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MATRIZ INVERSA

Exercício 1 e 2

1. (FGV-EAESP)

$$\begin{bmatrix} x & 1 \\ 5 & 3 \end{bmatrix} \cdot \begin{bmatrix} 3 & -1 \\ y & 2 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$
$$\begin{cases} 3x + y = 1 \\ 15 + 3y = 0 \end{cases} \quad \begin{cases} -x + 2 = 0 \\ -5 + 6 = 1 \end{cases}$$

$x = 2$ e $y = -5$

$x + y = -3 //$

Resposta C

2. (UNESP-2003)

a) 0 e 3

Falso

$$\begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 3 \\ 1 & 0 & 3 \end{pmatrix} \begin{matrix} 10 \\ 01 \\ 10 \end{matrix} \Rightarrow \begin{matrix} 3-1=2// \\ 3-0=3 \\ 1-0=1 \end{matrix}$$
$$\begin{pmatrix} 1 & 0 & 1 \\ 3 & 1 & 3 \\ 1 & 3 & 3 \end{pmatrix} \begin{matrix} 10 \\ 31 \\ 13 \end{matrix} \Rightarrow \begin{matrix} 3-1=2 \\ 3-9=12 \\ 1-9=-8 \end{matrix}$$

b) 1 e -1

Falso

$$\begin{pmatrix} 1 & 0 & 1 \\ 1 & 1 & 3 \\ 1 & 1 & 3 \end{pmatrix} \begin{matrix} 10 \\ 11 \\ 11 \end{matrix} \Rightarrow \begin{matrix} 4-4=0 \\ 3-1=2 \\ 1-3=-2 \end{matrix}$$
$$\begin{pmatrix} 1 & 0 & 1 \\ -1 & 1 & 3 \\ 1 & -1 & 3 \end{pmatrix} \begin{matrix} 10 \\ -11 \\ 1-1 \end{matrix} \Rightarrow \begin{matrix} 4-(-2)=6// \\ 3-0=3 \\ 1-3=-2 \end{matrix}$$

Continuação do exercício 2

c) 1 e 2

Resposta c

$$\begin{pmatrix} 1 & 0 & 1 \\ 1 & 1 & 3 \\ 1 & 1 & 3 \end{pmatrix} \begin{array}{l} 10 \\ 11 \\ 11 \end{array} = 4 - 4 = 0 //$$

$$301 = 4$$

$$130 = 4$$

$$\begin{pmatrix} 1 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & 2 & 3 \end{pmatrix} \begin{array}{l} 10 \\ 21 \\ 12 \end{array} = 7 - 7 = 0 //$$

$$304 = 7$$

$$160 = 7$$

d) 1 e 3

False

$$\begin{pmatrix} 1 & 0 & 1 \\ 1 & 1 & 3 \\ 1 & 1 & 3 \end{pmatrix} \begin{array}{l} 10 \\ 11 \\ 11 \end{array} = 4 - 4 = 0 //$$

$$301 = 4$$

$$130 = 4$$

$$\begin{pmatrix} 1 & 0 & 1 \\ 3 & 1 & 3 \\ 1 & 3 & 3 \end{pmatrix} \begin{array}{l} 10 \\ 31 \\ 13 \end{array} = 12 - 1 = -2 //$$

$$309 = 12$$

$$190 = 10$$

e) 3 e -1

False

$$\begin{pmatrix} 1 & 0 & 1 \\ 3 & 1 & 3 \\ 1 & 3 & 3 \end{pmatrix} \begin{array}{l} 10 \\ 31 \\ 13 \end{array} = 12 - 10 = -2 //$$

$$309 = 12$$

$$190 = 10$$

$$\begin{pmatrix} 1 & 0 & 1 \\ -1 & 1 & 3 \\ 1 & -1 & 3 \end{pmatrix} \begin{array}{l} 10 \\ -11 \\ 1-1 \end{array} = 4 - (-2) = 6 //$$

$$301 = 4$$

$$1-30 = -2$$

Exercício 3 e Exercício 4

3. (MACR)

$$A = \begin{bmatrix} 3 & 5 \\ 2 & 4 \end{bmatrix} \Rightarrow \det A = 12 - 10 = 2 //$$

$$B = A^{-1} = \begin{bmatrix} 4 & -5 \\ -2 & 3 \end{bmatrix} \div 2 = \begin{bmatrix} 2 & -\frac{5}{2} \\ -1 & \frac{3}{2} \end{bmatrix} \text{ Resposta C}$$

