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Lista de Exercícios - Matemática 1 - Aula 13

1) Dadas as matrizes  $A = \begin{bmatrix} 7/8 & 4 \\ 3 & -10 \end{bmatrix}_{2 \times 2}$ ,  $B = \begin{bmatrix} 2 & -5/3 \\ 3 & -1 \end{bmatrix}_{2 \times 2}$  e  $C = \begin{bmatrix} 1/3 & 6 \\ 8 & -1 \end{bmatrix}_{2 \times 2}$ , determine:

1.1)  $B^t - 1/13 \cdot (A+C) \Rightarrow B = \begin{bmatrix} 2 & -5/3 \\ 3 & -1 \end{bmatrix}$ ,  $B^t = \begin{bmatrix} 2 & 3 \\ -5/3 & -1 \end{bmatrix}_{2 \times 2}$

$= \begin{bmatrix} 2 & 3 \\ -5/3 & -1 \end{bmatrix} - \frac{1}{13} \cdot \left[ \begin{bmatrix} 7/8 & 4 \\ 3 & -10 \end{bmatrix} + \begin{bmatrix} 1/3 & 6 \\ 8 & -1 \end{bmatrix} \right]$   $\begin{matrix} 7/8 + 1/3 & 4+6 \\ 3+8 & -10-1 \end{matrix}$

$= \begin{bmatrix} 2 & 3 \\ -5/3 & -1 \end{bmatrix} - \frac{1}{13} \cdot \begin{bmatrix} (21/24 + 8/24) & (4+6) \\ (3+8) & (-10+(-1)) \end{bmatrix}$   $\begin{matrix} 8, 3 & 2 \\ 4, 3 & 2 \\ 2, 3 & 2 \end{matrix}$

$= \begin{bmatrix} 2 & 3 \\ -5/3 & -1 \end{bmatrix} - \frac{1}{13} \cdot \begin{bmatrix} 29/24 & 10 \\ 11 & -11 \end{bmatrix}$   $\begin{matrix} 1, 3 & 3 \\ 1, 1 & 24 \end{matrix}$

$= \begin{bmatrix} 2 & 3 \\ -5/3 & -1 \end{bmatrix} + \begin{bmatrix} (29/24 \cdot (-1/13)) & (10 \cdot (-1/13)) \\ (11 \cdot (-1/13)) & (-11 \cdot (-1/13)) \end{bmatrix} = \begin{bmatrix} 2 & 3 \\ -5/3 & -1 \end{bmatrix} \cdot \begin{bmatrix} -29/312 & -10/13 \\ -11/13 & 11/13 \end{bmatrix}$

$= \begin{bmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{bmatrix} \cdot \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} = \begin{bmatrix} (b_{11} \cdot a_{11} + b_{12} \cdot a_{21}) & (b_{11} \cdot a_{12} + b_{12} \cdot a_{22}) \\ (b_{21} \cdot a_{11} + b_{22} \cdot a_{21}) & (b_{21} \cdot a_{12} + b_{22} \cdot a_{22}) \end{bmatrix}$

$= \begin{bmatrix} 2 \cdot (-29/312) + 3 \cdot (-11/13) & 2 \cdot (-10/13) + 3 \cdot 11/13 \\ -5/3 \cdot (-29/312) + (-1) \cdot (-11/13) & -5/3 \cdot (-10/13) + (-1) \cdot 11/13 \end{bmatrix}$

$= \begin{bmatrix} (-58/624 - 33/13) & (-20/13 + 33/13) \\ (145/936 + 11/13) & (50/39 - 11/13) \end{bmatrix} = \begin{bmatrix} -58/624 & 13/13 \\ 145/936 & 17/39 \end{bmatrix}$

