Determina los valores de "m" /

① $X = \begin{pmatrix} m & -2 \\ 4 & 5 \end{pmatrix}$ verifique $X^2 - 6X + 13 = 0$

$$\begin{pmatrix} m & -2 \\ 4 & 5 \end{pmatrix}^2 - 6 \cdot \begin{pmatrix} m & -2 \\ 4 & 5 \end{pmatrix} + 13 \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} = \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$$

$$\begin{pmatrix} m^2-8 & -2m-10 \\ 4m+20 & 17 \end{pmatrix} - \begin{pmatrix} 6m & -12 \\ 24 & 30 \end{pmatrix} + \begin{pmatrix} 13 & 0 \\ 0 & 13 \end{pmatrix} = \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$$

$$m^2 - 8 - 6m + 13 = 0$$

$$\overset{a}{1}\, m^2 \overset{b}{-6}\, m \overset{c}{+5} = 0$$

$$\frac{6 \pm \sqrt{\underbrace{(-6)^2}_{36} \overbrace{-4 . 1 . 5}^{-20}}}{2 . 1} \Rightarrow \frac{6 \pm \sqrt{16}}{2}$$

$$\frac{6 \pm 4}{2}$$

$x_1 = \frac{6+4}{2}$ $\boxed{x_1 = 5}$

$x_2 = \frac{6-4}{2}$ $\boxed{x_2 = 1}$

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# Ec. 2do grado

$$\pm a x^2 \pm bx \pm c = 0$$

$x_1$ y $x_2$ $\Rightarrow$ raíces de la ecuación

## F. Resolvente

$$x_{1;2} = \frac{-b \pm \sqrt{b^2 - 4.a.c}}{2.a}$$

(3)

$$\begin{pmatrix} m & -2 \\ 4 & 5 \end{pmatrix}^2 = \begin{pmatrix} m & -2 \\ 4 & 5 \end{pmatrix} \cdot \begin{pmatrix} m & -2 \\ 4 & 5 \end{pmatrix}$$

$$\begin{pmatrix} m^2-8 & -2m-10 \\ 4m+20 & 17 \end{pmatrix}$$

$$\boxed{X = \begin{pmatrix} 5 & -2 \\ 4 & 5 \end{pmatrix}} \qquad \boxed{X = \begin{pmatrix} 1 & -2 \\ 4 & 5 \end{pmatrix}}$$

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# Producto de MATRICES

Condición:

$$A_{\boxed{m} \times n} \cdot B_{h \times \boxed{p}} \Rightarrow C_{m \times p}$$

$\rightarrow n = h$

## Propiedades:

- Asociativa $A.(B.C) = (A.B).C$
- Distributiva respecto de la suma:

$$A.(B+C) = A.B + A.C$$

$$(B+C).A = B.A + C.A$$

5

- Elemento Neutro:

$$A.I = A$$
$$I.A = A$$

- No es conmutativo

$$A.B \neq B.A$$

# Producto Matrices → Mecanismo

6

$$A_{3\times 2} \cdot B_{2\times 2} = C_{3\times 2}$$

$$3\times 2$$

$$A = \begin{pmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \\ a_{31} & a_{32} \end{pmatrix} \qquad B = \begin{pmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{pmatrix}$$

$$= \begin{pmatrix} \boxed{a_{11}\cdot b_{11} + a_{12}\cdot b_{21}} & \boxed{a_{11}\cdot b_{12} + a_{12}\cdot b_{22}} \\ \boxed{a_{21}\cdot b_{11} + a_{22}\cdot b_{21}} & \boxed{a_{21}\cdot b_{12} + a_{22}\cdot b_{22}} \\ \boxed{a_{31}\cdot b_{11} + a_{32}\cdot b_{21}} & \boxed{a_{31}\cdot b_{12} + a_{32}\cdot b_{22}} \end{pmatrix}$$

## Ejemplo 1

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$$M = \begin{pmatrix} 5 & -3 & 2 \\ 6 & 9 & 8 \\ -1 & 0 & 2 \end{pmatrix}_{3\times 3} \qquad T = \begin{pmatrix} -1 & -1 \\ -5 & -2 \\ 0 & 6 \end{pmatrix}_{3\times 2}$$

$$R_{3\times 2}$$

$$\begin{pmatrix} 10 & 13 \\ -51 & 24 \\ 1 & 13 \end{pmatrix}$$

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$\overbrace{5(-1)}^{-5} + \overbrace{(-3)\cdot(-5)}^{15} + \overbrace{2\cdot 0}^{0} = 10 \quad 1\times 1$

$\underbrace{5(-1)}_{-5} + \underbrace{(-3)\cdot(-2)}_{+6} + \underbrace{2\cdot 6}_{+12} = 13 \quad 1\times 2$

$\overbrace{6\cdot(-1)}^{-6} + \overbrace{9(-5)}^{-45} + \overbrace{8\cdot 0}^{0} = -51 \quad 2\times 1$

$\underbrace{6\cdot(-1)}_{-6} + \underbrace{9(-2)}_{-18} + \underbrace{8\cdot 6}_{48} = \cancel{40}\ 24$

$\overbrace{-1\cdot(-1)}^{1} + \overbrace{0\cdot(-5)}^{0} + \overbrace{2\cdot(0)}^{0} = 1 \quad 3\times 1$

$\underbrace{(-1)(-1)}_{1} + \underbrace{0(-2)}_{0} + \underbrace{2\cdot 6}_{12} = 13 \quad 3\times 2$

## Inversa de una Matriz "A"

(9)

Cant. de filas = Cant. de columnas. → Cuadrada de $\boxed{\text{orden "2"}}$

$$\boxed{A^{-1} = \frac{1}{A}}$$

$$A . \underbrace{A^{-1}}_{\text{Inversa}} = A^{-1} . A = I$$

Condiciones:

↳ Matriz Cuadrada orden "2"

↳ $|A| \neq 0$

Si A tiene Inversa ↗ Inversible ↳ Regular

$$A = \begin{pmatrix} a & b \\ c & d \end{pmatrix} \rightarrow \boxed{A^{-1} = \frac{\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}}{|A|}}$$

.(-1)

(-1).