04. (UNITAU)

$$\begin{bmatrix} X & 1 & 2 \\ 3 & 1 & 2 \\ 10 & 1 & X \end{bmatrix}$$

~~X~~ $\{ X \times 3 \text{ e } X \neq 2 \}$

$$\begin{bmatrix} 3 & 1 & 2 & 3 & 1 \\ 3 & 1 & 2 & 3 & 1 \\ 10 & 1 & 3 & 10 & 1 \end{bmatrix} = 35 - 35 = 0 //$$

$$9 \ 20 \ 6 = 35$$

$$20 \ 6 \ 9 = 35$$

Verdadeiro

$$\begin{bmatrix} 2 & 1 & 2 & 2 & 1 \\ 3 & 1 & 2 & 3 & 1 \\ 10 & 1 & 2 & 10 & 1 \end{bmatrix} = 30 - 30 = 0 //$$

$$4 \ 20 \ 6 = 30$$

$$20 \ 4 \ 6 = 30$$

Continuação do exercício 4

B) $\{x \neq -2 \text{ e } x \neq 3\}$

Falso

$$\begin{bmatrix} -2 & 1 & 2 \\ 3 & 1 & 2 \\ 10 & 1 & -2 \end{bmatrix} \begin{bmatrix} -2 & 1 \\ 3 & 1 \\ 10 & 1 \end{bmatrix} = 30 - 10 = 20 //$$

$$4 \cdot 20 \cdot 6 = 30$$

$$20 - 4 - 6 = 10$$

$$\begin{bmatrix} 3 & 1 & 2 \\ 3 & 1 & 2 \\ 10 & 1 & 3 \end{bmatrix} \begin{bmatrix} 3 & 1 \\ 3 & 1 \\ 10 & 1 \end{bmatrix} = 35 - 35 = 0 //$$

$$9 \cdot 20 \cdot 6 = 35$$

$$20 \cdot 6 \cdot 9 = 35$$

C) $\{x = 1 \text{ e } x = -1\}$

Falso

$$\begin{bmatrix} 1 & 1 & 2 \\ 3 & 1 & 2 \\ 10 & 1 & 1 \end{bmatrix} \begin{bmatrix} 1 & 1 \\ 3 & 1 \\ 10 & 1 \end{bmatrix} = 27 - 25 = 2 //$$

$$1 \cdot 20 \cdot 6 = 27$$

$$20 \cdot 2 \cdot 3 = 25$$

$$\begin{bmatrix} -1 & 1 & 2 \\ 3 & 1 & 2 \\ 10 & 1 & -1 \end{bmatrix} \begin{bmatrix} -1 & 1 \\ 3 & 1 \\ 10 & 1 \end{bmatrix} = 27 - 15 = 12 //$$

$$1 \cdot 20 \cdot 6 = 27$$

$$20 \cdot -2 \cdot -3 = 15$$

D) $\{x = 0 \text{ e } x \neq 2\}$

Falso

$$\begin{bmatrix} 0 & 1 & 2 \\ 3 & 1 & 2 \\ 10 & 1 & 0 \end{bmatrix} \begin{bmatrix} 0 & 1 \\ 3 & 1 \\ 10 & 1 \end{bmatrix} = 26 - 20 = 6$$

$$0 \cdot 20 \cdot 6 = 26$$

$$20 \cdot 0 \cdot 0 = 20$$

$$\begin{bmatrix} 2 & 1 & 2 \\ 3 & 1 & 2 \\ 10 & 1 & 2 \end{bmatrix} \begin{bmatrix} 2 & 1 \\ 3 & 1 \\ 10 & 1 \end{bmatrix} = 30 - 30 = 0 //$$

$$4 \cdot 20 \cdot 6 = 30$$

$$20 \cdot 4 \cdot 6 = 30$$

E) $\{x = 2 \text{ e } x \neq 0\}$

Falso

Resposta A

Exercício 5 e 6

5. (UNISA)

