UNIVERSIDADE FEDERAL DE RORAIMA
DISCIPLINA DE ÁLGEBRA LINEAR
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LISTA 11

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Q1 a) $T: \mathbb{R}^2 \to \mathbb{R}^3$ tal que $T(x,y) = (x, 2x, y-x)$

onde $B = \{(1,2),(1,0)\}$ e $B' = \{(1,0,0),(1,2,3),(0,0,4)\}$.

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

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

$$[T]_{B}^{B'} = \begin{bmatrix} 0 & 1 \\ 1 & 0 \\ -\frac{1}{2} & -\frac{1}{4} \end{bmatrix}_{3\times 2}$$

$(1,2,1) = a(1,0,0) + b(1,2,3) + c(0,0,4)$

$(1,2,1) = (a,0,0) + (b,2b,3b) + (0,0,4c)$

$(1,2,1) = (a+b, 2b, 3b+c4)$

$$\begin{cases} a+b=1 \\ 2b=2 \\ 3b+4c=1 \end{cases}$$

logo $\boxed{b=1}$

$a+b=1$
$a+1=1$
$\boxed{a=0}$

$3b+4c=1$
$3.1+4c=1$
$c = \frac{1-3}{4}$
$c = \frac{-2}{4}$

$\boxed{c = -\frac{1}{2}}$

Jelino

$$(1,0,-1) = a(1,0,0) + b(1,2,3) + c(0,0,4)$$

$$(1,0,-1) = (a,0,0) + (b,2b,3b) + (0,0,4c)$$

$$(1,0,-1) = (a+b,\ 2b,\ 3b+4c)$$

$$\begin{cases} a+b=1 \\ 2b=0 \\ 3b+4c=-1 \end{cases}$$

$2b=0$

$\boxed{b=0}$

$a+b=1$

$a+0=1$

$\boxed{a=1}$

$3b+4c=-1$

$3\cdot 0+4c=-1$

$\boxed{c=-\frac{1}{4}}$

Felipe

b) $T: \mathbb{R}^2 \to P_1(\mathbb{R})$ Fellipi

$(a,b) \mapsto p(T) = bT + a + b$, onde $B = \{(1,2),(0,2)\}$

e $B' = \{2T, 3\}$;

$(1,2) = 2T + 1 + 2$; $(0,2) = 2T + 0 + 2$
$= 2T + 3$ $\qquad$ $= 2T + 2$

$(1,2) = 2T + 3 \Rightarrow 1 \cdot 2T + 1 \cdot 3 \Rightarrow [T(1,2)]_{B'} = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$

$(0,2) = 2T + 2 \Rightarrow 1 \cdot 2T + \frac{2}{3} \cdot 3 \Rightarrow [T(0,2)]_{B'} = \begin{bmatrix} 1 \\ \frac{2}{3} \end{bmatrix}$

$2T + 3 = a \cdot (2T) + b \cdot (3)$

$2T + 3 = 2aT + b3$

$\begin{cases} 2aT = 2T \\ b3 = 3 \end{cases}$

$2aT = 2T$ $\qquad$ $3b = 3$

$a = \frac{2T}{2T}$ $\qquad$ $b = \frac{3}{3}$

$\boxed{a = 1}$ $\qquad$ $\boxed{b = 1}$

$2T + 2 = a\,2T + b \cdot 3$

$\begin{cases} a2T = 2T \\ 3b = 2 \end{cases}$

$\boxed{b = \frac{2}{3}}$

$a2T = 2T$

$a = \frac{2T}{2T}$

$\boxed{a = 1}$

logo $[T]_{B}^{B'} = \begin{bmatrix} 1 & 1 \\ 1 & \frac{2}{3} \end{bmatrix}_{2\times 2}$

c) $T: M_{2x2}(\mathbb{R}) \to \mathbb{R}^2$, definida por $T\left(\begin{bmatrix} a & b \\ c & d \end{bmatrix}\right) = (a, b+c+d)$ onde β e β' ~~são~~ bases canônicas dos espaços $M_{2x2}(\mathbb{R})$ e $\mathbb{R}^2$, respectivamente

$$\beta = \left\{ \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 0 \\ 1 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix} \right\} \quad [T]^{\beta}_{\beta'} \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 \end{bmatrix}$$

$$\beta' = \{(1,0), (0,1)\}$$

$$T\left(\begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}\right) = (1,0); \quad T\left(\begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}\right) = (0,1);$$

$$T\left(\begin{bmatrix} 0 & 0 \\ 1 & 0 \end{bmatrix}\right) = (0,1); \quad T\left(\begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix}\right) = (0,1);$$

$(1,0) = a.(1,0) + b(0,1)$

$(1,0) = (a,0) + (0,b)$

$a = 1$ $\quad$ $b = 0$

$(0,1) = a(1,0) + b(0,1)$

$\boxed{a = 0}$ $\boxed{b = 1}$

Felipe