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## Operações com matrizes

1) Dadas as matrizes abaixo, indique as operações que podem ser efetuadas.

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

$$B = \begin{bmatrix} 2 & 1 \\ -1 & 4 \end{bmatrix}$$

$$C = \begin{bmatrix} \frac{1}{2} & 2 & 1 \\ 0 & -1 & 5 \end{bmatrix}$$

$$D = [-1 \ 0 \ 2]$$

$$E = \begin{bmatrix} 3 \\ 1 \\ 2 \end{bmatrix}$$

$$F = \begin{bmatrix} 2 & 3 \\ 5 & 1 \\ 0 & -2 \end{bmatrix}$$

a)  $B - A$

1)  $B - A$

2	1
-1	4

1	-2
3	0

$$= \begin{bmatrix} 1 & 3 \\ -4 & 4 \end{bmatrix}$$

b)  $C + F$

b)  $C + F$

$\frac{1}{2}$	2	1
0	-1	5

2	3
5	1
0	-2

= não é possível

c)  $E + D$

c)  $E + D$

3
1
2

-1	0	2
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= não é possível

d)  $A + 2B$

d)  $A + 2B$

2	1
-1	4

2	1
3	0

2	-4
6	0

$$= \begin{bmatrix} 4 & -3 \\ 5 & 4 \end{bmatrix}$$

2) Dadas as matrizes

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

$$B = \begin{bmatrix} -\frac{3}{2} & 0 & 4 \\ 2 & 6 & -3 \end{bmatrix}$$

Calcule  $C = A - B$ .

2.  $C = A - B$

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

3) Dadas as matrizes

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

$$B = \begin{bmatrix} 2 & 1 \\ -1 & 4 \end{bmatrix}$$

Calcule  $C = 2A + B^T$ .

3.  $C = 2A + B^T$

$$\begin{bmatrix} 1 & -2 \\ 3 & 0 \end{bmatrix} \rightarrow 2A \begin{bmatrix} 2 & -4 \\ 6 & 0 \end{bmatrix} \quad B^T \begin{bmatrix} 2 & -1 \\ 1 & 4 \end{bmatrix} = \begin{bmatrix} 4 & -5 \\ 7 & 4 \end{bmatrix}$$

4) Dadas as matrizes

$$A = [1 \quad -2 \quad 3 \quad 4]$$

$$B = \begin{bmatrix} 8 \\ 3 \\ -5 \\ 2 \end{bmatrix}$$

Calcule  $C = AB$

4.  $A = [1 \quad -2 \quad 3 \quad 4]$   $B = \begin{bmatrix} 8 \\ 3 \\ -5 \\ 2 \end{bmatrix}$

$$8 \cdot 1 + (-2) \cdot 3 + 3 \cdot (-5) + 4 \cdot 2 = -5$$

5) Dadas as matrizes

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

$$X = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$$

Calcule  $C = AX$

5.  $A = \begin{bmatrix} 2 & 1 & 4 \\ 5 & -3 & 2 \\ -1 & 6 & 3 \end{bmatrix}$   $X = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$   $C = AX$

$$C = \begin{bmatrix} 2x + 1y + 4z \\ 5x - 3y + 2z \\ -1x + 6y + 3z \end{bmatrix}$$

6) Dadas as matrizes abaixo, indique as operações que não podem ser efetuadas.

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

$$B = \begin{bmatrix} 2 & 1 \\ -1 & 4 \end{bmatrix}$$

$$C = \begin{bmatrix} 1 & 2 & 1 \\ 2 & -1 & 5 \\ 0 & -1 & 5 \end{bmatrix}$$

$$D = \begin{bmatrix} -1 & 0 & 2 \end{bmatrix}$$

$$E = \begin{bmatrix} 3 \\ 1 \\ 2 \end{bmatrix}$$

$$F = \begin{bmatrix} 2 & 3 \\ 5 & 1 \\ 0 & -2 \end{bmatrix}$$

a) CF

6. a) C.F.  $C = \begin{bmatrix} 1/2 & 2 & 1 \\ 0 & -1 & 5 \end{bmatrix}$   $F = \begin{bmatrix} 2 & 3 \\ 5 & 1 \\ 0 & -2 \end{bmatrix}$

$$\begin{bmatrix} 11 & 1,5 \\ -5 & -11 \end{bmatrix}$$

$1/2 \cdot 2 + 2 \cdot 5 + 1 \cdot 0 = 11$   $1/2 \cdot 3 + 2 \cdot 1 + 1 \cdot -2 = 1,5$   
 $0 \cdot 2 + (-1) \cdot 5 + 5 \cdot 0 = -5$   $0 \cdot 8 + (-1) \cdot 1 + 5 \cdot (-2) = -11$

b) AF

6. b) A.F.  $A = \begin{bmatrix} 1 & -2 \\ 3 & 0 \end{bmatrix}$   $F = \begin{bmatrix} 2 & 3 \\ 5 & 1 \\ 0 & -2 \end{bmatrix}$

não é possível a multiplicação

c)  $C^T B$

$C, C^T B \quad C \begin{bmatrix} 1/2 & 2 & 1 \\ 0 & -1 & 5 \end{bmatrix} \quad B \begin{bmatrix} 2 & 1 \\ -1 & 4 \end{bmatrix}$   
 $C^T \begin{bmatrix} 1/2 & 0 \\ 2 & -1 \\ 1 & 5 \end{bmatrix} \xrightarrow{2 \times 2} C^T B \begin{bmatrix} 1/2 \cdot 2 + 0 \cdot (-1) & 1/2 \cdot 1 + 0 \cdot 4 \\ 2 \cdot 2 + (-1) \cdot (-1) & 2 \cdot 1 + (-1) \cdot 4 \\ 1 \cdot 2 + 5 \cdot (-1) & 1 \cdot 1 + 5 \cdot 4 \end{bmatrix} \xrightarrow{3 \times 2} \begin{bmatrix} 1 & 0.5 \\ 5 & -2 \\ 3 & 21 \end{bmatrix} \xrightarrow{3 \times 2}$

