

REGRA DE Cramer

QUESTÃO A

$$\begin{cases} 2x + 5y + 6z = 2 \\ x + 2z = 0 \\ 2x + 3y - z = -5 \end{cases} \quad \begin{bmatrix} 2 & 5 & 6 \\ 1 & 0 & 2 \\ 2 & 3 & -1 \end{bmatrix}_{3 \times 3} \cdot \begin{bmatrix} x \\ y \\ z \end{bmatrix}_{3 \times 1} = \begin{bmatrix} 2 \\ 0 \\ -5 \end{bmatrix}_{3 \times 1}$$

CALCULANDO O DETERMINANTE DE A:

$$|A| = \begin{vmatrix} 2 & 5 & 6 \\ 1 & 0 & 2 \\ 2 & 3 & -1 \end{vmatrix}$$

$$\begin{aligned} |A| &= [(2)(0)(-1) + (5)(2)(2) + (6)(1)(3)] - [(6)(0)(2) + (2)(2)(3) + (5)(1)(-1)] \\ &= (0 + 20 + 18) - (0 + 12 - 5) \\ &= 38 - 7 \\ &= 31 \end{aligned}$$

LOGO, $|A| \neq 0$

CALCULANDO O VALOR DA INCÓGNITA X:

$$X = \frac{\begin{vmatrix} 2 & 5 & 6 \\ 0 & 0 & 2 \\ -5 & 3 & -1 \end{vmatrix}}{|A|}$$

$$\begin{aligned} &= \frac{[(2)(0)(-1) + (5)(2)(-5) + (6)(0)(3)] - [(6)(0)(-5) + (2)(2)(3) + (5)(0)(-1)]}{26} \\ &= \frac{(0 - 50 + 0) - (0 + 12 + 0)}{26} \\ &= \frac{-50 - 12}{26} \Rightarrow X = \frac{-62}{26} \Rightarrow X = -2 \end{aligned}$$

CALCULANDO O VALOR DA INCÓGNITA y :

$$y = \begin{vmatrix} 2 & 2 & 6 & 2 & 2 \\ 1 & 0 & 2 & 1 & 0 \\ 2 & -3 & -1 & 2 & -5 \end{vmatrix} \quad |A|$$

$$= \frac{[(2)(0)(-1) + (2)(2)(2) + (6)(1)(-5)] - [(6)(0)(2) + (2)(2)(-5) + (2)(1)(-1)]}{26}$$

$$= \frac{(0 + 8 - 30) - (0 - 20 - 2)}{26}$$

$$= \frac{-22 + 22}{26}$$

$$= \frac{0}{26}$$

$$= 0$$

CALCULANDO O VALOR DA INCÓGNITA z :

$$z = \begin{vmatrix} 2 & 4 & 2 & 2 & 4 \\ 1 & 0 & 0 & 1 & 0 \\ 2 & 3 & -5 & 2 & 3 \end{vmatrix} \quad |A|$$

$$= \frac{[(2)(0)(-5) + (4)(0)(2) + (2)(1)(3)] - [(2)(0)(2) + (2)(0)(3) + (4)(1)(-5)]}{26}$$

$$= \frac{(0 + 0 + 6) - (0 + 0 - 20)}{26}$$

$$= \frac{6 + 20}{26}$$

$$= \frac{26}{26}$$

$$= 1$$

SENDO ASSIM, OS VALORES DAS INCÓGNITAS SÃO:

38

$$x = -2; y = 0 \text{ E } z = 1$$

QUESTÃO 3

$$\begin{cases} x + y + z - 2w = -4 \\ 2y + z + 3w = 4 \\ 2x + y - z + 2w = 5 \\ x - y + w = 4 \end{cases}$$

$$\begin{bmatrix} 1 & 1 & 1 & -2 \\ 0 & 2 & 1 & 3 \\ 2 & 1 & -1 & 2 \\ 1 & -1 & 0 & 1 \end{bmatrix}_{4 \times 4} \cdot \begin{bmatrix} x \\ y \\ z \\ w \end{bmatrix}_{4 \times 1} = \begin{bmatrix} -4 \\ 4 \\ 5 \\ 4 \end{bmatrix}_{4 \times 1}$$

CALCULANDO O DETERMINANTE DE A:

$$|A| = \begin{vmatrix} 1 & 1 & 1 & -2 \\ 0 & 2 & 1 & 3 \\ 2 & 1 & -1 & 2 \\ 1 & -1 & 0 & 1 \end{vmatrix} = -30 \text{ (CALCULADO NO A)}$$

