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Turma: CTII 317

Tarefa Básica – Sistemas Lineares – Regra de Cramer – Escalonamento

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

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

$$\det x = \begin{vmatrix} 2 & -1 \\ -3 & 3 \end{vmatrix} = 6 - 3 = 3$$

$$\det y = \begin{vmatrix} 2 & 2 \\ -1 & -3 \end{vmatrix} = -6 - (-2) = -4$$


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

2. (b) 
$$\begin{cases} 3x - y + z = 1 \\ 2x + 3z = -1 \\ 4x + y - 2z = 7 \end{cases}$$
  
$$0 + 9 + 4 = 13$$

$$\det = \begin{vmatrix} 3 & -1 & 1 \\ 2 & 0 & 3 \\ 4 & 1 & -2 \end{vmatrix} = 10 - (13) = -3$$
  
$$0 + 1 + 2 = 3$$

$$\det x = \begin{vmatrix} -1 & 1 & 1 \\ 0 & 3 & 1 \\ 1 & -2 & 1 \end{vmatrix} = -22 - 1 = -23$$

tilibra



$$\det u_y = \begin{vmatrix} 3 & 1 & 1 & 3 & 1 \\ 2 & -1 & 2 & 2 & -1 \\ 4 & 4 & 2 & 4 & 2 \end{vmatrix} = 32 - 55 = -23$$

$$6 + 12 + 14 = 32$$

$$\det z = \begin{vmatrix} 3 & -1 & 1 & 3 & -1 \\ 2 & 0 & -1 & 2 & 0 \\ 4 & 1 & 2 & 4 & 1 \end{vmatrix} = 6(-18) = -108$$

$$0 + 4 + 2 = 6$$

$$x = \frac{dx}{dt} = \frac{-23}{-23} = 1$$

$$u_y = \frac{dy}{dt} = \frac{-23}{-23} = 1$$

$$z = \frac{dz}{dt} = \frac{-23}{-23} = 1$$

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

$$-5 - 12 - 18 = -35$$

$$2- \det t = \begin{vmatrix} 3 & 4 & -1 & 3 & 4 \\ 4 & 5 & 5 & 4 & 5 \\ 1 & 2 & 3 & 1 & 2 \end{vmatrix} = 61 - 31 = 30$$

$$15 + 8 + 8 = 31$$

$$-12 + 48 + 12 = 48$$

$$\det u_y = \begin{vmatrix} 3 & 1 & 1 & 3 & 1 \\ 4 & 12 & 2 & 4 & 12 \\ 1 & 8 & 2 & 1 & 8 \end{vmatrix} = 78 - 18 = 60$$

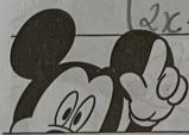
$$108 - 2 - 2 = 108$$

$$3- x + 2u_y + 2 = 1$$

$$3x + u_y - 112 = -2$$

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

$$2 + 33 - 6 = -37$$





$$\det = \begin{vmatrix} 1 & 2 & 1 & 1 & 2 \\ 3 & 1 & -1 & 3 & 1 \\ 2 & 3 & 1 & 2 & 3 \end{vmatrix} = -37 - (-36) = -1$$
$$-1 + (-4) + 9 = -36$$

$$\det x = \begin{vmatrix} 1 & 2 & 1 & 1 & 2 \\ 2 & 1 & -1 & 3 & 1 \\ 1 & 3 & 1 & 1 & 3 \end{vmatrix} = -29 - (-28) = -1$$
$$-1 - 22 - 6 = -29$$

$$\det y = \begin{vmatrix} 1 & 1 & 1 & 1 & 1 \\ 3 & 2 & -1 & 3 & 2 \\ 2 & 1 & -1 & 2 & 1 \end{vmatrix} = -17 - (-18) = 1$$
$$2 - 22 - 3 = -17$$

$$\det z = \begin{vmatrix} 1 & 2 & 1 & 1 & 2 \\ 3 & 1 & 2 & 3 & 1 \\ 2 & 3 & -1 & 2 & 3 \end{vmatrix} = 2 - 2 = 0$$
$$1 + (-8) + 9 = 2$$

$$x = dx/d = \frac{1}{1} = 1$$

$$y = dy/d = \frac{1}{1} = 1$$

$$z = dz/d = \frac{0}{1} = 0$$

$$a + b + c$$

$$1 + (-1) + 0$$

$$0$$

Letra E





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

$$-9-2-4=-15$$

$$\text{det} = \begin{vmatrix} 1 & 2 & -3 \\ 1 & 3 & 2 \\ 1 & -1 & -2 \end{vmatrix} = \begin{vmatrix} 1 & 2 \\ 1 & 3 \end{vmatrix} - \begin{vmatrix} 1 & -3 \\ 1 & -2 \end{vmatrix} = 13 - (-15) = 28$$