(10) Propiedades Matriz Inversa

Existe $A^{-1}$ y $B^{-1}$

- Si A y B son inversibles

$$(A \cdot B)^{-1} = B^{-1} \cdot A^{-1}$$

- La Inversa de la Traspuesta es la traspuesta de la Inversa

$$(A^{t})^{-1} = (A^{-1})^{t}$$

Dado $A=\begin{pmatrix}-5 & 3\\ 8 & 2\end{pmatrix}$, calcula su inversa.

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$$|A| = (-5)\cdot 2 - 8\cdot 3 = -10 - 24$$

$$\boxed{|A| = -34} \qquad |A| \neq 0$$

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

$$A^{-1} = \frac{\begin{pmatrix}2 & -3\\ -8 & -5\end{pmatrix}}{-34}$$

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

$$\boxed{A^{-1} = \begin{pmatrix}-\frac{1}{17} & \frac{3}{34}\\ \frac{4}{17} & \frac{5}{34}\end{pmatrix}}$$

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# Determinante de uma Matriz quadrada de ordem "2"

$$A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$$

$$|A| = a.d - c.b$$

$$|A| \neq 0$$

# Ecuación Matricial

## Ejemplos

$$A \cdot X = B$$

$$A^{-1} \cdot (A \cdot X) = A^{-1} \cdot B$$

$$\underbrace{A^{-1} \cdot A}_{I} \cdot X = A^{-1} \cdot B$$

$$\underbrace{I \cdot X} = A^{-1} \cdot B$$

$$\boxed{X = A^{-1} \cdot B}$$

**Propiedad**

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

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$$A \cdot x = B$$

$$\cancel{x = \frac{B}{A}}$$

## Ejemplo 2



$$X \cdot A = B$$

$$X \cdot \underbrace{A \cdot A^{-1}}_{I} = B \cdot A^{-1}$$

$$X = B \cdot A^{-1}$$

Siendo $A = \begin{pmatrix} 1 & 1 \\ 3 & 4 \end{pmatrix}$ $B = \begin{pmatrix} 2 & 1 \\ 1 & 2 \end{pmatrix}$



y $C = \begin{pmatrix} 1 & 2 \\ 1 & 3 \end{pmatrix}$

Realizar:

1) $X \cdot A = B + I$

2) $AX + BX = C$

1)

$$X \cdot A = B + I$$

$$\underbrace{X \cdot \underbrace{A \cdot A^{-1}}_{I}} = \begin{pmatrix} 3 & 1 \\ 1 & 3 \end{pmatrix} \cdot A^{-1}$$

$$X = \begin{pmatrix} 3 & 1 \\ 1 & 3 \end{pmatrix} \begin{pmatrix} 4 & -1 \\ -3 & 1 \end{pmatrix}$$

$$\boxed{X = \begin{pmatrix} 9 & -2 \\ -5 & 2 \end{pmatrix}}$$

$$B+I = \begin{pmatrix} 2 & 1 \\ 1 & 2 \end{pmatrix} + \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$$

$$\begin{pmatrix} 3 & 1 \\ 1 & 3 \end{pmatrix}$$

$$A^{-1} = \frac{\begin{pmatrix} 4 & -1 \\ -3 & 1 \end{pmatrix}}{1}$$

$$A^{-1} = \begin{pmatrix} 4 & -1 \\ -3 & 1 \end{pmatrix}$$

$$|A| = 4-3$$

$$|A| = 1$$

$$|A| \neq 0$$

2) $AX + BX = C$

(17)

$$(A+B)X = C$$

$$\underbrace{(A+B)^{-1}(A+B)}_{I} \cdot X = (A+B)^{-1}C$$

$$X = (A+B)^{-1} \cdot C$$

$$X = \begin{pmatrix} \frac{3}{5} & -\frac{1}{5} \\ -\frac{2}{5} & \frac{3}{10} \end{pmatrix} \cdot \begin{pmatrix} 1 & 2 \\ 1 & 3 \end{pmatrix}$$

$-\frac{2}{5} + \frac{3}{10}$

$\frac{-4+3}{10}$

$-\frac{4}{5} + \frac{9}{10}$

$\frac{-8+9}{10}$

$$\boxed{X = \begin{pmatrix} \frac{2}{5} & \frac{3}{5} \\ -\frac{1}{10} & \frac{1}{10} \end{pmatrix}}$$

$$A+B=\begin{pmatrix}3 & 2\\ 4 & 6\end{pmatrix} \qquad |A+B| = 18-8$$
$$= 10$$
$$|A+B| \neq 0$$

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$$(A+B)^{-1} = \frac{\begin{pmatrix}6 & -2\\ -4 & 3\end{pmatrix}}{10}$$

$$(A+B)^{-1} = \begin{pmatrix}\frac{3}{5} & -\frac{1}{5}\\ -\frac{2}{5} & \frac{3}{10}\end{pmatrix}$$