4 Aplicaciones lineales

$T: \mathbb{R}^3 \to \mathbb{R}^4$ $\quad B_1 = \{(1,3,5),(0,1,1),(0,1,1)\}$

$$M(T, B_C^3, B_C^4)$$

$$M(T, B_1, B_C^4) = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 0 & -2 \\ 0 & 2 & 4 \\ 5 & 4 & -3 \end{pmatrix}$$

$$M(T, B_C^3, B_C^4)$$

$B_C^3 \longrightarrow B_C^4$

$M(B_C, B_1)$ ↓ B_1 ↗ $M(T, B_1, B_C^4)$

$(1,0,0) = a(1,3,5) + b(0,1,1) + c(0,1,1)$ $\begin{matrix} 1 \\ 3 \\ -2 \end{matrix}$

$(0,1,0) = a(1,3,5) + b(0,1,1) + c(0,1,1)$ $\begin{matrix} 0 \\ 1 \\ -1 \end{matrix}$

$(0,0,1) = a(1,3,5) + b(0,1,1) + c(0,1,1)$ $\begin{matrix} 0 \\ 0 \\ 1 \end{matrix}$

$$M(T, B_C^3, B_C^4) = M(T, B_1, B_C^4) \cdot M(B_C, B_1)$$

$$\begin{pmatrix} 1 & 2 & 3 \\ 2 & 0 & -2 \\ 0 & 2 & 4 \\ 5 & 4 & -3 \end{pmatrix} \cdot \begin{pmatrix} 1 & 0 & 6 \\ -3 & 1 & 0 \\ -2 & -1 & 1 \end{pmatrix} = \begin{pmatrix} -11 & -1 & 3 \\ 6 & 2 & -2 \\ -14 & -2 & 4 \\ -1 & 7 & -3 \end{pmatrix}$$

b) Base de U

$3-2$

$$\begin{cases} x_1 + x_2 - x_3 = 0 \\ x_2 - x_3 = 0 \end{cases}$$

$\dim(U) = 1$

$$\begin{cases} x_1 = 0 \\ x_2 = \lambda \\ x_3 = \lambda \end{cases}$$

$\lambda = 1 = (0, 1, 1)$

Sistema generador de $T(U)$ es $T(0, 1, 1)$

$$\{T(0,1,1)\} = \{(2, 0, 2, 4)\}$$

$$(a, b, c, d) = \lambda(2, 0, 2, 4)$$

6) Diagonalización

2)

$\varphi(-1,4,1) = b_1(-1,4,1)$

$\varphi(1,-1,-1) = b_2(1,-1,-1)$

$\varphi(1,2,1) = b_3(1,2,1)$

$\varphi(1,1,1) = (4,4,2)$

$P\begin{pmatrix} -1 & 1 & 1 \\ 4 & -1 & 2 \\ 1 & -1 & 1 \end{pmatrix}$ A = Matriz base canónica

$A = Q^{-1} D Q$