

MATRIZES

QUESTÃO A

$$A + C$$

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

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

$$= \begin{bmatrix} 3 & -1 & 8 \\ 8 & -4 & 8 \end{bmatrix}_{2 \times 3}$$

QUESTÃO B

$$B + D$$

$$B + D = \begin{bmatrix} 7 & 3 & 2 \\ -4 & 3 & 5 \\ 6 & 1 & -1 \end{bmatrix}_{3 \times 3} + \begin{bmatrix} 3 & -1 & 3 \\ 4 & 1 & 5 \\ 2 & 1 & 3 \end{bmatrix}_{3 \times 3}$$

$$= \begin{bmatrix} 7+3 & 3+(-1) & 2+3 \\ -4+4 & 3+1 & 5+5 \\ 6+2 & 1+1 & -1+3 \end{bmatrix}_{3 \times 3}$$

$$= \begin{bmatrix} 10 & 2 & 5 \\ 0 & 4 & 10 \\ 8 & 2 & 2 \end{bmatrix}_{3 \times 3}$$

QUESTÃO C

$$E + F$$

$$E + F = \begin{bmatrix} 3 & -2 \\ 2 & 4 \end{bmatrix}_{2 \times 2} + \begin{bmatrix} -4 & 5 \\ 2 & 3 \end{bmatrix}_{2 \times 2}$$

$$= \begin{bmatrix} 3+(-4) & -2+5 \\ 2+2 & 4+3 \end{bmatrix}_{2 \times 2}$$

$$= \begin{bmatrix} -1 & 3 \\ 4 & 7 \end{bmatrix}_{2 \times 2}$$

QUESTÃO D

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BD

$$\begin{aligned} BD &= \begin{bmatrix} 7 & 3 & 2 \\ -4 & 3 & 5 \\ 6 & 1 & -1 \end{bmatrix}_{3 \times 3} \times \begin{bmatrix} 3 & -1 & 3 \\ 4 & 1 & 5 \\ 2 & 1 & 3 \end{bmatrix}_{3 \times 3} \\ &= \begin{bmatrix} (7)(3) + (3)(4) + (2)(2) & (7)(-1) + (3)(1) + (2)(1) & (7)(3) + (3)(5) + (2)(3) \\ (-4)(3) + (3)(4) + (5)(2) & (-4)(-1) + (3)(1) + (5)(1) & (-4)(3) + (3)(5) + (5)(3) \\ (6)(3) + (1)(4) + (-1)(2) & (6)(-1) + (1)(1) + (-1)(1) & (6)(3) + (1)(5) + (-1)(3) \end{bmatrix}_{3 \times 3} \\ &= \begin{bmatrix} 21 + 12 + 4 & -7 + 3 + 2 & 21 + 15 + 6 \\ -12 + 12 + 10 & 4 + 3 + 5 & -12 + 15 + 15 \\ 18 + 4 - 2 & -6 + 1 - 1 & 18 + 5 - 3 \end{bmatrix}_{3 \times 3} \\ &= \begin{bmatrix} 37 & -2 & 42 \\ 10 & 12 & 18 \\ 20 & -6 & 20 \end{bmatrix}_{3 \times 3} \end{aligned}$$

QUESTÃO E

EF

$$\begin{aligned} EF &= \begin{bmatrix} 3 & -2 \\ 2 & 4 \end{bmatrix}_{2 \times 2} \times \begin{bmatrix} -4 & 5 \\ 2 & 3 \end{bmatrix}_{2 \times 2} \\ &= \begin{bmatrix} (3)(-4) + (-2)(2) & (3)(5) + (-2)(3) \\ (2)(-4) + (4)(2) & (2)(5) + (4)(3) \end{bmatrix}_{2 \times 2} \\ &= \begin{bmatrix} -12 - 4 & 15 - 6 \\ -8 + 8 & 10 + 12 \end{bmatrix}_{2 \times 2} \\ &= \begin{bmatrix} -16 & 9 \\ 0 & 22 \end{bmatrix}_{2 \times 2} \end{aligned}$$

