AUTOEVALUCION MATRICES

(3) a) $A \cdot A^{-1} = I$

(8)

$$\begin{array}{c} \\ P \\ Q \\ R \\ S \end{array}\begin{array}{c} \begin{array}{ccc} A & B & C \end{array} \\ \begin{pmatrix} 1 & 2 & 0 \\ 1 & 0 & 2 \\ 2 & 1 & 0 \\ 1 & 1 & 1 \end{pmatrix} \end{array}$$

a) $u(20\ 25\ 6)$

$u(x\ y\ z\ t)$

$$(x\ y\ z\ t)\begin{pmatrix} 1 & 2 & 0 \\ 1 & 0 & 2 \\ 2 & 1 & 0 \\ 1 & 1 & 1 \end{pmatrix} = (20\ 25\ 6)$$

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DET 2X2

$$\begin{vmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{vmatrix} = a_{11}.a_{22} - a_{12}.a_{21}$$

DET 3X3

$$\begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix} = [\ ] - [\ ]$$

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DET ORDEN >3

PROP. DET.

[1] $|A| = |A^t|$

$\begin{vmatrix} 1 & 2 \\ 3 & 4 \end{vmatrix} = 1.4 - 2.3$

$\begin{vmatrix} 1 & 3 \\ 2 & 4 \end{vmatrix} = 1.4 - 3.2$

[2] $\begin{vmatrix} 1 & 0 & 1 \\ 2 & 0 & 3 \\ 3 & 0 & 1 \end{vmatrix} = 0$ $\quad Li = 0 \Rightarrow |A| = 0$

[3] $\begin{vmatrix} 1 & 2 \\ 3 & 4 \end{vmatrix} = 4 - 6 = -2$

$\begin{vmatrix} 3 & 4 \\ 12 & \end{vmatrix} = 6 - 4 = 2$

$Li \leftrightarrow Lj$ El det cambia de signo

$\begin{vmatrix} a & b \\ c & d \end{vmatrix} = 2$

$\begin{vmatrix} c & d \\ a & b \end{vmatrix} = -\begin{vmatrix} a & b \\ c & d \end{vmatrix} = -2$ (Fila)

$\begin{vmatrix} a & b & c \\ d & e & f \\ g & h & i \end{vmatrix} = 2$

$\begin{vmatrix} g & h & i \\ a & b & c \\ d & e & f \end{vmatrix} = -\begin{vmatrix} a & b & c \\ g & h & i \\ d & e & f \end{vmatrix} = \begin{vmatrix} a & b & c \\ d & e & f \\ g & h & i \end{vmatrix}$ (Fila, Fila) $= 2$

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[4] $Li = Lj$

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

$\begin{vmatrix} 1 & 2 & 1 \\ 2 & 1 & 2 \\ 3 & 0 & 3 \end{vmatrix} = (3+12+0) - [3+0+12] = 0$

[5] $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$

$2A = 2\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix} = \begin{pmatrix} 2 & 4 \\ 6 & 8 \end{pmatrix}$

$|A| = 4 - 6 = -2$

$|2A| = 16 - 24 = -8$ $\quad |2A| = 2^2|A|$

2 $\begin{vmatrix} 1 & 2 \\ 3 & 4 \end{vmatrix} = \begin{vmatrix} 2 & 2 \\ 6 & 4 \end{vmatrix}$ $\quad |\alpha A| = \alpha^n |A|$

$2.(-2) = -4$

$\begin{vmatrix} 3 & 1 \\ 9 & 5 \end{vmatrix} = 3\begin{vmatrix} 1 & 1 \\ 3 & 5 \end{vmatrix}$

$\begin{vmatrix} 3 & 6 \\ 9 & 12 \end{vmatrix} = 3^2\begin{vmatrix} 1 & 2 \\ 3 & 4 \end{vmatrix}$

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[6] $L_i = \alpha L_j$ $|A| = 0$

$\begin{vmatrix} 1 & 2 \\ 4 & 8 \end{vmatrix} = 0$

[7] $\begin{vmatrix} 1 & 2 \\ 3 & 4 \end{vmatrix} \overset{F_2 = F_2 - 2F_1}{=\!=} \begin{vmatrix} 1 & 2 \\ 1 & 0 \end{vmatrix}$ (−2, −2)

