

Cálculo del rango por determinantes

domingo, 18 de octubre de 2020 16:19

Ejemplo

$$A = \begin{pmatrix} 2 & 5 & -1 & 3 \\ 1 & 0 & -1 & 1 \\ 1 & 5 & 0 & 2 \end{pmatrix} \quad \text{Como } 2 \neq 0 \Rightarrow \text{Rango}(A) \geq 1$$

$$\begin{vmatrix} 2 & 5 \\ 1 & 0 \end{vmatrix} = -5 \neq 0 \Rightarrow \text{Rango}(A) \geq 2$$

Rango A = 2

$$\begin{vmatrix} 2 & 5 & -1 \\ 1 & 0 & -1 \\ 1 & 5 & 0 \end{vmatrix} = (0 - 5 - 5) - (0 - 10 + 0) = -10 + 10 = 0$$

$$\begin{vmatrix} 2 & 5 & 3 \\ 1 & 0 & 1 \\ 1 & 5 & 2 \end{vmatrix} = (0 + 15 + 5) - (0 + 10 + 10) = 20 - 20 = 0$$

Ejemplo

$$A = \begin{pmatrix} -1 & 3 & 2 & 7 \\ 5 & -2 & 1 & 0 \\ 1 & 0 & 0 & 1 \\ 5 & 1 & 3 & 7 \end{pmatrix} \quad \text{Como } 3 \neq 0 \Rightarrow \text{Rango}(A) \geq 1$$

$$\begin{vmatrix} 3 & 2 \\ -2 & 1 \end{vmatrix} = 3 + 4 = 7 \neq 0 \Rightarrow \text{Rango}(A) \geq 2$$

$$\begin{vmatrix} -1 & 3 & 2 \\ 5 & -2 & 1 \\ 1 & 0 & 0 \end{vmatrix}$$

$$\begin{vmatrix} -1 & 3 & 2 \\ 5 & -2 & 1 \\ 5 & 1 & 3 \end{vmatrix}$$

$$\begin{vmatrix} 3 & 2 & 7 \\ -2 & 1 & 0 \\ 0 & 0 & 1 \end{vmatrix}$$

$$\begin{vmatrix} 3 & 2 & 7 \\ -2 & 1 & 0 \\ 1 & 3 & 8 \end{vmatrix}$$

$$\begin{vmatrix} -1 & 3 & 2 \\ 5 & -2 & 1 \\ 1 & 0 & 0 \end{vmatrix} = 1 A_{31} = 1 \begin{vmatrix} 3 & 2 \\ -2 & 1 \end{vmatrix} = 3 + 4 = 7 \neq 0 \Rightarrow \text{Rango } A \geq 3$$

$$\begin{vmatrix} -1 & 3 & 2 & 7 \\ 5 & -2 & 1 & 0 \\ 1 & 0 & 0 & 1 \end{vmatrix}$$

$C_4 - C_1$

$$\begin{vmatrix} -1 & 3 & 2 & 8 \\ 5 & -2 & 1 & -5 \\ 1 & 0 & 0 & 0 \end{vmatrix}$$

$$= 1 \cdot \begin{vmatrix} 3 & 2 & 8 \\ -2 & 1 & -5 \\ 1 & 3 & 3 \end{vmatrix} =$$

$$\begin{vmatrix} 5 & -2 & 1 & 0 \\ 1 & 0 & 0 & 1 \\ 5 & 1 & 3 & 8 \end{vmatrix} \xrightarrow{C_4 - C_1} \begin{vmatrix} 5 & -2 & 1 & -5 \\ 1 & 0 & 0 & 0 \\ 5 & 1 & 3 & 3 \end{vmatrix} = 1 \cdot \begin{vmatrix} 1 & 3 & 3 \end{vmatrix}$$

$$= (9 - 48 - 10) - (8 - 45 - 12) = -49 + 49 = 0 \Rightarrow \boxed{\text{Range } A = 3}$$