

Name: Rodrigo Moreira de Almeida Sá: CTII - 317

Tarefa 6 - Sistemas Lineares.

1.

$$\begin{cases} ax + 4x = 1 \\ x + ay = b \end{cases} \quad D = \begin{vmatrix} a & 4 \\ 1 & a \end{vmatrix} = 2a - 4 \quad D_x = \begin{vmatrix} 1 & 4 \\ b & 2 \end{vmatrix} = 2 - 4b$$

$$D_x = da - 4 = 0$$

$$D = 2 - 4b = 0$$

R: 1,1

R: b)

a.

$$\begin{cases} x + \kappa y = 1 \\ \kappa x + y = -\kappa \end{cases}$$

$$D \left(\begin{array}{cc|c} 1 & \kappa & 1 \\ \kappa & 1 & -\kappa \end{array} \right) \left(\begin{array}{cc|c} 0 & \kappa^2 & 1+2\kappa \\ 0 & 1 & -2\kappa+1 \end{array} \right)$$
$$\kappa = -1 \quad x = (-2\kappa+1) = (-2(-1)+1) = 3$$
$$y = (-2\kappa^2+1) = (-2(-1)^2+1) = -1$$

R: d)

S. Imparneal

$\rightarrow \kappa \neq 1$ ou $\kappa \neq -1$
S.P. determinante

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

a)

$$\left| \begin{array}{ccc|c} 1 & 2 & c & 1 \\ 0 & 1 & 1 & 2 \\ 3 & 2 & 2 & 3 \end{array} \right.$$

$3c + 2 + 0 = 1$

$det = 8 + 3c - 2$

$det = 6 - 3c$

b) $6 - 3c \neq 0$

$$\frac{6}{3} = c$$

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

4.

$$\begin{cases} x - y = k \\ 12x - ky + y = 1 \\ 36x + ky - y = 2 \end{cases}$$

abc

$$d = \begin{vmatrix} 1 & -1 & 0 & 1 & -1 \\ 12 - k & 1 & 12 - k & = \det = k^2 - 36 - 12k \\ 36 & 0 & 0 & 36 & 0 \\ -x^2 + (-36) + 0 & = -x^2 - 36 \end{vmatrix}$$

$$d \neq 0 \rightarrow -k^2 - 36 - 12k \neq -1 \quad 6 \cdot 6 = 36 \rightarrow 6 + 6 = 12 \quad k \neq 6$$

$$k^2 + 12k + 36$$

$$6 + 6 = 12 \quad k \neq 6$$

$$6 \cdot 6 = 36$$

B.e)

$$5. \begin{cases} x - y + z = 6 \\ 2x + y - z = -3 \\ x + 2y - z = -5 \end{cases}$$

$$\begin{array}{l} x - y + z = 6 \\ 2x + y - z = -3 \\ 3y - 2z = -11 \end{array}$$

$$\begin{array}{l} x - y + z = 6 \\ 3y - 3z = -15 \\ 0 - z = -4 \\ z = 4 \end{array}$$

$$x - y - 3 = -4$$

$$3y - 2 \cdot 4 = -11$$

$$3y - 8 = -11$$

$$3y = -3$$

$$y = -1$$

$$x + 1 + 4 = 6$$

$$x + 5 = 6$$

$$x = 6 - 5$$

$$x = 1$$

6.

$$\begin{cases} x + y + z = K \\ Ky + y + z = 1 \\ x + y - z = K \end{cases}$$

$$d = \begin{vmatrix} 1 & 1 & 1 & K \\ 1 & y & 1 & 1 \\ 1 & 1 & -1 & 1 \end{vmatrix} \quad K=3$$

$$\begin{aligned} x + y + z &= 1 \\ x + y - z &= 1 \end{aligned}$$

$$-1 - 1 + \cancel{K} \quad -\cancel{1} + \cancel{1} + \cancel{K}$$

(y = a llore)

$$2K - 2, \quad x + y + z = 1 \Rightarrow x + y = 1$$

$$b \boxed{D=0} \quad 0 + 0 - 2yz = 0$$

$$z = 0 \quad x = 1 + y,$$

$$K=1, (1-y, y, 0)$$

7.

$$\begin{cases} x + y + z = 1 \\ mx - 2y + 4z = 5 \\ m^2x + 4y - 16z = 25 \end{cases}$$

$$D = \begin{vmatrix} 1 & 1 & 1 & 1 \\ m & -2 & 4 & m \\ m^2 & 4 & 16 & m^2 \\ 2m^2 - 16 & -16m & -32 & 4m^2 + 4m \end{vmatrix}$$

$$6m^2 - 12m - 48 = 0$$

$$\Delta = 12^2 - 4 \cdot 6 \cdot (-48) \quad | \quad m_1 = \frac{12+36}{2 \cdot 6} = \frac{48}{12} = 4$$

$$144 + 1152$$

$$1296$$

$$\Delta = 36$$

$$m_2 = \frac{12-36}{2 \cdot 6} = \frac{-24}{12} = -2$$

$$4 - 2 = 2$$

R: 1 1 2

Tarea Básica - Sistemas Lineales Homogéneos

1.

