Recuperação da Prova 1

Igor Radtke

1- $N(T) = [4,5,4,6]$

$B = (1,0,0,0); (0,1,0,0); (0,0,1,0); (4,5,4,6)$

$$\left.\begin{array}{l} T(1,0,0,0) = (1,0,0,0) \\ T(0,1,0,0) = (0,1,0,0) \\ T(0,0,1,0) = (0,0,1,0) \\ T(4,5,4,6) = (0,0,0,0) \end{array}\right\} \begin{array}{l} (x,y,z,t) = a(1,0,0,0) + b(0,1,0,0) + \\ c(0,0,1,0) + d(4,5,4,6) \\ \\ (a+4d,\ b+5d,\ c+4d,\ 6d) \end{array}$$

$$\begin{cases} a+4d = x \\ b+5d = y \\ c+4d = z \\ 6d = t \end{cases} \quad a+4\left(\frac{t}{6}\right) = x \Rightarrow a = x - \frac{2t}{3} \quad b+5\left(\frac{t}{6}\right) = y \Rightarrow b = y - \frac{5t}{6}$$

$$d = \frac{t}{6} \qquad c = z - \frac{2t}{3} \qquad d = \frac{t}{6}$$

$$(x,y,z,t) = \left(x - \frac{2t}{3}\right)(1,0,0,0) + \left(y - \frac{5t}{6}\right)(0,1,0,0) + \left(z - \frac{2t}{3}\right)(0,0,1,0) + \left(\frac{t}{6}\right)(4,5,4,6) \Rightarrow$$

$$\| \qquad \| \qquad \| \qquad \frac{t}{6}(0,0,0,0)$$

$$\left(\left(x - \frac{2t}{3}\right), \left(y - \frac{5t}{6}\right), \left(z - \frac{2t}{3}\right), 0\right)$$

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Base

$Im\, T\,(a,b,c,d) \in \mathbb{R}^4;\ T(x,y,z,t) = (a,b,c,d)$

$(a,b,c,d) \in \mathbb{R}^4; \left(x - \frac{2t}{3}\right), \left(y - \frac{5t}{6}\right), \left(z - \frac{2t}{3}\right), d = 0$

$a \quad b \quad c$

$(a,b,c,d) \in \mathbb{R}^4;\ d = 0 = \{(a,b,c,0);\ a,b,c \in \mathbb{R}$

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

$\beta' = (1,0,0,0);(0,1,0,0);c(0,0,1,0)$

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2- $a=4$ $(a,a,2a+1)$ $(2a+1,a,a)$

$(4,4,9)$; $(9,4,4)$;

$B(1,0,0,0)\ (0,1,0,0)\ (0,0,1,0)\ (0,0,0,1)$

$$\begin{cases} T(1,0,0,0)=(4,4,9) \\ T(0,1,0,0)=(9,4,4) \\ T(0,0,1,0)=(0,0,0) \\ T(0,0,0,1)=(0,0,0) \end{cases}$$

$T(x,y,z,t)=xT(1,0,0,0)+yT(0,1,0,0)+zT(0,0,1,0)+tT(0,0,0,1)$

$x(4,4,9)+y(9,4,4)+z(0,0,0)+t(0,0,0)$

$T(x,y,z,t)=(4x+9y),(4x+4y),(9x+4y)$

$N(T)=(x,y,z,t)\in\mathbb{R}^4 = T(x,y,z,t)=(0,0,0,0)$

$(4x+9y,4x+4y,9x+4y)=(0,0,0)$

$$\begin{cases} 4x+9y=0 \\ 4x+4y=0 \quad \div 4: \\ 9x+4y=0 \end{cases}$$

$x=-y$

$4.(-y)+9y=0$

$-4y+9y=0$

$5y=0$

$y=0$

$x=0$

$(0,0,z,t)$; $z,t\in\mathbb{R}$

$z(0,0,1,0)+t(0,0,0,1)$; $z,t\in\mathbb{R}$

Uma base $B'\{(0,0,1,0);(0,0,0,1)\}$

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3- $P_3(\mathbb{R}) \to P_3(\mathbb{R})$

$T(4x) = x$

$T(4x^2+1) = x^2$

$T(2) = 1$

$T(x^3) = x^3$

$B\{4x, 4x^2+1, 2, x^3\}$

$Ax^3 + Bx^2 + Cx + D = a(4x) + b(4x^2+1) + c(2) + d(x^3)$

$Ax^3 + Bx^2 + Cx + D = dx^3 + (4b)x^2 + (4a)x + b + c$

$$\begin{cases} d = A \\ 4b = B \to b = B/4 \\ 4a = C \to a = C/4 \\ b + 2c = D \end{cases}$$

$c = \left(D - \frac{B}{4}\right)/2 \qquad c = \frac{D}{2} - \frac{B}{8}$

$Ax^3 + Bx^2 + Cx + D = \left(4x \cdot \frac{C}{4}\right) + \left(4x^2 \cdot \frac{B}{4}\right) + \left(\frac{B}{4}\right) + 2\left(\frac{D}{2} - \frac{B}{8}\right) +$

Ax^3

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