U0273317 - Mier Montoto, Juan Francisco 16/11; ...

1. Paso 1: Espacio vectorial $\mathbb{R}^4$: $PX'_{B'\mathbb{R}^4} = X_{B\mathbb{R}^4}$

Como la antigua base es la base canónica,

$$P = \begin{pmatrix} 1 & 0 & 1 & -1 \\ 0 & 1 & -1 & -1 \\ 1 & 0 & 0 & 1 \\ -1 & -1 & 0 & 1 \end{pmatrix}$$

Paso 2: Espacio vectorial $\mathbb{R}^3$. $QY'_{B'\mathbb{R}^3} = Y_{B\mathbb{R}^3}$

$$Q = \begin{pmatrix} 2 & 1 & -2 \\ 0 & 1 & -1 \\ 1 & 2 & -2 \end{pmatrix}$$, directamente ya que la base antigua es la canónica.

Paso 3: Aplicación lineal $AX_{B\mathbb{R}^4} = Y_{B\mathbb{R}^3}$

¿$MX'_{B'\mathbb{R}^4} = Y'_{B'\mathbb{R}^3}$?

$$\downarrow$$

$$APX'_{B'\mathbb{R}^4} = QY'_{B'\mathbb{R}^3}$$

$$Q^{-1}APX'_{B'\mathbb{R}^4} = Y'_{B'\mathbb{R}^3}$$

$$\boxed{M = Q^{-1}AP}$$

$$\left(\begin{array}{ccc|ccc} 2 & 1 & -2 & 1 & 0 & 0 \\ 0 & 1 & -1 & 0 & 1 & 0 \\ 1 & 2 & -2 & 0 & 0 & 1 \end{array}\right) \xrightarrow[F_3'=F_1]{F_1'=F_3} \left(\begin{array}{ccc|ccc} 1 & 2 & -2 & 0 & 0 & 1 \\ 0 & 1 & -1 & 0 & 1 & 0 \\ 0 & -3 & 2 & 1 & 0 & -2 \end{array}\right)$$

$Q \qquad I$

$$\xrightarrow{F_3'=F_3+3F_2} \left(\begin{array}{ccc|ccc} 1 & 2 & -2 & 0 & 0 & 1 \\ 0 & 1 & -1 & 0 & 1 & 0 \\ 0 & 0 & -1 & 1 & 3 & -2 \end{array}\right) \xrightarrow[F_2'=F_2+F_3']{F_3'=F_3/(-1)} \left(\begin{array}{ccc|ccc} 1 & 2 & -2 & 0 & 0 & \\ 0 & 1 & 0 & -1 & -2 & \\ 0 & 0 & 1 & -1 & -3 & \end{array}\right)$$

$$\xrightarrow{F_1'=F_1+2F_3} \left(\begin{array}{ccc|ccc} 1 & 2 & 0 & -2 & -6 & 5 \\ 0 & 1 & 0 & -1 & -2 & 2 \\ 0 & 0 & 1 & -1 & -3 & 2 \end{array}\right) \xrightarrow{F_1'=F_1-2F_2} \left(\begin{array}{ccc|c} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & -1 \end{array}\right)$$

I

$$M = \begin{pmatrix} 0 & -2 & 1 \\ -1 & -2 & 2 \\ -1 & -3 & 2 \end{pmatrix} \begin{pmatrix} -3 & -1 & 9 & -2 \\ -2 & -1 & 0 & -2 \\ -5 & -3 & 7 & -5 \end{pmatrix} \begin{pmatrix} 1 & 0 & 1 & -1 \\ 0 & 1 & -1 & -1 \\ 1 & 0 & 0 & 1 \\ -1 & -1 & 0 & 1 \end{pmatrix} =$$

$$= \begin{pmatrix} -1 & -1 & 4 & -1 \\ -3 & -3 & -1 & -4 \\ -1 & -2 & -1 & -2 \end{pmatrix} \begin{pmatrix} 1 & 0 & 1 & -1 \\ 0 & 1 & -1 & -1 \\ 1 & 0 & 0 & 1 \\ -1 & -1 & 0 & 1 \end{pmatrix} = \begin{pmatrix} 4 & 0 & 0 & 5 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{pmatrix}$$

$f(1,0,0) = (-2,4,3,-1)$
$f(0,1,0) = (6,-6,-9,3)$ $\quad A = \begin{pmatrix} -2 & 6 & -2 \\ 4 & -6 & 4 \\ 3 & -9 & 2 \\ -1 & 3 & -1 \end{pmatrix}$
$f(0,0,1) = (-2,4,2,-1)$

Paro 1. $\quad P X_{B, \mathbb{R}^4} = X'_{B', \mathbb{R}^4}$ $\quad P = \begin{pmatrix} 2 & 0 & -1 & -1 \\ 0 & -1 & 1 & -1 \\ 1 & 0 & 0 & -1 \\ -1 & -1 & 0 & -2 \end{pmatrix}$

Paro 2. $\quad Q Y_{B, \mathbb{R}^3} = Y'_{B', \mathbb{R}^3}$ $\quad Q = \begin{pmatrix} 0 & -1 & 1 \\ 0 & 1 & 0 \\ -1 & -1 & 1 \end{pmatrix}$

Paro 3. $\quad M = P^{-1} A Q$

$$\left(\begin{array}{cccc|cccc} 2 & 0 & -1 & -1 & 1 & 0 & 0 & 0 \\ 0 & -1 & 1 & -1 & 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & -1 & 0 & 0 & 1 & 0 \\ -1 & -1 & 0 & -2 & 0 & 0 & 0 & 1 \end{array}\right) \longrightarrow \left(\begin{array}{cccc|cccc} 1 & 0 & 0 & 0 & -1 & 1 & 2 & - \\ 0 & 1 & 0 & 0 & 3 & -3 & -4 & 2 \\ 0 & 0 & 1 & 0 & -2 & 1 & 3 & - \\ 0 & 0 & 0 & 1 & -1 & 1 & 1 & - \end{array}\right)$$

I

$$M = \begin{pmatrix} -1 & 1 & 2 & -1 \\ 3 & -3 & -4 & 2 \\ -2 & 1 & 3 & -1 \\ -1 & 1 & 1 & -1 \end{pmatrix} \begin{pmatrix} -2 & 6 & -2 \\ 4 & -6 & 4 \\ 3 & -9 & 2 \\ -1 & 3 & -1 \end{pmatrix} \begin{pmatrix} 0 & -1 & 1 \\ 0 & 1 & 0 \\ -1 & -1 & 1 \end{pmatrix} =$$

$$= \begin{pmatrix} 13 & -33 & 11 \\ -32 & 78 & -28 \\ 18 & -48 & 15 \\ 10 & -24 & 8 \end{pmatrix} \begin{pmatrix} 0 & -1 & 1 \\ 0 & 1 & 0 \\ -1 & -1 & 1 \end{pmatrix}$$

No