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# LISTA 19

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Lista 19 A2 → Sérgio

1) a) $T: \mathbb{R}^3 \to \mathbb{R}^3 \quad T(x, y, z) = (2x, 2y, x+y+3z)$

$B = \{(1,0,0), (0,1,0), (0,0,1)\}$

$T(1,0,0) = (2,0,1)$

$T(0,1,0) = (0,2,1)$

$T(0,0,1) = (0,0,3)$

$$A = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 1 & 1 & 3 \end{bmatrix}$$

$\det(A - \lambda I)$

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

$= (2-\lambda) \cdot (2-\lambda) \cdot (3-\lambda)$

$= (2-\lambda)^2 \cdot (3-\lambda) = 0$

logo

$2-\lambda = 0$ e $3-\lambda = 0$

$\boxed{\lambda_1 = 2}$ e $\boxed{\lambda_2 = 3}$

Para $\lambda_1 = 2$

$$\begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 1 & 1 & 3 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \\ z \end{bmatrix} = 2 \cdot \begin{bmatrix} x \\ y \\ z \end{bmatrix}$$

$$\begin{bmatrix} 2x & 0 & 0 \\ 0 & 2y & 0 \\ x & y & 3z \end{bmatrix} = \begin{bmatrix} 2x \\ 2y \\ 2z \end{bmatrix}$$

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

$\vec{v_1} = (0,0,0)$

Para $\lambda_2 = 3$

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

$\vec{v_2} = (0,0,0)$

$B = \{(0,0,0)\}$ ✳

Lista 19 AL - Sélia

① b) $S: \mathbb{R}^3 \to \mathbb{R}^3$ definido por $S(x,y,z) = (x, x+y, x-2z)$

$B = \{(1,0,0), (0,1,0), (0,0,1)\}$

$S(1,0,0) = (1,1,1)$

$S(0,1,0) = (0,1,0)$

$S(0,0,1) = (0,0,-2)$

$$A = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ 1 & 0 & -2 \end{bmatrix}$$

$\det(A - \lambda I)$

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

$= (1-\lambda).(1-\lambda).(-2-\lambda) = 0$

$= (1-\lambda)^2.(-2-\lambda) = 0$

logo:

$(1-\lambda) = 0$ e $(-2-\lambda) = 0$

$\boxed{\lambda_1 = 1}$ e $\boxed{\lambda_2 = -2}$

Para $\lambda_1 = 1$

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

$$\begin{bmatrix} x & 0 & 0 \\ x & y & 0 \\ x & 0 & -2z \end{bmatrix} = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$$

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

$\vec{v_1} = (x, 0, \frac{x}{3}) = x(1, 0, \frac{1}{3})$

Para $\lambda_2 = -2$

$$\begin{cases} x = -2x \quad \therefore x = 0 \\ x + y = -2y \quad \therefore x = -y \Rightarrow \boxed{y = -x} \\ x - 2z = -2z \quad \therefore x = 0 \end{cases}$$

$\vec{v_2} = (0, -x, 0) = x(0, -1, 0)$

$B = \{(1, 0, \frac{1}{3}), (0, -1, 0)\}$.

Lista 1ª $A^1$ → [illegible]

c) $T: P_2(\mathbb{R}) \rightarrow P_2(\mathbb{R})$ definido por $T(f) = f'$

$\beta = \{T^2, T, 1\}$

$T(T^2) = 2T \Rightarrow 2+T^2 + 1T + 0 \cdot 1$

$T(T) = 1 \Rightarrow 0T^2 + 1T + 0 \cdot 1$

$T(1) = 0 \Rightarrow 0T^2 + 0T + 0 \cdot 1$

$$A = \begin{bmatrix} 2 & 0 & 0 \\ 1 & 1 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$\det(A - \lambda I)$

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

Lelisa L19 - AL

(Q12) b) é diagonalizável pois os autovetores encontrados usando o polinômio característico formam uma base e é diagonal.