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Tarefa básica - Regra de Cramer

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

$D = \begin{vmatrix} 2 & -1 \\ -1 & 3 \end{vmatrix} = 6 - 1 = 5$

$D_x = \begin{vmatrix} 2 & -1 \\ -3 & 3 \end{vmatrix} = 6 - 3 = 3$ $\quad x = \frac{D_x}{D} = \frac{3}{5}$

$D_y = \begin{vmatrix} 2 & 2 \\ -1 & -3 \end{vmatrix} = -6 - (-2) = -4$ $\quad y = \frac{D_y}{D} = \frac{-4}{5}$

$V = \left\{\left(\frac{3}{5}, -\frac{4}{5}\right)\right\}$

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

$D = \begin{vmatrix} 3 & -1 & 1 \\ 2 & 0 & 3 \\ 4 & 1 & -2 \end{vmatrix}$ $\begin{matrix} 0 & 9 & 4 \\ 3 & -1 & 1 \\ 2 & 0 & 3 \\ 4 & 1 & -2 \\ 0 & -12 & 2 \end{matrix}$ $= -10 - 13 = -23$

$D_x = \begin{vmatrix} 1 & -1 & 1 \\ -1 & 0 & 3 \\ 7 & 1 & -2 \end{vmatrix}$ $\begin{matrix} 0 & 3 & -2 \\ 1 & -1 & 1 \\ -1 & 0 & 3 \\ 7 & 1 & -2 \\ 0 & -21 & -1 \end{matrix}$ $= -22 - 1 = -23$ $\quad x = \frac{D_x}{D} = \frac{-23}{-23} = 1$

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$D_y =$

3	1	1	3	1	
2	-1	3	2	-1	
4	7	2	4	7	

$-4 \quad 6 \quad 3 \quad -4$

$6 \quad 12 \quad 14$

$32 - 55 = 23$ $\quad y = \frac{D_y}{D} = \frac{23}{-23} = -1$

$D_z =$

3	-1	1	3	1	
2	0	-1	2	0	
4	1	2	4	1	

$-3 \quad -14$

$0 \quad 4 \quad 2$

$6 - (-17) = 23$ $\quad z = \frac{D_z}{D} = \frac{23}{-23} = -1$

$V = \{(1, -1, -1)\}$ //

02) $\begin{cases} 3x + 4y - 2 = 1 \ (I) \\ 4x + 5y + 2z = 12 \ (II) \\ x - 2y + 3z = 8 \ (III) \end{cases} \Rightarrow \begin{cases} 4x + 2y + 2z = 9 \\ 4x + 5y + 2z = 12 \cdot (-1) \end{cases}$

$\begin{cases} \cancel{4x} + 2y + \cancel{2z} = 9 \\ \underline{-\cancel{4x} - 5y - \cancel{2z} = -12} \end{cases}$

$-3y = -3$

$y = \frac{-3}{3}$

$y = -1$ //

R: A //

(I) + (III)

$3x + 4y - z = 1$

$x - 2y + 3z = 8$

$4x + 2y + 2z = 9$

S T Q Q S S D

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

$D = \begin{vmatrix} 1 & 2 & -3 \\ 1 & 3 & 2 \\ 1 & -1 & -2 \end{vmatrix}$ $\begin{matrix} 1 & 2 \\ 1 & 3 \\ 1 & -1 \end{matrix}$ $-9 - 2 - 4 = -15$

$-6 \quad 4 \quad 3 = 1$ $\quad 1 + 15 = 16$

$D_x = \begin{vmatrix} 29 & 2 & -3 \\ 4 & 3 & 2 \\ 8 & -1 & -2 \end{vmatrix}$ $\begin{matrix} 29 & 2 \\ 4 & 3 \\ 8 & -1 \end{matrix}$ $-174 + 32 + 12 = -130$

