + 6y = 4 \\ -10x + 20y = 100 \end{array}$$

$$\begin{array}{r} 26y = 104 \\ \hline 26 \\ \hline y = 4 \end{array}$$

$$2x - 4(4) = -20$$

$$2x - 16 = -20$$

$$+16 \quad +16$$

$$2x = -4$$

$$x = -2$$

$(-2, 4)$

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