$= \begin{bmatrix} 29/156 - 33/13 & 13/13 \\ (145/936 - 11/13) & (50/39 - 11/13) \end{bmatrix} = \begin{bmatrix} (29/156 - 33/13) & 1 \\ (145/936 - 11/13) & 17/39 \end{bmatrix}$



$$\begin{array}{r|l}
 156, 13 & 2, 4 \\
 78, 13 & 2 \\
 39, 13 & 3, 12 \\
 13, 13 & 13 \\
 1, 1 & 156
 \end{array}
 \quad
 \begin{array}{r|l}
 936, 13 & 2 \\
 468, 13 & 2, 4 \\
 234, 13 & 2, 8 \\
 117, 13 & 3, 24 \\
 39, 13 & 3, 72 \\
 13, 13 & 13 \\
 1, 1 & 936
 \end{array}$$

$$\rightarrow = \begin{bmatrix} -367/156 & 1 \\ -647/936 & 57/39 \end{bmatrix}_{2 \times 2}$$

$$= \begin{bmatrix} (29/156 - 33/13) (1) \\ (145/936 - 11/13) (57/39) \end{bmatrix} = \begin{bmatrix} (29/156 - 396/156) (1) \\ (145/936 - 792/936) (57/39) \end{bmatrix}$$



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$$J.2) A \times B = \begin{bmatrix} 7/8 & 4 \\ 3 & -10 \end{bmatrix}_{2 \times 2} \cdot \begin{bmatrix} 2 & -5/3 \\ 3 & -1 \end{bmatrix}_{2 \times 2}$$

$$= \begin{bmatrix} (a_{11} \cdot b_{11} + a_{12} \cdot b_{21}) & (a_{11} \cdot b_{12} + a_{12} \cdot b_{22}) \\ (a_{21} \cdot b_{11} + a_{22} \cdot b_{21}) & (a_{21} \cdot b_{12} + a_{22} \cdot b_{22}) \end{bmatrix}_{2 \times 2}$$

$$= \begin{bmatrix} (7/8 \cdot 2 + 4 \cdot 3) & (7/8 \cdot (-5/3) + 4 \cdot (-1)) \\ (3 \cdot 2 + (-10) \cdot 3) & (3 \cdot (-5/3) + (-10) \cdot (-1)) \end{bmatrix}$$

$$= \begin{bmatrix} (7/4 + 12) & (-35/24 - 4) \\ (6 - 30) & (-5/1 + 10) \end{bmatrix} = \begin{bmatrix} 7/4 + 48/4 & (-35/24 - 96/24) \\ -24 & 5 \end{bmatrix}$$

$$= \begin{bmatrix} (7/4 + 48/4) & (-35/24 - 96/24) \\ -24 & 5 \end{bmatrix} = \begin{bmatrix} 55/4 & -131/24 \\ -24 & 5 \end{bmatrix}_{2 \times 2}$$

$$J.3) (A - C) \times (3B + A) = \left[ \begin{bmatrix} 7/8 & 4 \\ 3 & -10 \end{bmatrix} - \begin{bmatrix} 1/3 & 6 \\ 8 & -1 \end{bmatrix} \right] \cdot \begin{bmatrix} 2 \cdot 3 & -5/3 \cdot 3 \\ 3 \cdot 3 & -1 \cdot 3 \end{bmatrix}$$

$$\begin{bmatrix} 2 \cdot 3 & (-5/3) \cdot 3 \\ 3 \cdot 3 & -1 \cdot 3 \end{bmatrix} + \begin{bmatrix} 7/8 & 4 \\ 3 & -10 \end{bmatrix}$$

$$= \begin{bmatrix} (21/24 - 8/24) & (4 - 6) \\ (3 - 8) & (-10 + 1) \end{bmatrix} \cdot \begin{bmatrix} 6 & -5/1 \\ 9 & -3 \end{bmatrix} + \begin{bmatrix} 7/8 & 4 \\ 3 & -10 \end{bmatrix}$$

