

$$\begin{cases} a^2 = a & a^2 - a = 0 \\ a + b = 1 & a(a-1) = 0 \begin{cases} a=0 \\ a=1 \end{cases} \\ b^2 = b \end{cases}$$

$$\boxed{a=0 \quad b=1} \quad 1^2 = 1 \text{ ST}$$

$$\boxed{a=1 \quad b=0} \quad 0^2 = 0 \text{ ST}$$

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$$(24) A = \begin{pmatrix} 1 & 1/7 & 1/7 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

$$A^2 = A \cdot A = \begin{pmatrix} 1 & 1/7 & 1/7 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 1/7 & 1/7 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} = \begin{pmatrix} 1 & 2/7 & 2/7 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

$$A^3 = A^2 A = \begin{pmatrix} 1 & 3/7 & 3/7 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

$$A^4 = A^3 A = \begin{pmatrix} 1 & 4/7 & 4/7 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

$$\boxed{A^n = \begin{pmatrix} 1 & n/7 & n/7 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}}$$

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$$B = \begin{pmatrix} 1 & 0 \\ 0 & 3 \end{pmatrix} = 3^1$$

$$B^2 = B \cdot B = \begin{pmatrix} 1 & 0 \\ 0 & 9 \end{pmatrix} = 3^2$$

$$B^3 = B^2 \cdot B = \begin{pmatrix} 1 & 0 \\ 0 & 27 \end{pmatrix} = 3^3$$

$$B^4 = B^3 \cdot B = \begin{pmatrix} 1 & 0 \\ 0 & 81 \end{pmatrix} = 3^4$$

$$\boxed{B^n = \begin{pmatrix} 1 & 0 \\ 0 & 3^n \end{pmatrix}}$$

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$$A = \begin{pmatrix} 1 & -1 & 4 \\ 3 & 1 & 0 \\ -1 & 0 & 1 \end{pmatrix} \quad B = \begin{pmatrix} 11 \\ 5 \\ 2 \end{pmatrix}$$

$$AX=B \quad A^{-1}AX=A^{-1}B$$

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

$A^{-1}: \begin{pmatrix} 1 & -1 & 4 & | & 10 & 0 & 0 \\ 3 & 1 & 0 & | & 0 & 1 & 0 \\ -1 & 0 & 1 & | & 0 & 0 & 1 \end{pmatrix} \sim \begin{pmatrix} 1 & -1 & 4 & | & 10 & 0 & 0 \\ 0 & 4 & -12 & | & -30 & 1 & 0 \\ 0 & 1 & 5 & | & 10 & 1 & 1 \end{pmatrix}$   
 $F_2 = F_2 - 3F_1 \quad F_3 = 4F_3 + F_2$   
 $F_3 = F_3 + F_1 \quad F_3 = 4F_3 + F_2$   
 $\begin{pmatrix} 1 & -1 & 4 & | & 10 & 0 & 0 \\ 0 & 4 & -12 & | & -30 & 1 & 0 \\ 0 & 0 & 8 & | & 11 & 4 & 4 \end{pmatrix} \sim \begin{pmatrix} 1 & -1 & 4 & | & 10 & 0 & 0 \\ 0 & 4 & -12 & | & -30 & 1 & 0 \\ 0 & 0 & 8 & | & 11 & 4 & 4 \end{pmatrix}$   
 $F_3 = 3F_3 + 2F_2 \quad F_1 = F_1 + F_2$   
 $F_1 = F_1 - 2F_2$   
 $\begin{pmatrix} 8 & 0 & 0 & | & 1 & 1 & -4 \\ 0 & 8 & 0 & | & -3 & 5 & 12 \\ 0 & 0 & 8 & | & 1 & 1 & 4 \end{pmatrix} \sim \begin{pmatrix} 1 & 0 & 0 & | & 1/8 & 1/8 & -1/2 \\ 0 & 1 & 0 & | & -3/8 & 5/8 & 3/2 \\ 0 & 0 & 1 & | & 1/8 & 1/8 & 1/2 \end{pmatrix}$   
 $F_1 = F_1/8 \quad F_2 = F_2/8 \quad F_3 = F_3/8$   
 $A^{-1} = \begin{pmatrix} 1/8 & 1/8 & -1/2 \\ -3/8 & 5/8 & 3/2 \\ 1/8 & 1/8 & 1/2 \end{pmatrix}$   
 $X = \begin{pmatrix} 1/8 & 1/8 & -1/2 \\ -3/8 & 5/8 & 3/2 \\ 1/8 & 1/8 & 1/2 \end{pmatrix} \begin{pmatrix} 11 \\ 5 \\ 2 \end{pmatrix} = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$