QUESTÃO F

AG

$$\begin{aligned}
 AG &= \begin{bmatrix} 2 & -3 & 5 \\ 6 & -5 & 4 \end{bmatrix}_{2 \times 3} \times \begin{bmatrix} 1 & 0 \\ 2 & 1 \\ 3 & 2 \end{bmatrix}_{3 \times 2} \\
 &= \begin{bmatrix} (2)(1) + (-3)(2) + (5)(3) & (2)(0) + (-3)(1) + (5)(2) \\ (6)(1) + (-5)(2) + (4)(3) & (6)(0) + (-5)(1) + (4)(2) \end{bmatrix}_{2 \times 2} \\
 &= \begin{bmatrix} 2 - 6 + 15 & 0 - 3 + 10 \\ 6 - 10 + 12 & 0 - 5 + 8 \end{bmatrix}_{2 \times 2} \\
 &= \begin{bmatrix} 11 & 7 \\ 8 & 3 \end{bmatrix}_{2 \times 2}
 \end{aligned}$$

QUESTÃO G

GF

$$\begin{aligned}
 GF &= \begin{bmatrix} 1 & 0 \\ 2 & 1 \\ 3 & 2 \end{bmatrix}_{3 \times 2} \times \begin{bmatrix} -4 & 5 \\ 2 & 3 \end{bmatrix}_{2 \times 2} \\
 &= \begin{bmatrix} (1)(-4) + (0)(2) & (1)(5) + (0)(3) \\ (2)(-4) + (1)(2) & (2)(5) + (1)(3) \\ (3)(-4) + (2)(2) & (3)(5) + (2)(3) \end{bmatrix}_{3 \times 2} \\
 &= \begin{bmatrix} -4 + 0 & 5 + 0 \\ -8 + 2 & 10 + 3 \\ -12 + 4 & 15 + 6 \end{bmatrix}_{3 \times 2} \\
 &= \begin{bmatrix} -4 & 5 \\ -6 & 13 \\ -8 & 21 \end{bmatrix}_{3 \times 2}
 \end{aligned}$$

QUESTÃO H

3A

(26)

$$\begin{aligned}
 3A &= 3 \begin{bmatrix} 2 & -3 & 5 \\ 6 & -5 & 4 \end{bmatrix}_{2 \times 3} \\
 &= \begin{bmatrix} 3(2) & 3(-3) & 3(5) \\ 3(6) & 3(-5) & 3(4) \end{bmatrix}_{2 \times 3} \\
 &= \begin{bmatrix} 6 & -9 & 15 \\ 18 & -15 & 12 \end{bmatrix}_{2 \times 3}
 \end{aligned}$$

QUESTÃO I

-4D

$$\begin{aligned}
 -4D &= -4 \begin{bmatrix} 3 & -1 & 3 \\ 4 & 1 & 5 \\ 2 & 1 & 3 \end{bmatrix}_{3 \times 3} \\
 &= \begin{bmatrix} (-4)(3) & (-4)(-1) & (-4)(3) \\ (-4)(4) & (-4)(1) & (-4)(5) \\ (-4)(2) & (-4)(1) & (-4)(3) \end{bmatrix}_{3 \times 3} \\
 &= \begin{bmatrix} -12 & 4 & -12 \\ -16 & -4 & -20 \\ -8 & -4 & -12 \end{bmatrix}_{3 \times 3}
 \end{aligned}$$

QUESTÃO J

$$\begin{array}{c} 3 \\ 4 \end{array} G = \begin{bmatrix} 3/4 & 0 \\ 3/2 & 3/4 \\ 9/4 & 3/2 \end{bmatrix}_{3 \times 2}$$

$$\begin{aligned}
 \begin{array}{c} 3 \\ 4 \end{array} G &= \begin{array}{c} 3 \\ 4 \end{array} \begin{bmatrix} 1 & 0 \\ 2 & 1 \\ 3 & 2 \end{bmatrix}_{3 \times 2} \\
 &= \begin{bmatrix} (3/4)(1) & (3/4)(0) \\ (3/4)(2) & (3/4)(1) \\ (3/4)(3) & (3/4)(2) \end{bmatrix}_{3 \times 2}
 \end{aligned}$$

