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Matemática 1 - Lista de Exercícios

1) Escreva em forma de tabela a matriz A e B dadas por:
$A=(a_{ij})_{3\times3}$, com $a_{ij}=3.i+j^2$
$B=(b_{ij})_{3\times3}$, com $b_{ij}=-i^2+(-j^2)$

$$A=\begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}_{3\times3}; \quad B=\begin{bmatrix} b_{11} & b_{12} & b_{13} \\ b_{21} & b_{22} & b_{23} \\ b_{31} & b_{32} & b_{33} \end{bmatrix}_{3\times3}; \quad A=\begin{bmatrix} 4 & 7 & 12 \\ 7 & 10 & 15 \\ 10 & 13 & 18 \end{bmatrix}_{3\times3}$$

$a_{11}=3.1+1^2=3+1=4$
$a_{12}=3.1+2^2=3+4=7$
$a_{13}=3.1+3^2=3+9=12$

$$B=\begin{bmatrix} -2 & -5 & -10 \\ -5 & -8 & -13 \\ -10 & -13 & -18 \end{bmatrix}_{3\times3}$$

$a_{21}=3.2+1^2=6+1=7$
$a_{22}=3.2+2^2=6+4=10$
$a_{23}=3.2+3^2=6+9=15$

$a_{31}=3.3+1^2=9+1=10$
$a_{32}=3.3+2^2=9+4=13$
$a_{33}=3.3+3^2=9+9=18$

$b_{11}=-1^2+(-1^2)=-1-1=-2$
$b_{12}=-1^2+(-2^2)=-1-4=-5$
$b_{13}=-1^2+(-3^2)=-1-9=-10$

$b_{21}=-2^2+(-1^2)=-4-1=-5$
$b_{22}=-2^2+(-2^2)=-4-4=-8$
$b_{23}=-2^2+(-3^2)=-4-9=-13$

$b_{31}=-3^2+(-1^2)=-9-1=-10$
$b_{32}=-3^2+(-2^2)=-9-4=-13$
$b_{33}=-3^2+(-3^2)=-9-9=-18$

→ Determinar:

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

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

$$= \begin{bmatrix} 2 & 2 & 2 \\ 2 & 2 & 2 \\ 0 & 0 & 0 \end{bmatrix}, \text{ logo, } C = \begin{bmatrix} 2 & 2 & 2 \\ 2 & 2 & 2 \\ 0 & 0 & 0 \end{bmatrix}_{3\times3}$$

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

$$A = \begin{bmatrix} 4 & 7 & 12 \\ 7 & 10 & 15 \\ 10 & 13 & 18 \end{bmatrix}; A^t = \begin{bmatrix} 4 & 7 & 10 \\ 7 & 10 & 13 \\ 12 & 15 & 18 \end{bmatrix}_{3\times3}$$

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

$$= \begin{bmatrix} 2 & 2 & 0 \\ 2 & 2 & 0 \\ 2 & 2 & 0 \end{bmatrix}, \text{ logo, } C = \begin{bmatrix} 2 & 2 & 0 \\ 2 & 2 & 0 \\ 2 & 2 & 0 \end{bmatrix}_{3\times3}$$

2) Dadas as matrizes $A = \begin{bmatrix} 1 & -8 \\ 4 & 11 \\ -15 & 7 \end{bmatrix}_{3\times2}$ e $B = \begin{bmatrix} 7 & 10 \\ -14 & 9 \\ 3 & 0 \end{bmatrix}_{3\times3}$, determinar:

2.1) $A + B = C$

$$\begin{bmatrix} 1 & -8 \\ 4 & 11 \\ -15 & 7 \end{bmatrix} + \begin{bmatrix} 7 & 10 \\ -14 & 9 \\ 3 & 0 \end{bmatrix} = \begin{bmatrix} (1+7) & (-8+10) \\ (4-14) & (11+9) \\ (-15+3) & (7+0) \end{bmatrix} = \begin{bmatrix} 8 & 2 \\ -10 & 20 \\ -12 & 7 \end{bmatrix}_{3\times2}$$

2.2) $B^t + A$ $B^t + A = C$ logo, $C = \begin{bmatrix} 8 & 2 \\ -10 & 20 \\ -12 & 7 \end{bmatrix}_{3\times2}$

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$B=\begin{bmatrix}7 & 10\\ -14 & 9\\ 3 & 0\end{bmatrix}_{3\times2}$; $B^t=\begin{bmatrix}7 & -14 & 3\\ 10 & 9 & 0\end{bmatrix}_{2\times3}$; $A=\begin{bmatrix}1 & -8\\ 4 & 11\\ -15 & 7\end{bmatrix}_{3\times2}$

B^t 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:

$$\begin{bmatrix}3 & 2 & x+3\\ 2y-7 & 7a-5 & 2\\ 5 & 1 & 46-1\end{bmatrix}+\begin{bmatrix}5 & 3 & 3x\\ -7y & 2a & -7\\ 5 & 0 & 116\end{bmatrix}=\begin{bmatrix}8 & 5 & 19\\ 10 & 3 & -5\\ 10 & 1 & 9\end{bmatrix}$$

$2y-7+(-7y)=10$
$2y-7-7y=10$
$2y-7y=10+7$
$-5y=17 \cdot(-1)$
$5y=-17$
$y=\frac{-17}{5}$

$x+3+3x=19$
$x+3x=19-3$
$4x=16$
$x=\frac{16}{4}$
$x=4$

$7a-5+2a=3$
$7a+2a=3+5$
$9a=8$
$a=\frac{8}{9}$

$46-1+116=9$
$46+116=9+1$
$156=10$
$6=\frac{10}{15}:5$
$6=\frac{2}{3}$

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