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 Matemática 1 - Lista de Exercícios

1) Escreva em forma de tabela a matriz A e B dadas por:

$$A = (a_{ij})_{3 \times 3}, \text{ com } a_{ij} = 3 \cdot i + j^2$$

$$B = (b_{ij})_{3 \times 3}, \text{ com } b_{ij} = -i^2 + (-j^2)$$

$$A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}_{3 \times 3}; B = \begin{bmatrix} b_{11} & b_{12} & b_{13} \\ b_{21} & b_{22} & b_{23} \\ b_{31} & b_{32} & b_{33} \end{bmatrix}_{3 \times 3}; A = \begin{bmatrix} 4 & 7 & 12 \\ 7 & 10 & 15 \\ 10 & 13 & 18 \end{bmatrix}_{3 \times 3}$$

$$a_{11} = 3 \cdot 1 + 1^2 = 3 + 1 = 4$$

$$a_{12} = 3 \cdot 1 + 2^2 = 3 + 4 = 7$$

$$a_{13} = 3 \cdot 1 + 3^2 = 3 + 9 = 12$$

$$B = \begin{bmatrix} -2 & -5 & -10 \\ -5 & -8 & -13 \\ -10 & -13 & -18 \end{bmatrix}_{3 \times 3}$$

$$a_{21} = 3 \cdot 2 + 1^2 = 6 + 1 = 7$$

$$a_{22} = 3 \cdot 2 + 2^2 = 6 + 4 = 10$$

$$a_{23} = 3 \cdot 2 + 3^2 = 6 + 9 = 15$$

$$a_{31} = 3 \cdot 3 + 1^2 = 9 + 1 = 10$$

$$a_{32} = 3 \cdot 3 + 2^2 = 9 + 4 = 13$$

$$a_{33} = 3 \cdot 3 + 3^2 = 9 + 9 = 18$$

$$b_{11} = -1^2 + (-1^2) = -1 - 1 = -2$$

$$b_{12} = -1^2 + (-2^2) = -1 - 4 = -5$$

$$b_{13} = -1^2 + (-3^2) = -1 - 9 = -10$$

$$b_{21} = -2^2 + (-1^2) = -4 - 1 = -5$$

$$b_{22} = -2^2 + (-2^2) = -4 - 4 = -8$$

$$b_{23} = -2^2 + (-3^2) = -4 - 9 = -13$$

$$b_{31} = -3^2 + (-1^2) = -9 - 1 = -10$$

$$b_{32} = -3^2 + (-2^2) = -9 - 4 = -13$$

$$b_{33} = -3^2 + (-3^2) = -9 - 9 = -18$$

→ Determinar:

$$1.1) A + B \quad A + B = C$$

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$$\begin{bmatrix} 4 & 7 & 12 \\ 7 & 10 & 15 \\ 10 & 13 & 18 \end{bmatrix} + \begin{bmatrix} -2 & -5 & -10 \\ -5 & -8 & -13 \\ -10 & -13 & -18 \end{bmatrix} = \begin{bmatrix} (4-2) & (7-5) & (12-10) \\ (7-5) & (10-8) & (15-13) \\ (10-10) & (13-13) & (18-18) \end{bmatrix}$$

$$= \begin{bmatrix} 2 & 2 & 2 \\ 2 & 2 & 2 \\ 0 & 0 & 0 \end{bmatrix}, \text{ logo, } C = \begin{bmatrix} 2 & 2 & 2 \\ 2 & 2 & 2 \\ 0 & 0 & 0 \end{bmatrix}_{3 \times 3}$$