QUESTÃO K

$$F^T$$

$$F^T = \begin{bmatrix} -4 & 2 \\ 3 & 3 \end{bmatrix}_{2 \times 2}$$

QUESTÃO L

$$B^T$$

$$B^T = \begin{bmatrix} 7 & -4 & 6 \\ -3 & 3 & 1 \\ 2 & 3 & -7 \end{bmatrix}_{3 \times 3}$$

QUESTÃO M

$$C^T$$

$$C^T = \begin{bmatrix} 1 & 2 \\ 2 & 1 \\ 3 & 4 \end{bmatrix}_{3 \times 2}$$

QUESTÃO N

$$E^{-1}$$

$$[E | I_2] = \left[\begin{array}{cc|cc} 3 & -2 & 1 & 0 \\ 2 & 4 & 0 & 1 \end{array} \right] \times \left(\frac{1}{3} \right)$$

$$= \left[\begin{array}{cc|cc} 1 & -2/3 & 1/3 & 0 \\ 2 & 4 & 0 & 1 \end{array} \right] \times (-2)$$

(2P)

$$\begin{aligned}
 [E|I_2] &= \left[\begin{array}{cc|cc} 1 & -2/3 & 1/3 & 0 \\ 0 & 1/3 & -2/3 & 1 \end{array} \right] \times (3/16) \\
 &= \left[\begin{array}{cc|cc} 1 & -2/3 & 1/3 & 0 \\ 0 & 1 & -2/3 & 3/16 \end{array} \right] \begin{array}{l} \leftarrow + \\ \times (2/3) \end{array} \\
 &= \left[\begin{array}{cc|cc} 1 & 0 & 1/4 & 1/8 \\ 0 & 1 & -1/3 & 3/16 \end{array} \right]
 \end{aligned}$$

$$E^{-1} = \begin{bmatrix} 1/4 & 1/8 \\ -1/3 & 3/16 \end{bmatrix}_{2 \times 2}$$

QUESTÃO 0

D⁻¹

$$\begin{aligned}
 [D|I_3] &= \left[\begin{array}{ccc|ccc} 3 & -1 & 3 & 1 & 0 & 0 \\ 4 & 1 & 3 & 0 & 1 & 0 \\ 2 & 1 & 3 & 0 & 0 & 1 \end{array} \right] \times (1/3) \\
 &= \left[\begin{array}{ccc|ccc} 1 & -1/3 & 1 & 1/3 & 0 & 0 \\ 4 & 1 & 3 & 0 & 1 & 0 \\ 2 & 1 & 3 & 0 & 0 & 1 \end{array} \right] \begin{array}{l} \times (-4) \times (-2) \\ \leftarrow + \\ \leftarrow + \end{array} \\
 &= \left[\begin{array}{ccc|ccc} 1 & -1/3 & 1 & 1/3 & 0 & 0 \\ 0 & 7/3 & 1 & -5/3 & 1 & 0 \\ 0 & 5/3 & 1 & -2/3 & 0 & 1 \end{array} \right] \begin{array}{l} \times (3/7) \\ \\ \end{array} \\
 &= \left[\begin{array}{ccc|ccc} 1 & -1/3 & 1 & 1/3 & 0 & 0 \\ 0 & 1 & 3/7 & -5/7 & 3/7 & 0 \\ 0 & 5/3 & 1 & -2/3 & 0 & 1 \end{array} \right] \begin{array}{l} \leftarrow + \\ \times (1/3) \times (-5/3) \\ \leftarrow + \end{array} \\
 &= \left[\begin{array}{ccc|ccc} 1 & 0 & 8/7 & 1/7 & 1/7 & 0 \\ 0 & 1 & 3/7 & -5/7 & 3/7 & 0 \\ 0 & 0 & 2/7 & 2/7 & -3/7 & 1 \end{array} \right] \times (7/2) \\
 &= \left[\begin{array}{ccc|ccc} 1 & 0 & 8/7 & 1/7 & 1/7 & 0 \\ 0 & 1 & 3/7 & -5/7 & 3/7 & 0 \\ 0 & 0 & 1 & 1 & -3/2 & 7/2 \end{array} \right] \begin{array}{l} \leftarrow + \\ \leftarrow + \\ \times (-3/7) \times (-8/7) \end{array} \\
 &= \left[\begin{array}{ccc|ccc} 1 & 0 & 0 & -1 & 3 & -4 \\ 0 & 1 & 0 & -1 & 2/7 & -3/2 \\ 0 & 0 & 1 & 1 & -3/2 & 7/2 \end{array} \right]
 \end{aligned}$$

$$D^{-1} = \begin{bmatrix} -1 & 3 & -4 \\ -1 & 2\frac{1}{14} & -3/2 \\ 1 & -3/2 & 7/2 \end{bmatrix}_{3 \times 3}$$

