


a)

$$2x + 3y - z = -9$$

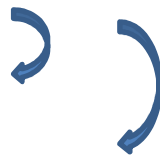
$$x - 2y + z = 9$$


$$-x + y + 2z = 0$$

$$\begin{array}{ccc|c} 2 & 3 & -1 & -9 \\ 1 & -2 & 1 & 9 \\ -1 & 1 & 2 & 0 \end{array}$$


$$\begin{array}{ccc|c} 1 & -2 & 1 & 9 \\ 2 & 3 & -1 & -9 \\ -1 & 1 & 2 & 0 \end{array}$$


· (-2)



$$\begin{array}{ccc|c} 1 & -2 & 1 & 9 \\ 0 & 7 & -3 & -27 \\ 0 & -1 & 3 & 9 \end{array}$$


$$\begin{array}{ccc|c} 1 & -2 & 1 & 9 \\ 0 & -1 & 3 & 9 \\ 0 & 7 & -3 & -27 \end{array}$$

· 7



· (-1)

$$\begin{array}{ccc|c} 1 & -2 & 1 & 9 \\ 0 & 1 & -3 & -9 \\ 0 & 0 & 18 & 36 \end{array}$$

$$\Rightarrow z = 2$$

$$\Rightarrow y - 3 \cdot 2 = -9 \quad \Rightarrow y = -3$$


$$\Rightarrow x - 2 \cdot (-3) + 2 = 9 \quad \Rightarrow x = 1$$

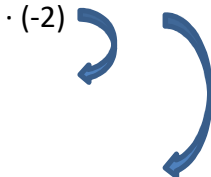
b)

$$2a + 2b - 4c = 12$$


$$a + 3b + c = 4$$

$$-a - b + 3c = -8$$

$$\begin{array}{ccc|c} 2 & 2 & -4 & 12 \\ 1 & 3 & 1 & 4 \\ -1 & -1 & 3 & -8 \end{array}$$


$$\begin{array}{ccc|c} 1 & 3 & 1 & 4 \\ 2 & 2 & -4 & 12 \\ -1 & -1 & 3 & -8 \end{array}$$


$$\begin{array}{ccc|c} 1 & 3 & 1 & 4 \\ 0 & -4 & -6 & 4 \\ 0 & 2 & 4 & -4 \end{array}$$


$$\begin{array}{ccc|c} 1 & 3 & 1 & 4 \\ 0 & 2 & 4 & -4 \\ 0 & -4 & -6 & 4 \end{array}$$


$$1 \quad 3 \quad 1 \quad | \quad 4$$

$$0 \quad 1 \quad 2 \quad | \quad -2$$

$$0 \quad 0 \quad 2 \quad | \quad -4$$

$$\Rightarrow 2c = -4 \quad \Rightarrow \quad c = -2$$

$$\Rightarrow b + 2 \cdot (-2) = -2 \quad \Rightarrow \quad b = 2$$

$$\Rightarrow a + 3 \cdot 2 - 2 = 4 \quad \Rightarrow \quad a = 0$$

c)

$$a + 2b - c - 4d = -8$$

$$2a - b + c - 2d = -6$$

$$-a + b + c + 2d = 5$$

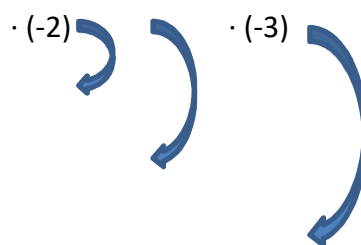
$$3a - 2b + c + d = 3$$

$$1 \quad 2 \quad -1 \quad -4 \quad | \quad -8$$

$$2 \quad -1 \quad 1 \quad -2 \quad | \quad -6$$

$$-1 \quad 1 \quad 1 \quad 2 \quad | \quad 5$$

$$3 \quad -2 \quad 1 \quad 1 \quad | \quad 3$$



$$1 \quad 2 \quad -1 \quad -4 \quad | \quad -8$$

$$0 \quad -5 \quad 3 \quad 6 \quad | \quad 10 \quad : (-5)$$

$$0 \quad 3 \quad 0 \quad -2 \quad | \quad -3$$

$$0 \quad -8 \quad 4 \quad 13 \quad | \quad 27$$

$$\begin{array}{cccc|c} 1 & 2 & -1 & -4 & -8 \\ 0 & 1 & -\frac{3}{5} & -\frac{6}{5} & -2 \\ 0 & 3 & 0 & -2 & -3 \\ 0 & -8 & 4 & 13 & 27 \end{array}$$

$$\cdot (-3) \quad \cdot 8$$

$$\begin{array}{cccc|c} 1 & 2 & -1 & -4 & -8 \\ 0 & 1 & -\frac{3}{5} & -\frac{6}{5} & -2 \\ 0 & 0 & \frac{9}{5} & \frac{8}{5} & 3 \\ 0 & 0 & -\frac{4}{5} & \frac{17}{5} & 11 \end{array}$$

$$: \frac{9}{5}$$

$$\begin{array}{cccc|c} 1 & 2 & -1 & -4 & -8 \\ 0 & 1 & -\frac{3}{5} & -\frac{6}{5} & -2 \\ 0 & 0 & 1 & \frac{8}{9} & \frac{5}{3} \\ 0 & 0 & -\frac{4}{5} & \frac{17}{5} & 11 \end{array}$$

$$\cdot \frac{4}{5}$$

$$\begin{array}{cccc|c} 1 & 2 & -1 & -4 & -8 \\ 0 & 1 & -\frac{3}{5} & -\frac{6}{5} & -2 \\ 0 & 0 & 1 & \frac{8}{9} & \frac{5}{3} \\ 0 & 0 & 0 & \frac{37}{9} & \frac{37}{3} \end{array}$$

$$\Rightarrow \frac{37}{9}d = \frac{37}{3} \quad \Rightarrow \quad d = 3$$

$$\Rightarrow c + \frac{8}{9} \cdot 3 = \frac{5}{3} \quad \Rightarrow \quad c = -1$$

$$\Rightarrow b - \frac{3}{5} \cdot (-1) - \frac{6}{5} \cdot 3 = -2 \quad \Rightarrow \quad b = 1$$

$$\Rightarrow a + 2 \cdot 1 - 1 \cdot (-1) - 4 \cdot 3 = -8 \quad \Rightarrow \quad a = 1$$