$-12 - 58 - 16 = -146$

$-130 - (-146) = 16$ $\quad x = \frac{D_x}{D} = \frac{16}{16} = 1$

$D_y = \begin{vmatrix} 1 & 29 & -3 \\ 1 & 4 & 2 \\ 1 & 8 & -2 \end{vmatrix}$ $\begin{matrix} 1 & 29 \\ 1 & 4 \\ 1 & 8 \end{matrix}$ $-8 \quad 58 \quad -24 = 26$

$-12 + 16 - 58 = -54$

$= 26 - (-54) = 80$ $\quad y = \frac{D_y}{D} = \frac{80}{16} = 5$

$D_z = \begin{vmatrix} 1 & 2 & 29 \\ 1 & 3 & 4 \\ 1 & -1 & 8 \end{vmatrix}$ $\begin{matrix} 1 & 2 \\ 1 & 3 \\ 1 & -1 \end{matrix}$ $24 \quad 8 \quad -29 = 3$

$87 - 4 + 16 = 99$

$3 - 99 = -96$ $\quad z = \frac{D_z}{D} = \frac{-96}{16} = -6$

$1 + 5 - 6 = 0$ $\quad R: A$ //

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

$D = \begin{vmatrix} 2 & 1 & 0 \\ 0 & 2 & 1 \\ 3 & 2 & 1 \end{vmatrix}$ $\begin{matrix} 2 & 1 \\ 0 & 2 \\ 3 & 2 \end{matrix}$ $4 + 3 + 0 = 7$ $\quad 7 - 4 = 3$

$0 \quad 4 \quad 0 = 4$

$D_x = \begin{vmatrix} 5 & 1 & 0 \\ 3 & 2 & 1 \\ 7 & 2 & 1 \end{vmatrix}$ $\begin{matrix} 5 & 1 \\ 3 & 2 \\ 7 & 2 \end{matrix}$ $14 \quad 3 \quad 6 = 23$

$10 + 3 + 14$

$23 - 27 = -4$ $\quad x = \frac{-4}{3}$

$D_y = \begin{vmatrix} 2 & 5 & 0 \\ 0 & 3 & 1 \\ 3 & 7 & 1 \end{vmatrix}$ $\begin{matrix} 2 & 5 \\ 0 & 3 \\ 3 & 7 \end{matrix}$ $6 \quad 15 \quad 0 = 21$

$14 + 0 + 0$

$21 - 14 = 7$ $\quad y = \frac{7}{3}$

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$$z = \begin{vmatrix} 4 & 1 & 5 & 2 & 1 \\ 0 & 2 & 3 & 0 & 2 \\ 3 & 2 & 3 & 3 & 2 \end{vmatrix} \quad \begin{matrix} 30\ 12 \\ \\ \\ 20\ 9\ 0 \end{matrix}$$

$37 - 42 = -5$

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

-R D //

06) $\begin{bmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ -1 & 2 & 2 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{matrix} x+0+0 \\ 2x+y+0 \\ -x+2y+2z \end{matrix} \Rightarrow \begin{cases} x & \cdot 3 \\ 2x+y & = 7 \\ -x+2y+2z & = 1 \end{cases}$

$$D = \begin{vmatrix} 1 & 0 & 0 & 1 & 0 \\ 2 & 1 & 0 & 2 & 1 \\ -1 & 2 & 2 & -1 & 2 \end{vmatrix} \quad \begin{matrix} 0\ 0\ 0 \\ \\ \\ 2\ 0\ 0 \end{matrix} \qquad = 2$$

$$D_z = \begin{vmatrix} 1 & 0 & 3 & 1 & 0 \\ 2 & 1 & 7 & 2 & 1 \\ -1 & 2 & -1 & -1 & 2 \end{vmatrix} \quad \begin{matrix} -3\ 14\ 0 \\ \\ \\ -1\ 0\ 12 \end{matrix} \qquad 11 - 11 = 0$$

$$z = \frac{0}{2} = 0 /$$

$$D_y = \begin{vmatrix} 1 & 3 & 0 & 1 & 3 \\ 2 & 7 & 0 & 2 & 7 \\ -1 & -1 & 2 & -1 & -1 \end{vmatrix} \quad \begin{matrix} 0\ 0\ 12 \\ \\ \\ 14\ 0\ 0 \end{matrix} \qquad = 14 - 12 = 2$$