$$6+4+3=13$$

$$-7-58-46=-111$$

$$\text{det } x = \begin{vmatrix} 29 & 2 & -3 \\ 4 & 3 & 2 \\ 8 & -1 & -2 \end{vmatrix} = \begin{vmatrix} 29 & 2 \\ 4 & 3 \end{vmatrix} - \begin{vmatrix} 29 & -3 \\ 8 & -2 \end{vmatrix} = -130 - (-146) = 16$$

$$-194+30+12=-130$$

$$\text{det } y = \begin{vmatrix} 1 & 29 & -3 \\ 1 & 4 & 2 \\ 1 & 8 & -2 \end{vmatrix} = \begin{vmatrix} 1 & 29 \\ 1 & 4 \end{vmatrix} - \begin{vmatrix} 1 & -3 \\ 1 & -2 \end{vmatrix} = -26 - (-51) = 25$$

$$-8+58+24=74$$

$$\text{det } z = \begin{vmatrix} 1 & 2 & 29 \\ 1 & 3 & 4 \\ 1 & -1 & 8 \end{vmatrix} = \begin{vmatrix} 1 & 2 \\ 1 & 3 \end{vmatrix} - \begin{vmatrix} 1 & 29 \\ 1 & 4 \end{vmatrix} = 3 - 99 = -96$$

$$24+8-29=3$$

$$x = \text{det } x / \text{det} = 16/28 = 4/7 \approx 0,57$$

$$y = \text{det } y / \text{det} = 25/28 = 20/7 \approx 2,85$$

$$z = \text{det } z / \text{det} = -96/28 = -24/7 \approx -3,42$$





$$\begin{aligned}(x+y+z) \\ 0,57+2,85+(-3,42) \\ 3,42-3,42 \\ 0\end{aligned}$$

Letra A

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

$$\begin{aligned}w_{dt}x = \begin{vmatrix} 2 & 1 & 0 \\ 0 & 2 & 1 \\ 3 & 2 & 1 \end{vmatrix} &= 7-4=3 \\ 4+3+0=7\end{aligned}$$

$$\begin{aligned}w_{dt}y = \begin{vmatrix} 5 & 1 & 0 \\ 3 & 2 & 1 \\ 7 & 2 & 1 \end{vmatrix} &= 17-13=4\end{aligned}$$

$$\begin{aligned}w_{dt}z = \begin{vmatrix} 2 & 5 & 0 \\ 0 & 3 & 1 \\ 3 & 7 & 1 \end{vmatrix} &= 21-14=7\end{aligned}$$

$$\begin{aligned}w_{dt}z = \begin{vmatrix} 2 & 1 & 0 \\ 0 & 2 & 1 \\ 3 & 2 & 1 \end{vmatrix} &= 37-42=-5\end{aligned}$$

$$x = w_{dx}/d = 4/3$$

$$y = w_{dy}/d = 7/3$$

$$z = w_{dz}/d = -5/3 \quad \text{Letra D}$$

$$V = \left( \frac{4}{3}, \frac{7}{3}, \frac{-5}{3} \right)$$



$$\begin{array}{ccc|c} 1 & 0 & 0 & x \\ 2 & 1 & 0 & y \\ -1 & 2 & 2 & z \end{array} \quad \begin{array}{l} = 3 \\ = 7 \\ = -1 \end{array}$$

$$\begin{array}{ccc|c} 1 & 0 & 0 & x \\ 2 & 1 & 0 & y \\ -1 & 2 & 2 & z \end{array} \quad \begin{array}{l} x+0y+0z \\ 2x+y+0z \\ -x+2y+2z \end{array} \quad \begin{array}{l} = 3 \\ = 7 \\ = -1 \end{array}$$

$$\begin{array}{ccc|c} x+0y+0z & & & 3 \\ 2x+y+0z & = & 7 & \\ -x+2y+2z & = & -1 & \end{array} \rightarrow \begin{array}{l} x=3 \\ 2x+y=7 \\ -x+2y+2z=-1 \end{array}$$

$$\text{delete } x: \begin{array}{ccc|c} 1 & 0 & 0 & 1 \\ 2 & 1 & 0 & 2 \\ -1 & 2 & 2 & -1 \end{array} \quad \begin{array}{l} 2+0+0=2 \\ 6+0+0=6 \end{array}$$

$$\text{delete } y: \begin{array}{ccc|c} 1 & 3 & 2 & 1 \\ 2 & 7 & 0 & 7 \\ -1 & -1 & 2 & -1 \end{array} \quad \begin{array}{l} 4+0+12=16 \\ 14-12=2 \end{array}$$

$$\text{delete } z: \begin{array}{ccc|c} 1 & 3 & 3 & 1 \\ 2 & 7 & 2 & 7 \\ -1 & -1 & -1 & -1 \end{array} \quad \begin{array}{l} -5+11=6 \\ 11-11=0 \end{array}$$

$$\begin{array}{l} x = dx/d = 6/2 = 3 \\ y = dy/d = 2/2 = 1 \\ z = dz/d = 2/2 = 1 \end{array} \quad \begin{array}{l} v = \{(3, 1, 0)\} \\ \text{Let's } E \end{array}$$