$$= \begin{bmatrix} 13/24 & -2 \\ -5 & -9 \end{bmatrix} \cdot \begin{bmatrix} 48/8 + 7/8 & (-5 + 4) \\ (9 + 3) & (-3 - 10) \end{bmatrix} = \begin{bmatrix} 13/24 & -2 \\ -5 & -9 \end{bmatrix} \cdot \begin{bmatrix} 55/8 & -1 \\ 12 & -13 \end{bmatrix}$$

$$= \begin{bmatrix} (a_{11} \cdot b_{11} + a_{12} \cdot b_{21}) & (a_{11} \cdot b_{12} + a_{12} \cdot b_{22}) \\ (a_{21} \cdot b_{11} + a_{22} \cdot b_{21}) & (a_{21} \cdot b_{12} + a_{22} \cdot b_{22}) \end{bmatrix}$$

$$= \begin{bmatrix} (13/24 \cdot 55/8 + (-2) \cdot 12) & (13/24 \cdot (-1) + (-2) \cdot (-13)) \\ (-5 \cdot (55/8) + (-9) \cdot 12) & (-5 \cdot (-1) + (-9) \cdot (-13)) \end{bmatrix}$$



$$= \begin{bmatrix} 715/192 - 24 & -13/24 + 26 \\ -275/8 - 108 & 5 + 117 \end{bmatrix}$$

$$= \begin{bmatrix} 715/192 - 4608/192 & -13/24 + 624/24 \\ -275/8 - 864/8 & 122 \end{bmatrix}$$

$$= \begin{bmatrix} -3893/192 & 611/24 \\ -1139/8 & 122 \end{bmatrix}_{2 \times 2}$$

2) Determinar  $x, y, a$  e  $b$  tal que:

$$\begin{bmatrix} 13x & -7/11 \\ 5 & 2b \end{bmatrix}_{2 \times 2} \cdot \begin{bmatrix} -5/6 & -5a \\ 3y & 9/4 \end{bmatrix}_{2 \times 2} = \begin{bmatrix} -2x & 3/5 \\ 40y & -23b \end{bmatrix}_{2 \times 2}$$

$$\begin{bmatrix} (a_{11} \cdot b_{11} + a_{12} \cdot b_{21}) & (a_{11} \cdot b_{12} + a_{12} \cdot b_{22}) \\ (a_{21} \cdot b_{11} + a_{22} \cdot b_{21}) & (a_{21} \cdot b_{12} + a_{22} \cdot b_{22}) \end{bmatrix} = \begin{bmatrix} c_{11} & c_{12} \\ c_{21} & c_{22} \end{bmatrix}_{2 \times 2}$$

$$= \begin{bmatrix} (13x \cdot (-5/6) + (-7/11) \cdot 3y) & (13x \cdot (-5a) + (-7/11) \cdot 9/4) \\ (5 \cdot (-5/6) + 2b \cdot 3y) & (5 \cdot (-5a) + 2b \cdot 9/4) \end{bmatrix} = \begin{bmatrix} -2x & 3/5 \\ 40y & -23b \end{bmatrix}$$

$$= \begin{bmatrix} (-65x/6 + (-21y/11)) & (-65x/6 + (-63/44)) \\ (-25/6 + 6by) & (-25a + 18b/4) \end{bmatrix} = \begin{bmatrix} -2x & 3/5 \\ 40y & -23b \end{bmatrix}$$

$$\begin{cases} -65x/6 - 21y/11 = -2x \\ -25/6 + 6by = 40y \end{cases}$$

\* Refiz esse exercício ao final da lista 😊



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3) A solução do sistema  $\begin{cases} (a-2)x + by = 1 \\ (a+2)x + 2by = 5 \end{cases}$  e  $x = -7$  e  $y = 5$ . Determine os valores de  $a$  e  $b$ .

