— 1 —

Tarefa Básica — Sistemas Lineares Regra de Cramer

1) a) $\begin{cases} 2x - y = 2 \\ -x + 3y = -3 \end{cases}$

$D = \begin{Bmatrix} 2 & -1 \\ -1 & -3 \end{Bmatrix}$

$\hookrightarrow D = 6 - 1 = 5$

— 1 —

$Dx = \begin{Bmatrix} 2 & -1 \\ -3 & 3 \end{Bmatrix} \quad 6 - 3 = 3$

— 1 —

$Dy = \begin{bmatrix} 2 & 2 \\ -1 & -3 \end{bmatrix} \quad \begin{array}{c} -6 - (\circledast) \\ -4 \end{array}$

$x = \dfrac{Dx}{D} = \dfrac{3}{5}$

$y = \dfrac{Dy}{D} = \dfrac{4}{5}$

$R: V = \left\{ \left(\dfrac{3}{5} ; \dfrac{4}{5} \right) \right\}$

$3x^{2}$

b) $\begin{cases} 3x - y + z = 1 \\ 2x + 3z = -1 \\ 4x + y - 2z = -7 \end{cases}$

$-1-$

$D = \begin{bmatrix} 3 & -1 & 1 \\ 2 & 0 & 3 \\ 4 & 1 & -2 \end{bmatrix} \begin{matrix} 3 & -1 \\ 2 & 0 \\ 4 & 1 \end{matrix}$ $-10 - 13 = -23$

I. $0 + 9 + 4 = 13$
II. $0 + 12 + 2 = +10$

$-1-$

$Dx = \begin{bmatrix} 1 & -1 & 1 \\ -1 & 0 & 3 \\ 7 & 1 & 2 \end{bmatrix} \begin{matrix} 1 & -1 \\ -1 & 0 \\ 7 & 1 \end{matrix}$ $(-22) - 1 = -23$

I. $0 + 3 - 2 = 1$
II. $0 - 21 - 1 = -22$

$-1-$

$Dy = \begin{bmatrix} 3 & 1 & 1 \\ 2 & -1 & 3 \\ 4 & 7 & 2 \end{bmatrix} \begin{matrix} 3 & 1 \\ 2 & -1 \\ 4 & 7 \end{matrix}$ $32 - 55 = -23$

I. $6 + 12 + 14 = 32$
II. $-4 + 63 - 4 = 55$

$$Dz = \begin{cases} 3 & -1 & 1 \\ 2 & 0 & -1 \\ 4 & 1 & 7 \end{cases} \begin{matrix} 3 & -1 \\ 2 & 0 \\ 4 & 1 \end{matrix}$$

I. $0 + 4 + 2$ } $6 - (-17) = 23$

II. $0 - 3 - 14$ }

$$X = \frac{-23}{-23} = 1 \qquad Z = \frac{23}{-23} = -1$$

$$y = \frac{-23}{-23} = 1$$

$$y = \frac{-23}{-23} = 1$$

2. $\begin{cases} 3x + 4y - z = 1 \\ 4x + 5y + 2z = 12 \\ x - 2y + 3z = 8 \end{cases}$

$Dy = \begin{bmatrix} 3 & 1 & -1 \\ 4 & 12 & 2 \\ 1 & 8 & 3 \end{bmatrix} \begin{matrix} 3 & 1 \\ 4 & 12 \\ 1 & 8 \end{matrix}$

$D = \begin{cases} 3 & 4 & -1 \\ 4 & 5 & 2 \\ 1 & -2 & 3 \end{cases} \begin{matrix} 3 & 4 \\ 4 & 5 \\ 1 & -2 \end{matrix}$

$78 - 48 = 30$

— / —

I. $-12 + 48 + 12$ } $61 - 31 = 30$

II. $-5 - 12 + 48$

$y = \frac{30}{30} \rightarrow \boxed{y = 1}$

$\boxed{\text{Alternativa A}}$

tilibra

3.
$$\begin{cases} x + 2y + z = 1 \\ 3x + x - 112 = -2 \\ 2x + 3y - z = 1 \end{cases}$$

$$D = \begin{cases} 1 & 2 & 1 \\ 3 & 1 & -11 \\ 2 & 3 & -1 \end{cases} \begin{array}{cc} 1 & 2 \\ 3 & 1 \\ 2 & 3 \end{array}$$

