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QUESTÃO 3

A (3x3), sendo  $a_{ij} = i + j$ , então a matriz é dada por:

$$A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix} \Rightarrow \begin{bmatrix} 2 & 3 & 4 \\ 3 & 4 & 5 \\ 4 & 5 & 6 \end{bmatrix} //$$

a)

Logo, a transposta de A é dada por:

$$A^T = \begin{bmatrix} 2 & 3 & 4 \\ 3 & 4 & 5 \\ 4 & 5 & 6 \end{bmatrix} //$$

b) \* COFATORES DE A //

$$\text{COF}(a_{11}) = (-1)^2 \cdot \begin{vmatrix} 4 & 5 \\ 5 & 6 \end{vmatrix} \Rightarrow -1 //$$

$$\text{COF}(a_{31}) = (-1)^4 \cdot \begin{vmatrix} 3 & 4 \\ 4 & 5 \end{vmatrix} = -1 //$$

$$\text{COF}(a_{12}) = (-1)^3 \cdot \begin{vmatrix} 3 & 5 \\ 4 & 6 \end{vmatrix} \Rightarrow -1 \cdot -2 = 2 //$$

$$\text{COF}(a_{32}) = (-1)^5 \cdot \begin{vmatrix} 2 & 4 \\ 3 & 5 \end{vmatrix} = -1 \cdot -2 = 2 //$$

$$\text{COF}(a_{13}) = (-1)^4 \cdot \begin{vmatrix} 3 & 4 \\ 4 & 5 \end{vmatrix} \Rightarrow -1 //$$

$$\text{COF}(a_{33}) = (-1)^6 \cdot \begin{vmatrix} 2 & 3 \\ 3 & 4 \end{vmatrix} = -1 //$$

$$\text{COF}(a_{21}) = (-1)^3 \cdot \begin{vmatrix} 3 & 4 \\ 5 & 6 \end{vmatrix} \Rightarrow -1 \cdot -2 = 2 //$$

$$\text{COF}(a_{22}) = (-1)^4 \cdot \begin{vmatrix} 2 & 4 \\ 4 & 6 \end{vmatrix} \Rightarrow -4 //$$

$$\text{COF}(a_{23}) = (-1)^5 \cdot \begin{vmatrix} 2 & 3 \\ 4 & 5 \end{vmatrix} \Rightarrow -1 \cdot -2 = 2 //$$

$$\text{Matriz dos COFATORES: } \begin{bmatrix} -1 & 2 & -1 \\ 2 & -4 & 2 \\ -1 & 2 & -1 \end{bmatrix} //$$

c) TRANSPOSTA DE A  $\Rightarrow$

$$A^T = \begin{bmatrix} 2 & 3 & 4 \\ 3 & 4 & 5 \\ 4 & 5 & 6 \end{bmatrix}, \text{ a INVERSA É DADA POR } \frac{1}{\text{DETA}} \cdot \text{Adj} A //$$

DET  $\Rightarrow$

$$\begin{array}{ccc} 2 & 3 & 4 \\ 3 & 4 & 5 \\ 4 & 5 & 6 \end{array}$$

$$\text{DET} = 48 + 60 + 60 - (54 + 50 + 64)$$

$$\text{DET} = 168 - 168 = 0 //$$

NÃO EXISTE INVERSA DE  $A^T //$

## QUESTÃO 2:

\* escalonamento

$$\textcircled{1} \quad R_2 - 1R_1 \rightarrow R_2 \quad \left| \begin{array}{ccccc} 1 & 1 & 0 & -1 & 0 \\ 0 & -1 & -1 & 2 & 2 \\ 0 & 1 & 1 & -1 & -3 \\ 1 & 1 & 0 & -2 & 1 \end{array} \right|$$

$$\textcircled{2} \quad R_4 - 1R_1 \rightarrow R_4 \quad \left| \begin{array}{ccccc} 1 & 1 & 0 & -1 & 0 \\ 0 & -1 & -1 & 2 & 2 \\ 0 & 1 & 1 & -1 & -3 \\ 0 & 0 & 0 & -1 & 1 \end{array} \right|$$

$$\textcircled{3} \quad -1R_2 \rightarrow R_2 \quad \left| \begin{array}{ccccc} 1 & 1 & 0 & -1 & 0 \\ 0 & 1 & 1 & -2 & -2 \\ 0 & 1 & 1 & -1 & -3 \\ 0 & 0 & 0 & -1 & 1 \end{array} \right|$$

$$\textcircled{4} \quad R_3 - 1R_2 \rightarrow R_3 \quad \left| \begin{array}{ccccc} 1 & 1 & 0 & -1 & 0 \\ 0 & 1 & 1 & -2 & -2 \\ 0 & 0 & 0 & 1 & -1 \\ 0 & 0 & 0 & -1 & 1 \end{array} \right|$$

$$\textcircled{5} \quad -1R_4 \rightarrow R_4 \quad \left| \begin{array}{ccccc} 1 & 1 & 0 & -1 & 0 \\ 0 & 1 & 1 & -2 & -2 \\ 0 & 0 & 0 & 1 & -1 \\ 0 & 0 & 0 & 1 & -1 \end{array} \right|$$

$$\textcircled{6} \quad R_4 - 1R_3 \rightarrow R_4 \quad \left| \begin{array}{ccccc} 1 & 1 & 0 & -1 & 0 \\ 0 & 1 & 1 & -2 & -2 \\ 0 & 0 & 0 & 1 & -1 \\ 0 & 0 & 0 & 0 & 0 \end{array} \right|$$

$$\textcircled{7} \quad R_2 + 2R_3 \rightarrow R_2 \quad \left| \begin{array}{ccccc} 1 & 1 & 0 & -1 & 0 \\ 0 & 1 & 1 & 0 & -4 \\ 0 & 0 & 0 & 1 & -1 \\ 0 & 0 & 0 & 0 & 0 \end{array} \right|$$

$$\textcircled{8} \quad R_1 + 1R_3 \rightarrow R_1 \quad \left| \begin{array}{ccccc} 1 & 1 & 0 & 0 & -1 \\ 0 & 1 & 1 & 0 & -4 \\ 0 & 0 & 0 & 1 & -1 \\ 0 & 0 & 0 & 0 & 0 \end{array} \right|$$

$$\textcircled{9} \quad R_1 - 1R_2 \rightarrow R_1 \quad \left| \begin{array}{ccccc} 1 & 0 & -1 & 0 & 3 \\ 0 & 1 & 1 & 0 & -4 \\ 0 & 0 & 0 & 1 & -1 \\ 0 & 0 & 0 & 0 & 0 \end{array} \right|$$

$\Rightarrow$  matriz em forma escada //

letra a)  $\left| \begin{array}{cccc} 1 & 0 & -1 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{array} \right|$  \* PC = 3 //

letra b)  $\left| \begin{array}{cccc} 1 & 0 & -1 & 0 & 3 \\ 0 & 1 & 1 & 0 & -4 \\ 0 & 0 & 0 & 1 & -1 \\ 0 & 0 & 0 & 0 & 0 \end{array} \right|$  \* PA = 3 //

(4-3)

letra c) sistema possível e indeterminado; grau de liberdade: 1 //  
 pois a variável  $x$  e  $y$  admitem infinitas soluções para qualquer valor de  $z$  //  
 e  $n > p$  //  
 $\hookrightarrow$  incógnitas  $\left( \begin{array}{l} x = 3 + z \\ y = -4 - z \\ w = -1 \end{array} \right)$  \* soluções //  $\Rightarrow \left( \begin{array}{l} x - z = 3 \\ y + z = -4 \end{array} \right)$  //