$$\begin{cases} (a-2) \cdot (-7) + b \cdot 5 = 1 \\ (a+2) \cdot (-7) + 2b \cdot 5 = 5 \end{cases}$$

$$5b = 32$$

$$b = \frac{32}{5}$$

$$\begin{cases} -7a + 14 + 5b = 1 \\ -7a - 14 + 10b = 5 \end{cases}$$

$$\begin{cases} -7a + 5b = -13 \quad \cdot (-2) \\ -7a + 10b = +19 \end{cases}$$

$$\begin{cases} -7a + 5b = 1 - 14 \\ -7a + 10b = 5 + 14 \end{cases}$$

$$\begin{cases} 14a - 10b = 26 \\ -7a + 10b = 19 \end{cases} +$$

$$\begin{cases} -7a + 5b = -13 \quad \cdot (-1) \\ -7a + 10b = +19 \end{cases}$$

$$7a + 0 = 45$$

$$\begin{cases} 7a - 5b = 13 \\ -7a + 10b = 19 \end{cases} +$$

$$a = \frac{45}{7}$$

$$0 + 5b = 32$$

$$(a, b) = \left( \frac{45}{7}, \frac{32}{5} \right)$$

2) Determinar  $x, y, a$  e  $b$  tal que:

$$\begin{bmatrix} 13 & -7/11 \\ 5 & 2 \end{bmatrix}_{2 \times 2} \cdot \begin{bmatrix} 5/6x & -5a \\ 3y & 9/4b \end{bmatrix}_{2 \times 2} = \begin{bmatrix} -2 & 3/5 \\ 40 & -23 \end{bmatrix}_{2 \times 2}$$

$$\begin{bmatrix} (a_{11} \cdot b_{11} + a_{12} \cdot b_{21}) & (a_{11} \cdot b_{12} + a_{12} \cdot b_{22}) \\ (a_{21} \cdot b_{11} + a_{22} \cdot b_{21}) & (a_{21} \cdot b_{12} + a_{22} \cdot b_{22}) \end{bmatrix} = \begin{bmatrix} c_{11} & c_{12} \\ c_{21} & c_{22} \end{bmatrix}_{2 \times 2}$$

$$= \begin{bmatrix} (13 \cdot (5/6x) + (-7/11) \cdot 3y) & (13 \cdot (-5a) + (-7/11) \cdot 9/4b) \\ (5 \cdot (5/6x) + 2 \cdot 3y) & (5 \cdot (-5a) + 2 \cdot (9/4b)) \end{bmatrix} = \begin{bmatrix} -2 & 3/5 \\ 40 & -23 \end{bmatrix}$$



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$$= \begin{bmatrix} (65x/6 + (-25y/11)) & (-65a + (-63b/44)) \\ (25x/6 + 6y) & (-25a + 18b/4) \end{bmatrix} = \begin{bmatrix} -2 & 3/5 \\ 40 & -23 \end{bmatrix}$$

$$\begin{cases} 65x/6 - 25y/11 = -2 & -25/6 \\ 25x/6 + 6y = 40 & 65/6 \end{cases}$$

$$\begin{cases} 65x/6 \cdot (-25/6) - 25y/11 \cdot (-25/6) = -2 \cdot (-25/6) \\ 25x/6 \cdot (65/6) + 6y \cdot (65/6) = 40 \cdot (65/6) \end{cases}$$

$$\begin{cases} -1625x + 175y/22 = 25/3 \\ +1625x + 65y = 1300/3 \end{cases}$$

$$0 + 175y + 1430y = 1325$$

$$\frac{1605y}{22} = \frac{1325}{3}$$

$$y = \frac{1325 \cdot 5 \cdot 22}{1605 \cdot 3}$$

$$y = \frac{265 \cdot 22}{321 \cdot 3}$$

$$y = \frac{5830}{963}$$

$$\begin{cases} 65x/6 - 25y/11 = -2 \cdot 6 \\ 25x/6 + 6y = 40 \cdot 21 \end{cases}$$