1.2) $B + A^t \quad B + A^t = C$

$$A = \begin{bmatrix} 4 & 7 & 12 \\ 7 & 10 & 15 \\ 10 & 13 & 18 \end{bmatrix}; A^t = \begin{bmatrix} 4 & 7 & 10 \\ 7 & 10 & 13 \\ 12 & 15 & 18 \end{bmatrix}_{3 \times 3}$$

$$B = \begin{bmatrix} -2 & -5 & -10 \\ -5 & -8 & -13 \\ -10 & -13 & -18 \end{bmatrix} + \begin{bmatrix} 4 & 7 & 10 \\ 7 & 10 & 13 \\ 12 & 15 & 18 \end{bmatrix} = \begin{bmatrix} (-2+4) & (-5+7) & (-10+10) \\ (-5+7) & (-8+10) & (-13+13) \\ (-10+12) & (-13+15) & (-18+18) \end{bmatrix}$$

$$= \begin{bmatrix} 2 & 2 & 0 \\ 2 & 2 & 0 \\ 2 & 2 & 0 \end{bmatrix}, \text{ logo, } C = \begin{bmatrix} 2 & 2 & 0 \\ 2 & 2 & 0 \\ 2 & 2 & 0 \end{bmatrix}_{3 \times 3}$$

2) Dadas as matrizes $A = \begin{bmatrix} 1 & -8 \\ 4 & 11 \\ -15 & 7 \end{bmatrix}_{3 \times 2}$ e $B = \begin{bmatrix} 7 & 10 \\ -14 & 9 \\ 3 & 0 \end{bmatrix}_{3 \times 2}$,
determinar:

2.1) $A + B = C$

$$\begin{bmatrix} 1 & -8 \\ 4 & 11 \\ -15 & 7 \end{bmatrix} + \begin{bmatrix} 7 & 10 \\ -14 & 9 \\ 3 & 0 \end{bmatrix} = \begin{bmatrix} (1+7) & (-8+10) \\ (4-14) & (11+9) \\ (-15+3) & (7+0) \end{bmatrix} = \begin{bmatrix} 8 & 2 \\ -10 & 20 \\ -12 & 7 \end{bmatrix}_{3 \times 2}$$

2.2) $B^t + A \quad B^t + A = C$

logo, $C = \begin{bmatrix} 8 & 2 \\ -10 & 20 \\ -12 & 7 \end{bmatrix}_{3 \times 2}$

$$B = \begin{bmatrix} 7 & 10 \\ -14 & 9 \\ 3 & 0 \end{bmatrix}_{3 \times 2}; B^t = \begin{bmatrix} 7 & -14 & 3 \\ 10 & 9 & 0 \end{bmatrix}_{2 \times 3}; A = \begin{bmatrix} 1 & -8 \\ 4 & 11 \\ -15 & 7 \end{bmatrix}_{3 \times 2}$$

Conforme descrito na observação, "A soma de matrizes existe se, e somente se, forem da mesma ordem (ou dimensão)". No caso, A possui 3 linhas e 2 colunas, porém B^t possui 2 linhas e 3 colunas, logo, a soma não pode ser efetuada.

3) Dadas as matrizes de ordem 3×3 , determinar X, Y, a e b, tal que:

$$\begin{bmatrix} 3 & 2 & x+3 \\ 2y-7 & 7a-5 & 2 \\ 5 & 1 & 4b-1 \end{bmatrix} + \begin{bmatrix} 5 & 3 & 3x \\ -7y & 2a & -7 \\ 5 & 0 & 11b \end{bmatrix} = \begin{bmatrix} 8 & 5 & 19 \\ 10 & 3 & -5 \\ 10 & 1 & 9 \end{bmatrix}$$

$$2y-7+(-7y)=10 \quad x+3+3x=19 \quad 7a-5+2a=3 \quad 13$$

$$2y-7-7y=10$$

$$x+3x=19-3$$

$$7a+2a=3+5$$

$$2y-7y=10+7$$

$$4x=16$$

$$9a=8$$

$$-5y=17 \quad \cdot (-1)$$

$$x=\frac{16}{4}$$

$$a=\frac{8}{9}$$

$$5y=-17$$

$$y=-\frac{17}{5}$$

$$x=4$$

$$4b-1+11b=9$$

$$4b+11b=9+1$$

$$15b=10$$

$$b=\frac{10}{15} : 5$$

$$b=\frac{2}{3}$$

$$\begin{bmatrix} \text{Gabriel} \\ \text{Goncalves} \\ \text{Oliveira} \end{bmatrix} + \begin{bmatrix} 1^\circ \text{ADS} \\ 11 \\ 11 \end{bmatrix} = \begin{bmatrix} 2111550021 \end{bmatrix}$$