Roger Ulla - Algebra lineal 11/09/2025

① Hallar inversa

$$A=\begin{bmatrix} 1 & -3 & 0 & -2 \\ 3 & -12 & -2 & -6 \\ -2 & 10 & 2 & 5 \\ -1 & 6 & 1 & 3 \end{bmatrix} \begin{matrix} 1 & -3 & 0 & -2 \\ 3 & -12 & -2 & -6 \\ -2 & 10 & 2 & 5 \\ -1 & 6 & 1 & 3 \end{matrix}$$

$$\begin{array}{r} 12 \\ 12 \\ \hline 24 \\ 12 \end{array}$$

$$C_{11} = (-1)^{1+1} \det|A_{11}|$$
$$= 1(72+60+60-72-60-60)$$
$$= 0$$

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

$$C_{12} = (-1)^{1+2} \det|A_{12}|$$
$$= -1(-12-15-12+18+10+12)$$
$$= -1(1)$$
$$= -1$$

$$\begin{matrix} 3 & -2 & -6 \\ -2 & 2 & 5 \\ -1 & 1 & 3 \end{matrix}$$

$$C_{13} = (-1)^{1+3} \det|A_{13}|$$
$$= 1(-66-90-72+90+60+72)$$
$$= 0$$

$$C_{14} = (-1)^{1+4} \det|A_{14}|$$
$$= -1(-20-36-24+30+24+24)$$
$$= 2$$

$$C_{21} = (-1)^{2+1} \det|A_{21}|$$
$$= -1(24+15-0+(-18)+0-20)$$
$$= -1$$

$$C_{22} = (-1)^{2+2} \det|A_{22}|$$
$$= 1(-4-5-0+6+0+4)$$
$$= 1$$

$$C_{23} = (-1)^{2+3} \det |A_{23}| \qquad \begin{matrix} 1 & -3 & 2 \\ -2 & 10 & 9 \\ -1 & 6 & 3 \end{matrix}$$

$$= -1(-20-30-18+30+15+24)$$

$$= -1$$

$$C_{24} = (-1)^{2+4} \det |A_{24}| \qquad \begin{matrix} 1 & -3 & 0 \\ -2 & 10 & 2 \\ -1 & 6 & 1 \end{matrix}$$

$$= 1(0-12-6+10+6+0)$$

$$= -2$$

$$C_{31} = (-1)^{3+1} \det |A_{31}| \qquad \begin{matrix} 3 & 0 & -2 \\ -12 & -2 & -6 \\ 6 & 1 & 3 \end{matrix}$$

$$= 1(-24+18+0-18+0+24)$$

$$= 0$$

$$C_{32} = (-1)^{3+2} \det |A_{32}| \qquad \begin{matrix} 1 & 0 & -2 \\ 3 & 2 & 5 \\ -1 & 1 & 3 \end{matrix}$$

$$= -1(-4-5-0+6+0-6)$$

$$= 2$$

$$C_{33} = (-1)^{3+3} \det |A_{33}| \qquad \begin{matrix} 1 & -3 & -2 \\ 3 & -12 & -6 \\ -1 & 6 & 3 \end{matrix}$$

$$= 1(24+36+27-36-18-36)$$

$$= -3$$

$$C_{34} = (-1)^{3+4} \det |A_{34}| \qquad \begin{matrix} 1 & -3 & 0 \\ 3 & -12 & -2 \\ -1 & 6 & 1 \end{matrix}$$

$$= -1(0+12+9-12-6+0)$$

$$= -3$$

$$C_{41} = (-1)^{4+1} \det |A_{41}| \qquad \begin{matrix} -3 & 0 & -2 \\ -12 & -2 & -6 \\ 10 & 2 & 5 \end{matrix}$$

$$= -1(-40-36+0+30+0+48)$$

$$= -2$$

$$C_{42} = (-1)^{4+2} \det |A_{42}| \qquad \begin{matrix} 1 & 0 & -2 \\ 3 & -2 & -6 \\ -2 & 2 & 5 \end{matrix}$$

$$= 1(8+12+0-10+0+12)$$

$$= -2$$

$$C_{43} = (-1)^{4+3} \det |A_{43}| \qquad \begin{matrix} 1 & -3 & -2 \\ 3 & -12 & -6 \\ -2 & 10 & 5 \end{matrix}$$

$$= -1(48+60+45-60-36-60)$$

$$= -3$$

$C_{44} = (-1)^{4+4} \det |A_{44}|$ $\quad \begin{matrix} 1 & -3 & 0 \\ 3 & -12 & -2 \\ -2 & 10 & 2 \end{matrix}$

$= 1(0+20+18-24-1210)$

$= 2$

$$M(A) = \begin{bmatrix} 0 & -1 & 0 & 2 \\ -1 & 1 & -1 & -2 \\ 0 & 2 & -3 & -3 \\ -2 & -2 & 3 & 2 \end{bmatrix} \qquad Adj(A) = \begin{bmatrix} 0 & -1 & 0 & -2 \\ -1 & 1 & 2 & -2 \\ 0 & -1 & -3 & 3 \\ 2 & -2 & -3 & 2 \end{bmatrix}$$

Inversa $A^{-1} = \dfrac{1}{-1} \cdot Adj(A)$

$$A^{-1} = -1 \begin{bmatrix} 0 & -1 & 0 & -2 \\ -1 & 1 & 2 & -2 \\ 0 & -1 & -3 & 3 \\ 2 & -2 & -3 & 2 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 & 2 \\ 1 & -1 & -2 & 2 \\ 0 & 1 & 3 & -3 \\ -2 & 2 & 3 & -2 \end{bmatrix}$$

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$$A = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 5 & 6 & 7 & 8 \\ 9 & 10 & 11 & 13 \\ 14 & 15 & 16 & 17 \end{bmatrix}$$

$C_{11} = (-1)^{1+1} \det(A_{11})$

$= 1(-1320 - 1248 - 1190 + 1122 + 1365 + 1280)$

$= 9$

$C_{12} = (-1)^{1+2} \det(A_{12})$ $\quad \begin{matrix} 5 & 7 & 8 \\ 9 & 11 & 13 \\ 14 & 16 & 17 \end{matrix}$

$= -1(-1232 - 1040 - 1071 + 935 + 1274 + 1152)$

$= -18$

$C_{13} = (-1)^{1+3} \det(A_{13})$ $\quad \begin{matrix} 5 & 6 & 8 \\ 9 & 10 & 13 \\ 14 & 15 & 17 \end{matrix}$

$= 1(850 + 1092 + 1080 - 1120 - 945 + 918)$

$= 9$

$$C_{14} = (-1)^{1+4} \det |A_{14}|$$

$$\begin{matrix} 5 & 6 & 7 \\ 9 & 10 & 11 \\ 14 & 15 & 16 \end{matrix}$$

$$= -1(800+924+945-980-825-864)$$

$$= 0$$

$$\det A = 9 \cdot 1 + (-18) \cdot 2 + 9 \cdot 3 + 0 \cdot 4 =$$

$$\det A = 9 - 36 + 27 + 0$$

$$\det A = 0$$

la matriz no es invertible ya que su determinante es 0 y para que una matriz sea invertible su det $\neq 0$