I. $2 - 33 + 6$ } $(-36) - (-37) = 1$
II. $-1 - 44 + 9$

$$Dy = \begin{bmatrix} 1 & 1 & 1 \\ 3 & -2 & -11 \\ 2 & 1 & -1 \end{bmatrix} \begin{array}{cc} 1 & 1 \\ 3 & -2 \\ 2 & 1 \end{array} = (-17) - (-18) = 1$$

$$Dx = \begin{bmatrix} 1 & 1 & 1 \\ 3 & -2 & 11 \\ 2 & 1 & -1 \end{bmatrix} \begin{array}{cc} 1 & 1 \\ 3 & -2 \\ 2 & 1 \end{array} = (-17) - (-18) = 1$$

I. $-4 - 11 - 3$
II. $2 - 223$

$$Dz = \begin{bmatrix} 1 & 2 & 1 \\ 3 & 1 & -2 \\ 2 & 3 & 1 \end{bmatrix} \begin{array}{cc} 1 & 2 \\ 3 & 1 \\ 2 & 3 \end{array} \qquad 2 - 2 = 0$$

I. $1, -8, 9.$
II. $2, -6, 6.$

$$x = \frac{-1}{1} = -1$$

$$y = \frac{1}{1} = 1$$

$$z = \frac{0}{1} = 0$$

$a + b + c =$
$1 + (-1) + 0 = \emptyset$

[Alternativa C]

4) $\begin{cases} x + 2y - 3z = 29 \\ x + 3y + 2z = 4 \\ x - y - 2z = 8 \end{cases}$

$D = \begin{bmatrix} 1 & 2 & -3 \\ 1 & 3 & 2 \\ 1 & -1 & -2 \end{bmatrix} \begin{matrix} 1 & 2 \\ 1 & 3 \\ 1 & -1 \end{matrix} = 1 - (-15) = 16.$

$Dx \cdot \begin{bmatrix} 29 & 2 & -3 \\ 4 & 3 & 2 \\ 8 & -1 & -2 \end{bmatrix} \begin{matrix} 29 & 2 \\ 4 & 3 \\ 8 & 1 \end{matrix} = (-30) - (-146) = 16$

I. $-174 + 32 + 12$
II. $-72 - 58 - 16$

$Dy = \begin{bmatrix} 1 & 29 & -3 \\ 1 & 4 & 2 \\ 1 & 8 & -2 \end{bmatrix} \begin{matrix} 1 & 29 \\ 1 & 4 \\ 1 & 8 \end{matrix} = 26 - (-64) = 80$

I. $-12 + 16 - 58$
II. $-8 + 58 - 24$

$$Dz = \begin{bmatrix} 1 & 2 & 29 \\ 1 & 3 & 4 \\ 1 & -1 & 8 \end{bmatrix} \begin{matrix} 1 & 2 \\ 1 & 3 \\ 1 & -1 \end{matrix}$$

I. $24 + 8 - 27$ } $3 - 99 = -96$
II. $87 - 4 + 16$ }

$X = \dfrac{16}{16} = 1$ $Z = \dfrac{-96}{16} = -6$

$y = \dfrac{80}{16} = 5$

$x + y + z \to 1 + 5 + (-6) \to x + y + z = 0$

[Alternativa A]

$x+y+z=8 \; | \; 5+(-6) \; \ldots$

5. $\begin{cases} 2x+y=5 \\ 2y+z=3 \\ 3x+2y+z=7 \end{cases}$

$D = \begin{cases} 5 & 1 & 0 \\ 3 & 2 & 1 \\ 7 & 2 & 1 \end{cases} \begin{matrix} 5 & 1 \\ 3 & 2 \\ 7 & 1 \end{matrix}$

I. $6+10+3 \begin{cases} 17-13=4 \end{cases}$

II. $10+7+0 \; S$

$Dy = \begin{bmatrix} 2 & 5 & 0 \\ 0 & 3 & 1 \\ 3 & 7 & 1 \end{bmatrix} \begin{matrix} 2 & 5 \\ 0 & 3 \\ 3 & 7 \end{matrix}$

I. $0 + 14 + 0$ } $21 - 14 = 7$
II. $6 + 15 + 0$ }

$Dz = \begin{Bmatrix} 2 & 1 & 5 \\ 0 & 2 & 3 \\ 3 & 2 & 7 \end{Bmatrix}$ $37 - 42 = -5$

I $28 + 9 + 0$
II $10 + 12 + 0$

$Dx = \begin{bmatrix} 5 & 1 & 0 \\ 3 & 2 & 1 \\ 7 & 2 & 1 \end{bmatrix} \begin{matrix} 5 & 1 \\ 3 & 2 \\ 7 & 1 \end{matrix} = 17 - 13 = 4$