$$\begin{cases} 65x/6 \cdot (6) - 25y/11 \cdot (6) = -2 \cdot 6 \\ 25x/6 \cdot (21) + 25y/11 \cdot (21) = 40 \cdot 21 \end{cases}$$

$$\begin{cases} 65x - 7y/11 \cdot 2 = -12 \\ 25x \cdot (7)/2 - 7y/11 \cdot (2) = 840 \end{cases}$$

$$\frac{1605x}{22} - 0 = \frac{840}{11} + \frac{(-132)}{11}$$

$$\frac{1605x}{22} = \frac{708}{11} \rightarrow x = \frac{708 \cdot 2}{1605}$$

$$x = \frac{1416}{1605}$$

$$\begin{cases} -65a + (-63b/44) = 3/5 \cdot (-25) \\ -25a + 18b/4 = -23 \cdot (65) \end{cases}$$

$$\begin{cases} -65a \cdot (-25) - 63b/44 \cdot (-25) = 3/5 \cdot (-25) \\ -25a \cdot (65) + 18b/4 \cdot (65) = -23 \cdot (65) \end{cases}$$



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DSLM QMS  
DLMM JVS

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$$\begin{cases} +1625a + 1575b/44 = -75/5 \\ -1625a + 1170b/4 = -1495 \end{cases}$$

$$\begin{array}{r|l} 44, 2 & 2 \\ 22, 1 & 2 \\ 11, 1 & 11 \\ 1, 1 & 44 \end{array}$$

$$\begin{cases} 1625a + 1575b/44 = -15 \\ -1625a + 585b/2 = -1495 \end{cases} +$$

$$0 + \frac{1575b}{44} + \frac{585b}{2} = -1510$$

$$\frac{1575b}{44} + \frac{12870b}{44} = -1510$$

$$\frac{14445b}{44} = -1510$$

$$b = -1510 \cdot 44$$

$$b = -66440 : 5$$

$$b = -13288$$

$$14445 : 5$$

$$b = \frac{13288}{2889}$$

$$\begin{cases} -65a + (-63b/44) = 3/5 \\ -25a + 18b/4 = -23 \end{cases}$$

$$\begin{cases} -65a + -63b/44 = 3/5 \cdot (18/4) \\ -25a + 18b/4 = -23 \cdot (63/44) \end{cases}$$

$$\begin{cases} -65a \cdot (18/4) - 63b/44 \cdot (18/4) = 3/5 \cdot 18/4 \\ -25a \cdot (18/4) + 18b = 3/5 \cdot 18/4 \end{cases}$$

$$\begin{cases} -25a \cdot (63/44) + 18b/4 \cdot (63/44) = -23 \cdot (63/44) \end{cases}$$

$$\begin{cases} -1170a/4 - 1134b/11 = 54/20 \\ -1575a/44 + 1134b/11 = -1449/44 \end{cases} +$$

$$\begin{array}{r|l} 44, 20 & 2 \\ 22, 10 & 2 \\ 11, 5 & 5 \\ 11, 1 & 11 \\ 1, 1 & 220 \end{array}$$

$$\begin{aligned} -1170a - 1170a &= -1449 + 54 \\ \frac{-1170a}{44} - \frac{1170a}{4} &= \frac{-1449}{44} + \frac{54}{20} \\ -1575a - 12870a &= -7245 + 594 \\ \frac{-1575a}{44} - \frac{12870a}{220} &= \frac{-7245}{44} + \frac{594}{220} \end{aligned}$$

$$-14445a = \frac{7839}{220} - \frac{6651}{220} \cdot (-1)$$

$$\frac{14445a}{44} = \frac{6651}{220}$$

$$a = \frac{6651 \cdot 44}{14445}$$

$$a = \frac{292644}{14445} : 9 \Rightarrow a = \frac{32516}{1605}$$

"A cada dia  
novos aprendi-  
zados". Obrigada  
por tudo  
professora "