

# LISTA 1 - ALGEBRA LINEAR

sexta-feira, 18 de agosto de 2023 08:24

## ALGEBRA LINEAR

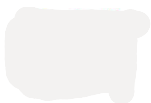
### LISTA 1

1. Dada as matrizes:

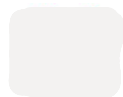
$$A = \begin{bmatrix} 3 & 0 \\ -1 & 2 \\ 1 & 1 \end{bmatrix}, B = \begin{bmatrix} 4 & -1 \\ 0 & 2 \end{bmatrix}, C = \begin{bmatrix} 1 & 4 & 2 \\ 3 & 1 & 5 \end{bmatrix}, D = \begin{bmatrix} 1 & 5 & 2 \\ -1 & 0 & 1 \\ 3 & 2 & 4 \end{bmatrix} \text{ e } E = \begin{bmatrix} 6 & 1 & 3 \\ -1 & 1 & 2 \\ 4 & 1 & 3 \end{bmatrix}$$

Calcule se possível:

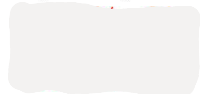
a.  $D + E$



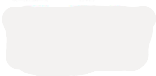
b.  $5A$



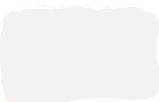
c.  $-3(D + 2E)$



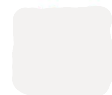
d.  $2A^T + C$



e.  $\frac{1}{2}C^T - \frac{1}{4}A$



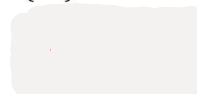
f.  $AB$



g.  $BA$



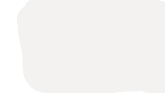
h.  $(3E)*D$



i.  $CC^T$



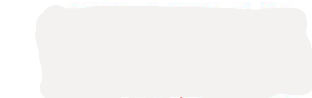
j.  $D^TE^T$



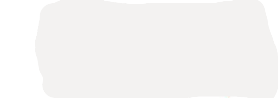
k.  $B^{-1}$



l.  $D^{-1}$



m.  $E^{-1}$



2. Determine os valores de a, b, c e d

a.  $A = \begin{bmatrix} a & 3 \\ -1 & a+b \end{bmatrix} = \begin{bmatrix} 4 & d-2c \\ d+2c & -2 \end{bmatrix}$

b.  $A = \begin{bmatrix} a-b & b+a \\ 3d+c & 2d-c \end{bmatrix} = \begin{bmatrix} 8 & 2 \\ 11 & 14 \end{bmatrix}$

3. Responda com Verdadeiro ou Falso

a. ( ) A matriz  $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$  não tem diagonal principal.

b. ( ) Uma matriz m x n tem m vetores colunas e n vetores linha.

c. ( ) Se A e B forem matrizes 2x2, então BA = AB.

d. ( ) O i-ésimo vetor linha de um produto matricial AB pode ser calculado multiplicando A pelo i-ésimo vetor linhas de B.

e. ( ) Se A e B forem matrizes quadradas de mesma ordem, então  $(AB)^T = A^T B^T$ .

4. Verifique se as matrizes abaixo são invertíveis, e se for, encontre sua inversa:

a.  $A = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 1 & 0 \\ 0 & 1 & 1 \end{bmatrix}$

b.  $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 1 \end{bmatrix}$

$\begin{bmatrix} 0 & 0 & 1 \end{bmatrix}$

d.  $A = \begin{bmatrix} -1 & 0 & 1 \\ 1 & -1 & 1 \\ -1 & 1 & -1 \end{bmatrix}$

$A = \begin{bmatrix} 2 & -3 & 5 \\ -3 & 6 & 7 \\ 5 & 7 & -8 \end{bmatrix}$

$$A = \begin{bmatrix} \tilde{-3} & \tilde{6} & \tilde{7} \\ 5 & 7 & -8 \end{bmatrix}$$

$$c. A = \begin{bmatrix} 0 & 0 & 1 \\ 1 & 1 & 0 \\ -1 & 1 & 1 \end{bmatrix}$$

5. Encontre os valores desconhecidos que tornam a matriz A simétrica

$$a. \begin{bmatrix} 4 & -3 \\ a+5 & -1 \end{bmatrix}$$

$$A^T = \begin{bmatrix} 2 & 3 & 0 \\ a-2b+2c & 5 & -2 \\ 2a+b+c & a+c & 7 \end{bmatrix}$$

$$b. A =$$

$$\begin{bmatrix} 2 & a-2b+2c & 2a+b+c \\ 3 & 5 & a+c \\ 0 & -2 & 7 \end{bmatrix}$$