QUESTÃO P

$$B^{-1}$$

$$\begin{aligned}
 [B | I_3] &= \begin{bmatrix} 7 & 3 & 2 & | & 1 & 0 & 0 \\ -4 & 3 & 3 & | & 0 & 1 & 0 \\ 6 & 1 & -1 & | & 0 & 0 & 1 \end{bmatrix} \times (1/7) \\
 &= \begin{bmatrix} 1 & 3/7 & 2/7 & | & 1/7 & 0 & 0 \\ -4 & 3 & 3 & | & 0 & 1 & 0 \\ 6 & 1 & -1 & | & 0 & 0 & 1 \end{bmatrix} \times (4) \times (-6) \\
 &= \begin{bmatrix} 1 & 3/7 & 2/7 & | & 1/7 & 0 & 0 \\ 0 & 3\frac{1}{7} & 5\frac{1}{7} & | & \frac{4}{7} & 1 & 0 \\ 0 & -1\frac{1}{7} & -9\frac{1}{7} & | & -\frac{6}{7} & 0 & 1 \end{bmatrix} \leftarrow + \quad \leftarrow + \\
 &= \begin{bmatrix} 1 & 3/7 & 2/7 & | & 1/7 & 0 & 0 \\ 0 & 3\frac{1}{7} & 5\frac{1}{7} & | & \frac{4}{7} & 1 & 0 \\ 0 & -1\frac{1}{7} & -9\frac{1}{7} & | & -\frac{6}{7} & 0 & 1 \end{bmatrix} \times (\frac{7}{33}) \\
 &= \begin{bmatrix} 1 & 3/7 & 2/7 & | & 1/7 & 0 & 0 \\ 0 & 1 & 4\frac{1}{33} & | & \frac{4}{33} & \frac{7}{33} & 0 \\ 0 & -1\frac{1}{7} & -9\frac{1}{7} & | & -\frac{6}{7} & 0 & 1 \end{bmatrix} \leftarrow + \quad \times (-3/7) \times (7/7) \\
 &= \begin{bmatrix} 1 & 0 & -2\frac{2}{77} & | & \frac{7}{77} & -\frac{7}{77} & 0 \\ 0 & 1 & 4\frac{1}{33} & | & \frac{4}{33} & \frac{7}{33} & 0 \\ 0 & 0 & -\frac{22}{33} & | & -\frac{22}{33} & \frac{11}{33} & 1 \end{bmatrix} \times (-\frac{33}{22}) \\
 &= \begin{bmatrix} 1 & 0 & -2\frac{2}{77} & | & \frac{7}{77} & -\frac{7}{77} & 0 \\ 0 & 1 & 4\frac{1}{33} & | & \frac{4}{33} & \frac{7}{33} & 0 \\ 0 & 0 & 1 & | & 1 & -\frac{1}{2} & -\frac{33}{22} \end{bmatrix} \leftarrow + \quad \leftarrow + \\
 &= \begin{bmatrix} 1 & 0 & 0 & | & 2\frac{2}{77} & -\frac{35}{154} & -\frac{693}{2694} \\ 0 & 1 & 0 & | & -\frac{39}{33} & \frac{57}{66} & \frac{43}{22} \\ 0 & 0 & 1 & | & 1 & -\frac{1}{2} & -\frac{33}{22} \end{bmatrix} \times (-\frac{43}{33}) \times (\frac{29}{77})
 \end{aligned}$$

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$$B^{-1} = \begin{bmatrix} \frac{28}{77} & -\frac{33}{154} & -\frac{693}{1694} \\ -\frac{39}{33} & \frac{57}{66} & \frac{53}{22} \\ 1 & -\frac{1}{2} & -\frac{33}{22} \end{bmatrix}$$