CALCULANDO O VALOR DA INCÓGNITA X:

$$x = \frac{\begin{vmatrix} -4 & 1 & 1 & -2 \\ 4 & 2 & 1 & 3 \\ 5 & 1 & -1 & 2 \\ 4 & -1 & 0 & 1 \end{vmatrix}}{|A|}$$

$$= \frac{-30}{-30}$$

$$= 1$$

CALCULANDO O VALOR DA INCÓGNITA Y:

CALCULANDO O VALOR DA INCÓGNITA Z:

CALCULANDO O VALOR DA INCÓGNITA w :

$$W = \frac{1}{|A|} \begin{vmatrix} 1 & 1 & 1 & -5 \\ 0 & 2 & 1 & 4 \\ 2 & 1 & -1 & 5 \\ 1 & -1 & 0 & 4 \end{vmatrix}$$

DESSA FORMA, OS VALORES DAS INCÓGNITAS SÃO:

50

$$x=1; y=-1; z=0 \text{ e } w=2$$

QUESTÃO C

$$\begin{cases} 2x_1 + x_2 + x_3 = 6 \\ 3x_1 + 2x_2 - 2x_3 = -2 \\ x_1 + x_2 + 2x_3 = 4 \end{cases} \quad \begin{bmatrix} 2 & 1 & 1 \\ 3 & 2 & -2 \\ 1 & 1 & 2 \end{bmatrix}_{3 \times 3} \cdot \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}_{3 \times 1} = \begin{bmatrix} 6 \\ -2 \\ 4 \end{bmatrix}_{3 \times 1}$$

CALCULANDO O DETERMINANTE DE A:

$$|A| = \begin{vmatrix} 2 & 1 & 1 & 2 & 1 \\ 3 & 2 & -2 & 3 & 2 \\ 1 & 1 & 2 & 1 & 1 \end{vmatrix}$$

$$\begin{aligned} |A| &= [(2)(2)(2) + (1)(-2)(1) + (1)(3)(1)] - [(1)(2)(1) + (2)(-2)(1) + (1)(3)(2)] \\ &= (8 - 2 + 3) - (2 - 4 + 6) \\ &= 9 - 5 \\ &= 4 \end{aligned}$$

CALCULANDO O VALOR DA INCÓGNITA x_1 :

$$x_1 = \frac{\begin{vmatrix} 6 & 1 & 1 & 6 & 1 \\ -2 & 2 & -2 & -2 & 2 \\ 4 & 1 & 2 & 4 & 1 \end{vmatrix}}{|A|}$$

$$\begin{aligned} &= \frac{[(6)(2)(2) + (1)(-2)(4) + (1)(-2)(1)] - [(1)(2)(4) + (6)(-2)(1) + (1)(-2)(2)]}{4} \\ &= \frac{(24 - 8 - 2) - (8 - 12 - 4)}{4} \\ &= \frac{14 + 8}{4} \\ &= \frac{22}{4} \end{aligned} \quad \rightarrow x_1 = 5,5$$

CALCULANDO O VALOR DA INCÓGNITA X_2 :

$$X_2 = \frac{\begin{vmatrix} 2 & 6 & 1 \\ 3 & -2 & -2 \\ 1 & 1 & 2 \end{vmatrix}}{|A|}$$

$$= \frac{[(2)(-2)(2) + (6)(-2)(1) + (1)(3)(1)] - [(1)(-2)(1) + (2)(-2)(1) + (6)(3)(2)]}{5}$$

$$= \frac{(-8 - 12 + 3) - (-2 - 2 + 36)}{5}$$

$$= \frac{-8 - 12}{5}$$

$$= \frac{-20}{5}$$

$$= -4$$

CALCULANDO O VALOR DA INCÓGNITA X_3 :

$$X_3 = \frac{\begin{vmatrix} 2 & 1 & 6 \\ 3 & 2 & -2 \\ 1 & 1 & 4 \end{vmatrix}}{|A|}$$

$$= \frac{[(2)(2)(4) + (1)(-2)(1) + (6)(3)(1)] - [(6)(2)(1) + (2)(-2)(1) + (1)(3)(1)]}{5}$$

$$= \frac{(16 - 2 + 18) - (12 - 2 + 3)}{5}$$

$$= \frac{32 - 20}{5}$$

$$= \frac{12}{5}$$

$$= 2,4$$

DESTANTE, OS VALORES DAS INCÓGNITAS SÃO:

K2

$$x_1 = 5,4; x_2 = -3,2 \text{ E } x_3 = 2,4$$