6. Encontre os valores desconhecidos que tornam a matriz A invertível

$$a. A = \begin{bmatrix} 1 & x^2 & x^4 \\ 0 & x+2 & x^3 \\ 0 & 0 & x-4 \end{bmatrix}$$

$$b. A = \begin{bmatrix} x - \frac{1}{2} & 0 & 0 \\ x & x - \frac{1}{3} & 0 \\ x^2 & x^3 & \frac{1}{4} \end{bmatrix}$$

7. Seja  $A = [a_{ij}]$  uma matriz  $n \times n$ . Em cada caso, determine se A é simétrica:

$$a. a_{ij} = i^2 + j^2$$

$$c. a_{ij} = i^2 - j^2$$

$$b. a_{ij} = 2i + 2j$$

$$d. a_{ij} = 2i^2 + 2j^2$$

8. Calcule a determinante das matrizes abaixo através do método de triangulação

$$a. A = \begin{bmatrix} 3 & -7 & -2 \\ -3 & 5 & 1 \\ 6 & -4 & 0 \end{bmatrix}$$

a.  $A = \begin{bmatrix} -3 & 5 & 1 \\ 6 & -4 & 0 \end{bmatrix}$

b.  $A = \begin{bmatrix} 2 & -4 & 2 \\ -4 & 5 & 2 \\ 6 & -9 & 1 \end{bmatrix}$

c.  $A = \begin{bmatrix} 1 & 3 & 2 & 0 \\ -2 & -3 & -4 & 12 \\ 3 & 0 & 4 & -36 \\ -5 & -3 & -8 & 49 \end{bmatrix}$

d.  $A = \begin{bmatrix} 1 & 3 & 1 & 5 \\ 5 & 5 & 6 & 1 \\ -2 & -1 & -1 & -4 \\ -1 & 7 & 1 & 7 \end{bmatrix}$

e.  $A = \begin{bmatrix} 2 & 4 & -1 & 5 & -2 \\ -4 & -5 & 3 & -8 & 1 \\ 2 & -5 & -4 & 1 & 8 \\ -2 & 1 & 4 & 2 & 8 \\ -6 & 0 & 7 & -3 & 1 \end{bmatrix}$

9. Calcule a inversa das matrizes:

a.  $A = \begin{bmatrix} 2 & 5 \\ -3 & -4 \end{bmatrix}$

b.  $A = \begin{bmatrix} 6 & 4 \\ 12 & 5 \end{bmatrix}$

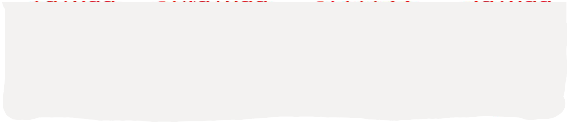
$$c. A = \begin{bmatrix} 1 & -3 & -6 \\ 0 & 4 & 3 \\ -3 & 6 & 0 \end{bmatrix}$$

$$d. A = \begin{bmatrix} 3 & 0 & 0 \\ -3 & -4 & 0 \\ 8 & 5 & -3 \end{bmatrix}$$

$$e. A = \begin{bmatrix} -1 & -3 & 0 & 1 \\ 3 & 5 & 8 & -3 \\ -2 & -6 & 3 & 2 \\ 0 & -1 & 2 & 1 \end{bmatrix}$$

$$f. A = \begin{bmatrix} 3 & 4 & 7 & 4 \\ 0 & 1 & 4 & 6 \\ 0 & 0 & 2 & 8 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$g. A = \begin{bmatrix} 4 & 0 & -3 & -7 \\ -6 & 2 & 1 & -2 \\ 7 & -5 & 0 & 1 \\ -1 & 2 & 4 & -1 \end{bmatrix}$$



h.  $A = \begin{bmatrix} 5 & 3 & 1 & 7 & 9 \\ 6 & 4 & 2 & 8 & -8 \\ 7 & 5 & 3 & 10 & 9 \\ 9 & 6 & 4 & -9 & -5 \\ 8 & 5 & 2 & 11 & 4 \end{bmatrix}$

