

UNIVERSIDADE FEDERAL DE RORAIMA
DISCIPLINA DE ÁLGEBRA LINEAR
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LISTA 12

BOA VISTA, 29 DE OUTUBRO DE 2020

① $T: \mathbb{R}^3 \rightarrow \mathbb{R}^2$; definido por $T(x, y, z) = (x + y - 4z, 6z - 2x - y)$

$$T(x, y, z) = (0, 0)$$

Lelys

$$(x + y - 4z, 6z - 2x - y) = (0, 0)$$

$$\begin{cases} x + y - 4z = 0 \\ 6z - 2x - y = 0 \end{cases} \Rightarrow \begin{cases} x + y - 4z = 0 \\ -2x + y + 6z = 0 \cdot (-1) \end{cases} \Rightarrow \begin{cases} x + y = 4z \\ 2x - y = 6z \end{cases}$$

$$3x = 10z$$

$$\boxed{x = \frac{10z}{3}}$$

$$x + y = 4z$$

$$\frac{10z}{3} + y = 4z$$

$$y = 4z - \frac{10z}{3}$$

$$y = \frac{12z - 10z}{3}$$

$$\boxed{y = \frac{2z}{3}}$$

$$N(T) = \left\{ \left(\frac{10z}{3}, \frac{2z}{3}, z \right) / z \in \mathbb{R} \right\}$$

Operado de T e $\text{rank}(T) = \dim(\text{Im}(T)) = ①$

$$\textcircled{b)} \quad T: \mathbb{R}^2 \rightarrow \mathcal{P}_2(\mathbb{R})$$

$$(a, b) \mapsto p(T) = aT^2 + aT + b$$

fillip

$$T(a, b) = (aT^2 + aT + b)$$

$$T(a, b) = 0T^2 + 0T + 0$$

$$aT^2 + aT + b = 0T^2 + 0T + 0$$

$$\begin{cases} aT^2 = 0T^2 \\ aT = 0T \\ b = 0 \end{cases}$$

$$\text{logo } \boxed{b=0}$$

$$aT = 0T$$

$$a = \frac{0T}{T}$$

$$\boxed{a=0}$$

Portanto o núcleo

$$N(T) = aT^2 + aT + b \text{ onde } a = b = 0;$$

$$N(T) = 0T^2 + 0T + 0 \quad \#$$

$$\text{portanto o posto} = \text{rank}(T) = 0 \quad \#$$

c) $T: M_{2 \times 2}(\mathbb{R}) \rightarrow \mathbb{R}^2$, definida por:

$$T\left(\begin{bmatrix} a & b \\ c & d \end{bmatrix}\right) = (a+b, c+d)$$

$$T\left(\begin{bmatrix} a & b \\ c & d \end{bmatrix}\right) = (0, 0)$$

Logo

$$(a+b, c+d) = (0, 0)$$

$$\begin{cases} a+b=0 \\ c+d=0 \end{cases}$$

$$\boxed{a = -b}$$

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

Logo o núcleo

$$N(T) = \{(-b+b, -d+d) / b, d \in \mathbb{R}\}$$

$$\text{Logo } N(T) = (0, 0)$$

$$\text{portanto } \text{posto} = \text{rank}(T) = 0$$