I $10 - 7 - 0$
II $0 + 10 + 0$

$X = \dfrac{4}{3}$ $y = \dfrac{7}{3}$

$z = \dfrac{-5}{3}$

(Alternativa D)

6.
$$\begin{bmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ -1 & 2 & 2 \end{bmatrix} \rightarrow \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 3 \\ 7 \\ -1 \end{bmatrix}$$

$(1.x) + (0.x) + (0.z) = 3$

$\boxed{x = 3}$

$-1-$

$(2.x) + (1.y) + (0.z) = 7$

$6 + y = 7 \quad \rightarrow y = 7 - 6 = -1,$

$-1-$

$(-1.x) + (2.y) + (2.z) = -1$

$-3 + 2 + 2z = -1$

$-1 + 2z = -1$

$2z = -1 + 1$

$z = \dfrac{0}{2}$

$\boxed{z = 0}$

$x = 3$

$y = -1$

$z = 0$

Alternativa E

Tarefa Bosica II

1. $\begin{cases} 2x - y - 3z = -5 \\ x + 3y - z = 11 \\ x - 5z = 3 \end{cases}$

$$\left(\begin{array}{ccc|c} 2 & -1 & -3 & -5 \\ 1 & 3 & -1 & +11 \\ 1 & 0 & -5 & 3 \end{array} \right) \begin{array}{l} -\frac{1}{2} \\ -\frac{1}{2} \end{array}$$
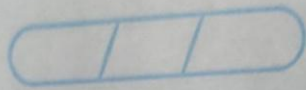
$$\left(\begin{array}{ccc|c} 2 & -1 & -3 & -5 \\ 0 & 7/2 & 1/2 & 27/2 \\ 0 & 1/2 & -7/2 & 11/2 \end{array} \right) -\frac{1}{7}$$

$$\left(\begin{array}{ccc|c} 2 & -1 & -3 & -5 \\ 0 & 7/2 & 1/2 & 27/2 \\ 0 & 0 & -25/7 & 25/7 \end{array} \right)$$

$-\dfrac{25}{7} \cdot Z = \dfrac{25}{7}$ $\begin{cases} z = \dfrac{25}{7} \cdot \left(\dfrac{-7}{25} \right) \\ z = -\dfrac{25}{25} \rightarrow \boxed{z = -1} \end{cases}$

$\dfrac{7}{2} \cdot y + \dfrac{1}{2} \cdot (-1) = \dfrac{27}{2}$

$\dfrac{7}{2} y = \dfrac{27}{2} + \dfrac{1}{2} \rightarrow y = 14 \cdot \dfrac{2}{7} = y = 4$

$$x - 5 \cdot (-1) = 3$$

$$x = 3 - 5$$

$$\boxed{x = -2}$$

//

2.
$$\begin{bmatrix} x = 2y \\ 2y = 3z \\ x + y + z = 11 \end{bmatrix}$$

$$\begin{bmatrix} x - 2y = 0 \\ 2y - 3z = 0 \\ x + y + z = 11 \end{bmatrix}$$

$$\begin{pmatrix} 1 & -2 & 0 & | & 0 \\ 0 & 2 & -3 & | & 0 \\ 1 & 1 & 1 & | & 11 \end{pmatrix} \begin{matrix} -1 \\ \\ \end{matrix}$$

$$\begin{pmatrix} 1 & -2 & 0 & | & 0 \\ 0 & 2 & -3 & | & 0 \\ 0 & 3 & 1 & | & 11 \end{pmatrix} \begin{matrix} -3 \\ 2 \\ \end{matrix}$$

$$\begin{pmatrix} 1 & -2 & 0 & | & 0 \\ 0 & 2 & -3 & | & 0 \\ 0 & 0 & \frac{4}{2} & | & 4 \end{pmatrix}$$

$\frac{11 \cdot 2 = 11}{2}$

$z = \frac{11 \cdot 2}{11}$

$z = 2$ //

$2y - 3.2 = 0$
$2y = 6$
$y = 3$ //

$x - 2.3 = 0$
$x = 6$ //

Alternativa B.