$$\begin{bmatrix} 1 & 7 \\ 7 & 1 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = 2 \cdot \begin{bmatrix} x \\ y \end{bmatrix} \quad \begin{cases} x + 7y = -k \\ 7x + y = k \end{cases}$$

$$D = \begin{vmatrix} 1 & 7 \\ 7 & 1 \end{vmatrix} = 1 - 49 = -48 \quad D_x = \begin{vmatrix} x & 7 \\ k & 1 \end{vmatrix} = k - 7x = -6x$$

$$\frac{7(1+k)}{-48} \quad \left| \begin{array}{l} 0 \cdot 48 : -6x \\ \hline \end{array} \right. \rightarrow z = -48 = 6k$$

$$D \neq 0 \rightarrow 48 \neq -6k$$

$$-48 = k$$

$$\frac{-6}{18 = k}$$

R: 21

2.

$$\begin{cases} 3x + 4y - z = 0 \\ 2x - y + 3z = 0 \\ x - y = 0 \end{cases}$$

$0+0+0$

$$D_x = \begin{vmatrix} 0 & 4 & -1 \\ 0 & 1 & 3 \\ 1 & -1 & 0 \end{vmatrix} = 0$$

$0+0+0$

$0+0+0$

$$D = \begin{vmatrix} 3 & 4 & 1 & | & 3 & 4 \\ 2 & -1 & 3 & | & 2 & -1 \\ 1 & 1 & 0 & | & 1 & 1 \end{vmatrix} = 10 - 10 = 0$$

$0+12+(-2) = 10$

$$x = \frac{dy}{d} = 0 \quad y = \frac{dz}{d} = 6.875$$

$$D_y = \begin{vmatrix} 3 & 0 & -1 & 0 \\ 2 & 1 & 3 & 0 \\ 1 & -1 & 0 & 0 \end{vmatrix} = 0$$

$0+0+0$

~~$$D_z = \begin{vmatrix} 3 & 4 & 0 & 3 & 4 \\ 2 & -1 & 0 & 3 & -1 \\ 1 & 1 & 0 & 1 & 1 \end{vmatrix} = 0$$~~

R: d)

3. 30

$$\begin{cases} x + y + z = 0 \\ Kx + 3y + 4z = 0 \\ x + Ky + 3z = 0 \end{cases}$$

$$3 + 4K + 5K = 3 + 7K$$

$$d = \begin{vmatrix} x & x & x & 1 \\ K & 3 & 4 & 2 \\ x & K & 3 & 1 \\ x & 3 & K & 3 \end{vmatrix} =$$

$$9 + 4 + K^2 = 13 + K^2$$

$$13 + K^2 - 3 + 7K$$

$$K^2 + 7K + 10 = 0$$

soma K

$$2 + 5 = 7$$

d)

$$2 + 5 = 7$$

$$2 \cdot 5 = 10$$

14.

$$\begin{cases} x + Kx = 0 \\ x + Kx + Ky = 0 \\ x + Ky + gy = 0 \end{cases} \quad \begin{cases} dx = 0 \\ dy = 0 \\ dz = 0 \end{cases} \quad \left\{ \begin{array}{ccc} 1 & 0 & K \\ K & 1 & 0 \\ 0 & K & 0 \end{array} \right\} = \begin{array}{|ccc|} \hline 1 & 0 & K \\ K & 1 & 0 \\ 0 & K & 0 \\ \hline \end{array} = K^3 - K$$

$$K^3 - K$$

$$K(K-1)(K+1) = 0 \quad K=0, K+1, K=-1$$

$$K=-1, K=0, K=1$$

$$V = \{(K \in \mathbb{R} \mid K \neq 0, K \neq 1, K \neq -1)\} \cup \{0, 1, -1\}$$

$$5. \begin{cases} -x + 2y - 3 = 0 \\ 3x - y + 3 = 0 \\ 2x - 4y + 6 = 0 \end{cases}$$

$$\begin{array}{c|ccc|cc} & -1 & 2 & 2 & 1 & 2 \\ D = & 3 & 1 & 3 & -1 & -54 \\ & 2 & -4 & 6 & 2 & 4 \end{array}$$

$$-6 + (-12) + 36 = 18$$

$$-54 - 18 = 36$$

$$6 + 12 + 36 = 54$$

$$d \neq 0 \rightarrow 36$$

B: b)