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(22)  $AXB=C$

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

$$A^{-1}AXB B^{-1} = A^{-1}CB^{-1}$$

$$X = A^{-1}CB^{-1}$$

$A^{-1}: \begin{pmatrix} 3 & 2 & | & 10 & 0 \\ 4 & 3 & | & 0 & 1 \end{pmatrix} \sim \begin{pmatrix} 3 & 2 & | & 10 & 0 \\ 0 & -1 & | & 4 & -3 \end{pmatrix}$   
 $F_2 = -3F_2 + F_1 \quad F_1 = F_1 + 2F_2$   
 $\begin{pmatrix} 3 & 0 & | & 9 & -6 \\ 0 & -1 & | & 4 & -3 \end{pmatrix} \sim \begin{pmatrix} 1 & 0 & | & 3 & -2 \\ 0 & 1 & | & -4 & 3 \end{pmatrix}$   
 $F_1 = F_1/3 \quad F_2 = F_2/-1$   
 $A^{-1} = \begin{pmatrix} 1/3 & -2/3 \\ 0 & -1 \end{pmatrix}$   
 $B^{-1}: \begin{pmatrix} 2 & 3 & | & 10 & 0 \\ 2 & 0 & | & 0 & 1 \end{pmatrix} \sim \begin{pmatrix} 2 & 3 & | & 10 & 0 \\ 0 & 1 & | & -12 & 1 \end{pmatrix}$   
 $\begin{pmatrix} 2 & 0 & | & 4 & -6 \\ 0 & 1 & | & -12 & 1 \end{pmatrix} \sim \begin{pmatrix} 1 & 0 & | & 2 & -3 \\ 0 & 1 & | & -12 & 1 \end{pmatrix}$   
 $B^{-1} = \begin{pmatrix} 1/2 & -3/2 \\ 0 & 1 \end{pmatrix}$   
 $X = \begin{pmatrix} 1/3 & -2/3 \\ -4/3 & 1/3 \end{pmatrix} \begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix} \begin{pmatrix} 2 & -3 \\ -12 & 1 \end{pmatrix}$   
 $\begin{pmatrix} 1 & 1 \\ -1 & -1 \end{pmatrix} \begin{pmatrix} 2 & -3 \\ -12 & 1 \end{pmatrix} = \begin{pmatrix} 1 & -1 \\ -1 & 1 \end{pmatrix}$

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(10)

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

$$B^{-1} = \begin{pmatrix} -1 & -1/2 & 3/2 \\ 3 & 1 & -3 \\ -1 & 0 & 1 \end{pmatrix}$$

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SISTEMAS 40N MATRICIES

$$\begin{cases} A+2B=C \\ 2A-B=D \end{cases}$$

$$\begin{cases} A+2B=C \\ 2A-B=D \end{cases}$$

$$-5B=D-2C$$

$$B = \frac{1}{-5}(D-2C)$$

$$A = C-2B$$

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MATRICES QUE CONMUTAN  
CON UNA DADA

$$A = \begin{pmatrix} 1 & 2 \\ 0 & 1 \end{pmatrix} \quad AX = XA$$

$$\begin{pmatrix} 1 & 2 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} x & y \\ z & t \end{pmatrix} = \begin{pmatrix} x & y \\ z & t \end{pmatrix} \begin{pmatrix} 1 & 2 \\ 0 & 1 \end{pmatrix}$$

$$\begin{pmatrix} x+2z & y+2t \\ z & t \end{pmatrix} = \begin{pmatrix} x & 2x+y \\ z & 2z+t \end{pmatrix}$$

$$\begin{cases} x+2z = x & \rightarrow z = 0 \\ y+2t = 2x+y & t = x \\ z = z \\ t = 2z+t & \rightarrow z = 0 \end{cases}$$

$$\begin{cases} z = 0 \\ t = x \end{cases} \quad \begin{cases} x = \alpha \\ y = \beta \\ z = 0 \\ t = \alpha \end{cases}$$

$$X = \begin{pmatrix} \alpha & \beta \\ 0 & \alpha \end{pmatrix} \quad \forall \alpha, \beta \in \mathbb{R}$$

~~$\begin{pmatrix} \alpha & \beta \\ 0 & \alpha \end{pmatrix}$~~

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