d) DE

$$d. D \cdot E \quad D = \begin{bmatrix} -1 & 0 & 2 \end{bmatrix} \quad E = \begin{bmatrix} 3 \\ 1 \\ 2 \end{bmatrix}$$

$$\textcircled{1} \cdot 3$$

$$-1 \cdot 3 + 0 \cdot 1 + 2 \cdot 2 = 1$$

$$\textcircled{3 \times 1}$$

$$(1)$$

7) Dadas as matrizes

$$D = \begin{bmatrix} 4 & 0 & 1 \\ -2 & 3 & 0 \end{bmatrix} \qquad G = \begin{bmatrix} 2 & 3 \\ 5 & 1 \\ 0 & -2 \end{bmatrix}$$

Calcule  $M = DG$

$$G = \begin{bmatrix} 2 & 3 \\ 5 & 1 \\ 0 & -2 \end{bmatrix}$$

Calcule  $M = DG$

7, Calcule  $M = DG$ .

$$D = \begin{bmatrix} 4 & 0 & 1 \\ -2 & 3 & 0 \end{bmatrix} \quad 6 \begin{bmatrix} 2 & 3 \\ 5 & 1 \\ 0 & -2 \end{bmatrix} \quad M = \begin{bmatrix} 8 & 10 \\ 11 & -3 \end{bmatrix}$$

$\begin{matrix} 2 \times 3 \\ 3 \times 2 \end{matrix}$

$$\begin{aligned} 4 \cdot 2 + 0 \cdot 5 + 1 \cdot 0 &= 8 & 4 \cdot 3 + 0 \cdot 1 + 1 \cdot (-2) &= 10 \\ -2 \cdot 2 + 3 \cdot 5 + 0 \cdot 0 &= 11 & -2 \cdot 3 + 3 \cdot 1 + 0 \cdot (-2) &= -3 \end{aligned}$$

$$D = \begin{bmatrix} 4 & 0 & 1 \\ -2 & 3 & 0 \end{bmatrix} \quad 6 \begin{bmatrix} 2 & 3 \\ 5 & 1 \\ 0 & -2 \end{bmatrix} \quad M = \begin{pmatrix} 8 & 10 \\ 11 & -3 \end{pmatrix}$$

$$\begin{array}{rcl} 4.2 + 0.5 + 1.0 & = & 8 \\ -2.2 + 3.5 + 0.0 & = & 11 \end{array} \quad \begin{array}{rcl} 4.8 + 0.1 + 1.(-2) & = & 50 \\ -2.8 + 3.2 + 0.(-2) & = & -3 \end{array}$$

8) Dadas as matrizes

$$A = \begin{bmatrix} 6 & 5 \\ 1 & 0 \end{bmatrix}$$

$$B = \begin{bmatrix} 2 & 4 \\ 1 & 3 \end{bmatrix}$$

a)  $A + 2B$

a)  $A + 2B$

$$\begin{array}{c} A \begin{bmatrix} 6 & 5 \\ 1 & 0 \end{bmatrix} + 2B \begin{bmatrix} 4 & 8 \\ 2 & 6 \end{bmatrix} = \begin{bmatrix} 10 & 13 \\ 3 & 6 \end{bmatrix} \end{array}$$

b)  $2A - B$

b)  $2A - B$

$$\begin{array}{c} 2A \begin{bmatrix} 12 & 10 \\ 2 & 0 \end{bmatrix} - B \begin{bmatrix} 2 & 4 \\ 1 & 3 \end{bmatrix} = \begin{bmatrix} 10 & 6 \\ 1 & -3 \end{bmatrix} \end{array}$$

c)  $AB$

c)  $AB$

$$\begin{array}{c} A \begin{bmatrix} 6 & 5 \\ 1 & 0 \end{bmatrix} \begin{matrix} \downarrow \downarrow \\ B \begin{bmatrix} 2 & 4 \\ 1 & 3 \end{bmatrix} \end{matrix} \begin{matrix} \rightarrow \\ \begin{bmatrix} 6 \cdot 2 + 5 \cdot 1 & 6 \cdot 4 + 5 \cdot 3 \\ 1 \cdot 2 + 0 \cdot 1 & 1 \cdot 4 + 0 \cdot 3 \end{bmatrix} \end{matrix} = \begin{bmatrix} 17 & 39 \\ 2 & 4 \end{bmatrix} \end{array}$$

(2x2)      (2x2)

d)  $BA$

d)  $BA$

$$\begin{array}{c} B \begin{bmatrix} 2 & 4 \\ 1 & 3 \end{bmatrix} \begin{matrix} \downarrow \downarrow \\ A \begin{bmatrix} 6 & 5 \\ 1 & 0 \end{bmatrix} \end{matrix} \begin{matrix} \rightarrow \\ \begin{bmatrix} 2 \cdot 6 + 4 \cdot 1 & 2 \cdot 5 + 4 \cdot 0 \\ 1 \cdot 6 + 3 \cdot 1 & 1 \cdot 5 + 3 \cdot 0 \end{bmatrix} \end{matrix} = \begin{bmatrix} 16 & 10 \\ 9 & 5 \end{bmatrix} \end{array}$$

(2x2)      (2x2)