

20 sep 22

Ejercicio 14: Halla una matriz, X, tal que $AX + B = 0$, siendo:

$$A = \begin{pmatrix} 1 & -1 & 0 \\ 2 & 0 & 1 \\ -1 & 1 & -1 \end{pmatrix} \quad \text{y} \quad B = \begin{pmatrix} -2 & -1 \\ -4 & -4 \\ 4 & 1 \end{pmatrix}$$

$$A \cdot X + B = 0$$
$$AX = -B \rightarrow \overset{\bar{A}^{-1}}{\bar{A} \cdot A} \cdot X = -\bar{A}^{-1} \cdot B$$

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

$$\bar{A}^{-1} = \frac{1}{|A|} \cdot (\text{Adj } A)^t$$

$$\begin{vmatrix} 1 & -1 & 0 \\ 2 & 0 & 1 \\ -1 & 1 & -1 \end{vmatrix} = 0 + 0 + 1 - 0$$
$$\rightarrow 1 - 2 = -2$$

$$\text{Adj} \begin{pmatrix} 1 & -1 & 0 \\ 2 & 0 & 1 \\ -1 & 1 & -1 \end{pmatrix} = \begin{pmatrix} -1 & -(-1) & 2 \\ -(-1) & -1 & -(-2) \\ -1 & -(-1) & 2 \end{pmatrix} = \begin{pmatrix} -1 & 1 & 2 \\ -1 & -1 & 0 \\ -1 & -1 & 2 \end{pmatrix}$$

$$= \begin{pmatrix} \begin{vmatrix} 0 & 1 \\ 1 & -1 \end{vmatrix} & - \begin{vmatrix} 2 & 1 \\ -1 & -1 \end{vmatrix} & \begin{vmatrix} 2 & 0 \\ -1 & 1 \end{vmatrix} \\ \begin{vmatrix} -1 & 0 \\ 1 & -1 \end{vmatrix} & \begin{vmatrix} 1 & 0 \\ -1 & -1 \end{vmatrix} & \begin{vmatrix} 1 & -1 \\ -1 & 1 \end{vmatrix} \\ \begin{vmatrix} -1 & 0 \\ 0 & 1 \end{vmatrix} & \begin{vmatrix} 1 & 0 \\ 2 & 1 \end{vmatrix} & \begin{vmatrix} 1 & -1 \\ 2 & 0 \end{vmatrix} \end{pmatrix}$$

$$\begin{pmatrix} -1 & 1 & 2 \\ -1 & -1 & 0 \\ -1 & -1 & 2 \end{pmatrix}^t = \begin{pmatrix} -1 & -1 & -1 \\ 1 & -1 & -1 \\ 2 & 0 & 2 \end{pmatrix}$$

$$\bar{A}^{-1} = \frac{1}{-2} \begin{pmatrix} -1 & -1 & -1 \\ 1 & -1 & -1 \\ 2 & 0 & 2 \end{pmatrix} = \begin{pmatrix} 1/2 & 1/2 & 1/2 \\ -1/2 & 1/2 & 1/2 \\ -1 & 0 & -1 \end{pmatrix}$$

$$X = -\bar{A}^{-1} \cdot B =$$
$$= - \begin{pmatrix} 1/2 & 1/2 & 1/2 \\ -1/2 & 1/2 & 1/2 \\ -1 & 0 & -1 \end{pmatrix} \cdot \begin{pmatrix} -2 & -1 \\ -4 & -4 \\ 4 & 1 \end{pmatrix} = \begin{pmatrix} -1 & 2 \\ -1 & 1 \\ 2 & 0 \end{pmatrix}$$

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