

① Por método de eliminación

$$5x + 2y + 4z = 12, \quad -3x + 3y + 3z = 56$$

$$2x - y - z = 69$$

$$\begin{bmatrix} 5x + 2y - 4z = 12 \\ -3x + 3y + 3z = 56 \\ 2x - y - z = 69 \end{bmatrix}$$

$$\begin{bmatrix} 15x + 6y - 12z = 36 \\ -15x + 15y + 15z = 280 \\ 2x - y - z = 69 \end{bmatrix}$$

$$\begin{array}{r} -15x + 15y + 15z = 280 \\ + 15x + 6y - 12z = 36 \end{array}$$

$$21y + 3z = 316$$

$$\begin{bmatrix} 15x + 6y - 12z = 36 \\ 21y + 3z = 316 \\ 2x - y - z = 69 \end{bmatrix}$$

$$\begin{array}{r} 30x + 12y - 24z = 72 \\ 21y + 3z = 316 \\ 30x - 15y - 15z = 1035 \end{array}$$

$$\begin{array}{r} 30x - 15y - 15z = 1035 \\ -30x + 12y - 24z = 72 \end{array}$$

$$-27y + 9z = 963$$

$$\begin{array}{r} 30x + 12y - 24z = 72 \\ 21y + 3z = 316 \\ -27y + 9z = 963 \end{array}$$

$$\begin{array}{r} 21y + 3z = 316 \times 9 \\ -27y + 9z = 963 \times 7 \end{array}$$

$$\begin{bmatrix} 30x + 12y - 24z = 72 \\ 189y + 27z = 2844 \\ -189y + 63z = 6741 \end{bmatrix}$$

$$-189y + 63z = 6741$$

+

$$189y + 27z = 2844$$

$$90z = 9585$$

$$\begin{bmatrix} 30x + 12y - 24z = 72 \\ 189y + 27z = 2844 \\ 90z = 9585 \end{bmatrix}$$

$$90z = 9585 \rightarrow z = \frac{213}{2}$$

$$189y + 27 \frac{213}{2} = 2844 \rightarrow y = -\frac{1}{6}$$

$$30x + 12 \left(-\frac{1}{6}\right) - 24 \frac{213}{2} = 72 \rightarrow x = \frac{263}{3}$$

$$x = \frac{263}{3}, \quad z = \frac{213}{2}, \quad y = -\frac{1}{6}$$

2) Método de sustitución.

$$\begin{cases} -5x - 2y - 3z = 22 \\ x + 2y + 9z = 22 \\ -4x + 3y + 8z = 45 \end{cases}$$

$$\begin{cases} \frac{-22 + 2y + 3z}{5} + 2y + 9z = 22 \\ -4 \left(\frac{-22 + 2y + 3z}{5} \right) + 3y + 8z = 45 \end{cases}$$

$$\begin{cases} \frac{8y + 42z - 22}{5} = 22 \\ \frac{23y + 52z + 88}{5} = 45 \end{cases}$$

$$\frac{23 \cdot 3(-7z + 22)}{4} + 52z + 88 = 45$$

$$\left[\frac{11(-5z + 34)}{4} = 45 \right]$$

$$y = \frac{3(-7 \cdot \frac{194}{55} + 22)}{4}$$

$$y = \frac{-111}{55}$$

$$x = \frac{-22 + 2 \left(\frac{-111}{55} \right) + 3 \cdot \frac{194}{55}}{5}$$

$$x = \frac{-314}{55}$$

$$x = \frac{314}{55} \quad y = \frac{-111}{55} \quad z = \frac{194}{55}$$

$$\begin{aligned} 3) \quad & 12x - 14y - 45z = 120 \\ & 654x + 120y - 3z = -600 \\ & -5x - 2y + z = 60 \end{aligned}$$

$$\begin{aligned} & 12x - 14y - 45z = 120 \\ & 654x + 120y - 3z = -600 \\ & -1083y + 0977z = 55,413 \end{aligned}$$

$$\begin{aligned} & 12x - 14y - 45z = 120 \\ & 883y + 24495z = -7140 \\ & -1083y + 0977z = 55413 \end{aligned}$$

$$\begin{aligned} X - & 1167y - 375z = 10 \\ & 883y + 24495z = -7140 \\ & -1083y + 0977z = 55413 \end{aligned}$$

$$\begin{aligned} X - & 1167y - 375z = 10 \\ & 883y + 24495z = -7140 \\ & 398z = 46659 \end{aligned}$$

$$\begin{aligned} X - 1167y - 375z &= 10 \\ y + 2774z &= -8086 \\ 398z &= 46659 \end{aligned}$$

$$\begin{aligned} X - 1167y - 375z &= 10 \\ y + 2774z &= -8086 \\ z &= 11723 \end{aligned}$$

$$\begin{aligned} y + 2774z &= -8086 \\ y + 2774z \cdot 11723 &= -8086 \\ y &= -40606 \end{aligned}$$

$$\begin{aligned} X - 1167y - 375z &= 10 \\ X - 1167y(-40606) - 375 \cdot 11723 &= 10 \\ X = 6587 \end{aligned}$$

4) Método de sustitución

$$\begin{cases} -x + 3y - z = 40 \\ x + 2y = 50 \\ 2x - 6y + 2z = 30 \end{cases}$$

$$\begin{cases} -(50 - 2y) + 3y - z = 40 \\ 2(50 - 2y) - 6y + 2z = 30 \end{cases}$$

$$\begin{cases} -50 + 5y - z = 40 \\ 100 - 10y + 2z = 30 \end{cases}$$

$$100 - 10 \cdot \frac{z + 90}{5} + 2z = 30$$

$$[-80 = 30]$$

sin solución

Método de reducción

$$\begin{bmatrix} -x + 3y - z = 40 \\ x + 2y = 50 \\ 2x - 6y + 2z = 30 \end{bmatrix}$$

$$\begin{bmatrix} -2x + 6y - 2z = 80 \\ 2x - 6y + 2z = 30 \\ x + 2y = 50 \end{bmatrix}$$

$$\begin{aligned} 2x - 6y + 2z &= 30 + -2 \times 4 \\ 6y - 2z &= 80 \\ 0 &= 110 \end{aligned}$$

$$\begin{bmatrix} -2x + 6y - 2z = 80 \\ 0 = 110 \\ x + 2y = 50 \end{bmatrix}$$

Sin solución