

Method of Elimination

Adding or Subtracting two linear equations in order to eliminate the y variable or the x variable. Solve for one variable and substitute it's value into one of the original equations to solve for the other variable

$$\begin{array}{l} 4 \quad 4x + 2y = 6 \quad ax + by = c \\ \underline{\oplus -2x + 2y = 18} \\ \frac{6x}{6} = \frac{-12}{6} \\ x = -2 \\ 4(-2) + 2y = 6 \\ -8 + 2y = 6 \\ \underline{+8} \quad +8 \\ 2y = 14 \\ \frac{2y}{2} = \frac{14}{2} \\ y = 7 \end{array}$$

$(-2, 7)$

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$$\begin{array}{l} 6. \quad 10x - 3y = 18 \quad 10(3) - 3y = 18 \\ \underline{\oplus -2x + 3y = 6} \quad \underline{-30 - 3y = 18} \\ \frac{8x}{8} = \frac{24}{8} \quad \frac{-3y}{-3} = \frac{-12}{-3} \\ x = 3 \quad y = 4 \\ \boxed{(3, 4)} \end{array}$$

$$\begin{array}{l} 7) \quad x - y = 10 \quad 7 - y = 10 \\ \underline{\oplus 3x + y = 18} \quad \underline{-7 - 7} \\ 4x = 28 \quad -y = 3 \\ x = 7 \quad \boxed{y = -3} \\ \circled{(-3)} \end{array}$$

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$$\begin{array}{l} x = 3y + 11 \quad 5 = 3y + 11 \\ 2x - 3y = 16 \quad \underline{-11 \quad -11} \\ \underline{\ominus x - 3y = 11} \quad \underline{-6 = 3y} \\ x = 5 \quad \frac{-6}{3} = \frac{3y}{3} \\ \boxed{(5, -2)} \end{array}$$

$$\begin{array}{l} 9. \quad 4y = 2x - 8 \\ \underline{\oplus 5x - 4y = 20} \\ 3x = 12 \\ x = 4 \\ 4y = 2(4) - 8 \\ 4y = 8 - 8 \\ \frac{4y}{4} = \frac{0}{4} \\ y = 0 \\ \boxed{(4, 0)} \end{array}$$

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10
$$\begin{aligned} 3x - 4y &= -10 \\ 3x - 4y &= -13 \end{aligned}$$

$$M = \frac{-a}{b} = \frac{-3}{-4} \left(\frac{3}{4} \right)$$

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11
$$\begin{aligned} 2x + y &= -10 \\ -y &= 2x + 10 \\ -1 &\quad -1 \quad -1 \end{aligned}$$

$$y = -2x - 10$$

Infinitely Many

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(x, y)
 $5 = 2 \quad N/S$
 $5 = 5 \quad \infty$

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P14 ① $\begin{aligned} 2(x + 3y) &= 6 \\ 2x + 6y &= 6 \end{aligned}$

② $\begin{aligned} 2x - 7y &= -1 \\ 2x - 7y &= -1 \end{aligned}$

$$\begin{array}{r} 2x + 6y = 6 \\ -2x + 7y = 1 \\ \hline 13y = 13 \\ y = 1 \end{array}$$

$x + 3(1) = 6$
 $x + 3 = 6$
 $-3 \quad -3$
 $x = 3$

$(3, 1)$

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2) P14
$$\begin{aligned} 9x + 3y &= 12 \\ 3(2x + y) &= 5 \end{aligned}$$

$$\begin{array}{r} 9(-1) + 3y = 12 \\ -9 + 3y = 12 \\ +9 \quad +9 \\ 3y = 21 \\ y = 7 \end{array}$$

$$\begin{array}{r} 6x + 3y = 15 \\ 9x + 3y = 12 \\ \hline -3x = 3 \\ -3 \quad -3 \\ x = -1 \end{array}$$

$(-1, 7)$

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7) P15
$$\begin{aligned} 2(3x + 4y) &= 6 \\ 7x + 8y &= 10 \end{aligned}$$

$$\begin{array}{r} 3(-2) + 4y = 6 \\ -6 + 4y = 6 \\ +6 \quad +6 \\ 4y = 12 \\ y = 3 \end{array}$$

$$\begin{array}{r} 6x + 8y = 12 \\ 6x = -12 \\ \hline x = -2 \end{array}$$

$(-2, 3)$

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$$\begin{array}{l}
 9) \quad 5x + 9y = -10 \\
 \underline{7x + 10y = -1} \\
 \hline
 \begin{array}{l}
 \cancel{7(5x + 9y = -10)} \quad \text{or} \quad \cancel{10(5x + 9y = -10)} \\
 \cancel{5(7x + 10y = -1)} \quad \quad \quad \quad \quad \cancel{9(7x + 10y = -1)}
 \end{array}
 \\[10pt]
 \begin{array}{r}
 \cancel{35x + 63y = -70} \\
 \cancel{\ominus 35x + 50y = -5} \\
 \hline
 13y = -65 \\
 \hline
 y = -5
 \end{array}
 \quad
 \begin{array}{r}
 \cancel{50x + 90y = -100} \\
 \cancel{\ominus 63x + 90y = -9} \\
 \hline
 -13x = -91 \\
 \hline
 x = 7
 \end{array}
 \end{array}$$

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