$2\begin{vmatrix} 1 & 2 \\ 3 & 4 \end{vmatrix} \overset{F_2 = 2F_2 - F_1}{=\!=} \frac{1}{2}\cdot\begin{vmatrix} 1 & 2 \\ 5 & 6 \end{vmatrix}$ (−2, −4)

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[8] $|A+B| \neq |A| + |B|$

$\begin{vmatrix} a & c \\ b & d \end{vmatrix} + \begin{vmatrix} a & e \\ b & F \end{vmatrix} = \begin{vmatrix} a & c+e \\ b & d+F \end{vmatrix}$

[9] $|AB| = |A|\,|B|$

[10] $L_i = \alpha L_j + \beta L_k$ $|A| = 0$

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

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[11] $\begin{vmatrix} 1 & 0 & 0 \\ 4 & 2 & 0 \\ -1 & 5 & 3 \end{vmatrix} = 1 \cdot 2 \cdot 3$

|Mat. triang| = Prod elem diagonal principal

[12] $|0| = 0$

$|I| = 1$

$|A^{-1}| = 1/|A|$

$A \cdot A^{-1} = I$

$|A \cdot A^{-1}| = |I|$

$|A|\,|A^{-1}| = 1$ $\quad |A^{-1}| = \frac{1}{|A|}$

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Resumen propiedades

$|A| = 0 \rightarrow \begin{cases} L_i = 0 \\ L_i = L_j \\ L_i = \alpha L_j \\ L_i = \alpha L_j + \beta L_k \end{cases}$

$|A^t| = |A|$

$|I| = 1$

$|0| = 0$

$|A^{-1}| = 1/|A|$

|Mat. triang| = a11 ... ann

$|A+B| \neq |A| + |B|$

$\begin{vmatrix} a & b \\ c & d \end{vmatrix} + \begin{vmatrix} a & b \\ e & F \end{vmatrix} = \begin{vmatrix} a & b \\ c+e & d+F \end{vmatrix}$

$|AB| = |A|\,|B|$

- $L_i \leftrightarrow L_j \Rightarrow$ El det cambia de signo
- $\begin{vmatrix} & \overset{F_i = F_i + \alpha F_j}{=\!=} & \\ & \overset{F_i = \alpha F_i + F_j \cdot \frac{1}{\alpha}}{=\!=} & \end{vmatrix}$

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(3) a) Porque $F_2 = 0$

Prop: Si una fila de la matriz es nula, el det es cero.

b) Porque $F_3 = -2F_1$

Prop: . — — .

c) $F_3 = 10F_2 + F_1$

d) $F_1 = 10F_2 + F_3$

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(4) $\begin{vmatrix} x & y & z \\ 5 & 0 & 3 \\ 1 & 1 & 1 \end{vmatrix} = 1$

a) $\begin{vmatrix} 3x & 3y & 3z \\ 5 & 0 & 3 \\ 1 & 1 & 1 \end{vmatrix} = 3 \cdot \underbrace{\begin{vmatrix} x & y & z \\ 5 & 0 & 3 \\ 1 & 1 & 1 \end{vmatrix}}_{1} = 3 \cdot 1 = 3$

b) $\begin{vmatrix} 5x & 5y & 5z \\ 1 & 0 & 3/5 \\ 1 & 1 & 1 \end{vmatrix} = 5 \begin{vmatrix} x & y & z \\ 1 & 0 & 3/5 \\ 1 & 1 & 1 \end{vmatrix} = \begin{vmatrix} x & y & z \\ 5 & 0 & 3 \\ 1 & 1 & 1 \end{vmatrix} = 1$

c) $\begin{vmatrix} x & y & z \\ 2x+5 & 2y & 2z+3 \\ x+1 & y+1 & z+1 \end{vmatrix} = \overset{F_2 = F_2 - 2F_1}{=} \begin{vmatrix} x & y & z \\ 5 & 0 & 3 \\ x+1 & y+1 & z+1 \end{vmatrix} = \overset{F_3 = F_3 - F_1}{=} \begin{vmatrix} x & y & z \\ 5 & 0 & 3 \\ 1 & 1 & 1 \end{vmatrix} = 1$

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Deberes

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