$x + 2y + 3z$
$6 + 2.3 + 3.2$
$\boxed{6 + 6 + 6 = 18}$

//

3.
$$\begin{cases} x+y+z=0 \\ 2x-y-2z=1 \\ 6y+3z=-12 \end{cases}$$

$$\left(\begin{array}{ccc|c} 1 & 1 & 1 & 0 \\ 2 & -1 & -2 & 1 \\ 0 & 6 & 3 & -12 \end{array}\right) \cdot -2$$

$$\left(\begin{array}{ccc|c} 1 & 1 & 1 & 0 \\ 0 & -3 & -4 & 1 \\ 0 & 6 & 3 & -12 \end{array}\right) \cdot 2$$

$$\left(\begin{array}{ccc|c} 1 & 1 & 1 & 0 \\ 0 & -3 & 4 & 1 \\ 0 & 0 & -5 & -10 \end{array}\right)$$

$-5z=-10$ Alternativa D)

$z=\dfrac{-10}{-5}$

$z=2$ //

4.

$$\begin{cases} x = y + \frac{1}{3} \cdot z \\ 3y = z + \frac{1}{3} \cdot x \\ z + x + y = 68 \end{cases}$$

$$\begin{cases} x - y - \frac{z}{3} = 0 \\ (-\frac{x}{3}) + 3y - z = 0 \\ x + y + z = 68 \end{cases}$$

$$\left(\begin{array}{ccc|c} \frac{1}{3} & (-1) & (-\frac{1}{3}) & 0 \\ (-\frac{1}{3}) & 3 & (-1) & 0 \\ 1 & 1 & 1 & 68 \end{array}\right) \begin{array}{c} \frac{1}{3} \\ \\ \end{array} \quad -1$$

$$\left(\begin{array}{ccc|c} 1 & (-1) & (-\frac{1}{3}) & 0 \\ 0 & 14/5 & 4/5 & 0 \\ 0 & 2 & 6/5 & 68 \end{array}\right) \begin{array}{c} -5/7 \\ \\ \end{array}$$

$$\left(\begin{array}{ccc|c} 1 & (-1) & (-1/9) & 0 \\ 0 & 14/5 & 4,5 & 0 \\ 0 & 0 & 68/35 & 68 \end{array}\right)$$

$$\frac{68}{35} \cdot z = 68 \qquad z = 35_{,}$$

$$z = \frac{68 \cdot 35}{68}$$

$$2y + \frac{6}{5} \cdot 35 = 68$$

$$x + 13 + 35 = 68$$

$$2y = 68 - 42$$

$$x = 68 - 43$$

$$2y = 26$$

$$x = 20_{11}$$

$$y = 26/2 \rightarrow 13_{11}$$

$x \rightarrow R\$ 20,00$
$y \rightarrow R\$ 13,00$
$z \rightarrow R\$ 25,00$

Alternativo A

-8 R$ 5,00

5.

$$A = \begin{bmatrix} 0 & 3 & 4 \\ 1 & 0 & 5 \\ 2 & 1 & 0 \end{bmatrix} \qquad x = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$$

$$A \cdot x = \begin{bmatrix} 134 \\ 115 \\ 48 \end{bmatrix}$$

$$\begin{cases} 3y + 4z = 134 \\ x + 5z = 115 \\ 2x + y = 48 \end{cases}$$

$$\left(\begin{array}{ccc|c} 0 & 3 & 4 & 134 \\ 1 & 0 & 5 & 115 \\ 2 & 1 & 0 & 48 \end{array} \right) \cdot -2$$

$$\begin{pmatrix} 0 & 3 & 4 & | & 134 \\ 1 & 0 & 5 & | & 115 \\ 0 & 1 & -10 & | & -182 \end{pmatrix} \cdot \frac{1}{3}$$

$$\begin{pmatrix} 0 & 3 & 4 & | & 134 \\ 1 & 0 & 5 & | & 115 \\ 0 & 0 & -\frac{34}{3} & | & -\frac{680}{3} \end{pmatrix} \cdot \frac{1}{3}$$

$$\left(-\frac{34}{3}\right) \cdot z = \left(-\frac{680}{3}\right) \cdot \left(-\frac{3}{34}\right) \rightarrow$$

$$z = -\frac{680}{3} \cdot \left(-\frac{3}{34}\right)$$

$$z = \frac{680}{34} \rightarrow z = 20_{//}$$

$$— / —$$

$y - 10 \cdot 20 = (-182)$	$x + 5 \cdot 20 = 115$
$y = (-182) + 200$	$y = 115 - 100$
	$x = 15_{//}$
$y = 18_{//}$	

$x + y + z = ?$

$15 + 18 + 20 = 53_{//}$

Alternativa Ⓐ