$x = 3 /$

-R E //

$y = \frac{2}{2} = 1 /$

S T Q Q S S D

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Tarefa básica - Escalonamento

01)
$$S=\begin{cases} 2x - y - 3z = -5 \ \text{I} \\ x + 3y - z = 11 \ \text{II} \\ x - 5z = 3 \ \text{III} \rightarrow x = 3 + 5z \end{cases}$$

I - $2(3+5z) - y - 3z = -5$

$6 + 10z - y - 3z = -5$

$6 + 7z - y = -5$

$7z - y = -5 - 6$

$7z - y = -11$

$-y = -11 - 7z \ (-1)$

$y = 11 + 7z \rightarrow y$

II - $3 + 5z + 3(7z + 11) - z = 11$

$3 + 5z + 21z + 33 - z = 11$

$3 + 25z + 33 = 11$

$25z = 11 - 36$

$25z = -25$

$z = \frac{-25}{25}$

$\boxed{z = -1}$

III - $x - 5z = 3$

$x - 5(-1) = 3$

$x = 3 - 5$

$\boxed{x = -2}$

II - $x + 3y - z = 11$

$-2 + 3y - z = 11$

$-2 + 3y + 1 = 11$

$3y = 11 + 2 - 1$

$3y = 12$

$y = \frac{12}{3}$

$\boxed{y = 4}$

$x = -2, y = 4, z = 1$

02)
$$\begin{cases} x = 2y \\ 2y = 3z \rightarrow z = \frac{2y}{3} \\ x + y + z = 11 \end{cases}$$

$x + y + z = 11$

$\frac{2y}{1} + \frac{y}{1} + \frac{2y}{3} = 11$

$\frac{6y + 3y + 2y}{3} = 33$

$6y + 3y + 2y = 33$

$11y = 33$

$y = \frac{33}{11}$

$\boxed{y = 3}$

$x = 2y$

$x = 2 \cdot 3$

$\boxed{x = 6}$

$x + y + z = 11$

$6 + 3 + z = 11$

$9 + z = 11$

$z = 11 - 9$

$\boxed{z = 2}$

$x + 2y + 3z = ?$

$6 + 6 + 6 = 18$

R B

spiral

S T Q Q S S D

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

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

$\begin{cases} -3y - 4z = 1 \quad (-2) \\ 6y + 3z = -12 \end{cases}$

$\begin{cases} -6y - 8z = 2 \\ 6y + 3z = -12 \end{cases}$

$-5z = -10$ R.D //

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

$\boxed{z = 2}$

05) 134,00 115,00 48,00

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

$\begin{cases} 0 \quad 3y \quad 4z = 135 \\ x \quad 0 \quad 5z = 115 \\ 2x \quad y \quad 0 = 48 \end{cases}$

$Dx = \begin{vmatrix} 134 & 3 & 4 \\ 115 & 0 & 5 \\ 48 & 1 & 0 \end{vmatrix} \begin{matrix} 135 & 3 \\ 115 & 0 \\ 48 & 1 \end{matrix}$

0 0 0

$D = \begin{vmatrix} 0 & 3 & 4 \\ 1 & 0 & 5 \\ 2 & 1 & 0 \end{vmatrix} \begin{matrix} 0 & 3 \\ 1 & 0 \\ 2 & 1 \end{matrix} = 34$

0 30 4

1180 - 675 = 510

$X = \frac{510}{34} = 15$

spiral

S T Q Q S S D

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820 0 0

Dy =	0	134	4	0	134
	1	115	5	1	115
	2	48	0	2	48

0 1340 192

0 0 144

= 1532 - 920 = 612

$y = \frac{612}{34} = 18$

Dz =	0	3	134	0	3
	1	0	115	1	0
	2	1	48	2	1

0 690 135

= 824 - 144 = 680

$z = \frac{680}{34} = 20$

15 + 18 + 20 = 53,00

R. A