UNIVERSIDADE FEDERAL DE RORAIMA
DISCIPLINA DE ÁLGEBRA LINEAR
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LISTA 19

BOA VISTA, 09 DE DEZEMBRO DE 2020

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

$$A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 1 & 1 & 3 \end{bmatrix} \qquad P(y) = (A - I\lambda)$$

$$det(A-\lambda I) = \begin{vmatrix} 1-\lambda & 0 & 0 & 1-\lambda & 0 \\ 0 & 1-\lambda & 0 & 0 & 1-\lambda \\ 1 & 1 & 3-\lambda & 1 & 1 \end{vmatrix}$$

$$A - \lambda I = \begin{bmatrix} 1-\lambda & 0 & 0 \\ 0 & 1-\lambda & 0 \\ 1 & 1 & 3-\lambda \end{bmatrix}$$

$det(A-\lambda I) \Rightarrow (1-\lambda).(1-\lambda).(3-\lambda) = 0$

$1-\lambda=0 \quad 3-\lambda=0$

$\boxed{\lambda_1 = 1} \quad \boxed{\lambda_2 = 3}$

Para $\lambda_1 = 1$:

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

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

$x+y+2z=0$

$z = \frac{-x-y}{2}$

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

$\vec{V}_1 = (0,0,0)$

Para $\lambda_2 = 3$

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

$\vec{V}_1 = (0,0,0)$

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

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

$$\det(A - \lambda I) = \begin{vmatrix} 1-\lambda & 0 & 0 & 1-\lambda & 0 \\ 1 & 1-\lambda & 0 & 1 & 1-\lambda \\ 1 & 0 & -2-\lambda & 1 & 0 \end{vmatrix}$$

$$\det(A - \lambda I) = (1-\lambda)\cdot(1-\lambda)\cdot(-2-\lambda) = 0$$

$1-\lambda = 0$ $\quad$ $-2-\lambda = 0$

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

Para $\lambda_2 = -2$:

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

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

$\boxed{x = 0}$ $\quad$ $x - 2z = -2z$ $\quad$ $\boxed{x = 0}$

$x + y = -2y$

$x = -2y - y$

$\boxed{x = -3y}$ $\quad$ $\vec{v_1} = (0, -3, 0)$

Para $\lambda_1 = 1$

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

$x - 2z - z = 0$

$x - 3z = 0$

$\boxed{x = 3z}$

$\vec{v_2} = (0, 0, 3)$

Selisa L19 - AL

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