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

$$\begin{array}{l} -1 \cdot \left(\begin{array}{ccc|ccc} -1 & -1 & 2 & 1 & 0 & 0 \\ 2 & 1 & -2 & 0 & 1 & 0 \\ 1 & 1 & -1 & 0 & 0 & 1 \end{array} \right) \\ -2 \cdot \left(\begin{array}{ccc|ccc} -1 & -1 & 2 & 1 & 0 & 0 \\ 2 & 1 & -2 & 0 & 1 & 0 \\ 1 & 1 & -1 & 0 & 0 & 1 \end{array} \right) \\ 1 \cdot \left(\begin{array}{ccc|ccc} -1 & -1 & 2 & 1 & 0 & 0 \\ 2 & 1 & -2 & 0 & 1 & 0 \\ 1 & 1 & -1 & 0 & 0 & 1 \end{array} \right) \end{array} \quad \left(\begin{array}{ccc|ccc} 1 & 1 & 0 & 0 & 0 & 0 \\ 0 & -1 & 2 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 & 0 & 0 \end{array} \right)$$

$$A + A^{-1}$$

$$A = \begin{pmatrix} -1 & -1 & 2 \\ 2 & 1 & -2 \\ 1 & 1 & -1 \end{pmatrix} + A^{-1} = \begin{pmatrix} 1 & 1 & 0 \\ 0 & -1 & 2 \\ 1 & 0 & 1 \end{pmatrix} = \begin{pmatrix} 0 & 0 & 2 \\ 2 & 0 & 0 \\ 2 & 1 & 0 \end{pmatrix} \quad \text{Resposta B}$$

6. (PUC)

$$(X \cdot A)^t = B$$

$$((X \cdot A)^t)^t = B^t = X \cdot A = B^t$$

$$X A^{-1} = B^t A^{-1}$$

$$X = B^t A^{-1}$$

Exercício 7 e 8

7. (FAAP) $B = \begin{bmatrix} x \\ y \end{bmatrix}$ $C = \begin{bmatrix} 4x + 5y \\ 5x + 6y \end{bmatrix}$ $A = ?$ $AB = C$

$AB = C \begin{bmatrix} 4x + 5y \\ 5x + 6y \end{bmatrix} \rightarrow A = \begin{bmatrix} 4 & 5 \\ 5 & 6 \end{bmatrix} \rightarrow A^{-1} = \begin{bmatrix} -6 & 5 \\ 5 & -4 \end{bmatrix}$ Resposta D

8. (MACK) $\begin{pmatrix} 2 & k \\ -2 & 1 \end{pmatrix}$

a) $A = \begin{pmatrix} 2 & 2 \\ -2 & 1 \end{pmatrix} \rightarrow 2 - (4) = -2$ $A^{-1} = \begin{pmatrix} 1 & -2 \\ -2 & 2 \end{pmatrix} \rightarrow 2 - 4 = -2$

b) $A = \begin{pmatrix} 2 & -2 \\ -2 & 1 \end{pmatrix} \rightarrow 2 - 4 = -2$ $A^{-1} = \begin{pmatrix} 1 & 2 \\ 2 & 2 \end{pmatrix} \rightarrow 2 - 4 = -2$

Resposta B

Exercício 9

9. (FGV)

$$\text{A) } (A+B)(A-B) \\ A^2 - AB + BA - B^2$$

$$\text{B) } (A+B)^2 = A^2 - AB + BA - B^2 \\ \boxed{AB = BA}$$

$$\text{C) } \frac{\det A}{\det(-A)} = 1$$

$$\text{D) } \det AB = 1 \quad \det A \cdot \det B = 1$$

$$\boxed{\det B = \frac{1}{\det A}}$$