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CT11 350

1) $A = B^{-1}$

$x + y = ??$

$A = \begin{bmatrix} x & 1 \\ 5 & 3 \end{bmatrix}$

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

$A \cdot A' = I_n$

$B \cdot A = I_n$

$$\underbrace{\begin{bmatrix} 3 & -1 \\ y & 2 \end{bmatrix} \times \begin{bmatrix} x & 1 \\ 5 & 3 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}}$$

(I) $3x - 5 = 1$

(II) $xy + 10 = 0$

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I) $3x - 5 = 1$

$3x = 1 + 5 \Rightarrow x = \frac{6}{3} \Rightarrow 2$

II) $x \cdot y + 10 = 0$

$2y = -10$

$y = -10/2 = -5$

$x + y = 2 + (-5)$

$= -3$

R: Alternativa C)

data

2)
$$A = \begin{bmatrix} 1 & 0 & 1 \\ K & 1 & 3 \\ 1 & K & 3 \end{bmatrix} \rightarrow Det = 0$$

$K = ?$

$$\det A = \begin{bmatrix} 1 & 0 & 1 \\ K & 1 & 3 \\ 1 & K & 3 \end{bmatrix} \begin{matrix} 1 & 0 \\ K & 1 \\ 1 & K \end{matrix}$$

I $1 + 3K + 0 = 3K + 1$
II $3 + 0 + K^2 = K^2 + 3$

$K^2 + 3 - (3K + 1) \rightarrow K^2 + 3 - 3K - 1 \rightarrow K^2 - 3K + 2 = 0$

$\Delta = 9 - 4 \cdot 1 \cdot 2$
$\Delta = 9 - 8$
$\Delta = 1$

$K = \frac{3 \pm \sqrt{1}}{2 \cdot 1}$

$k_1 = \frac{3+1}{2} = \frac{4}{2} = 2$

$k_2 = \frac{3-1}{2} = \frac{2}{2} = 1$

Alternativa C

3) $B = A^{-1}$, $Det\ A = 12 - 10$ $Det A = 2.$

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

*usei regra matriz de ordem 2

$B = \begin{bmatrix} 4 & -5 \\ -2 & 3 \end{bmatrix} : 2$

$\begin{bmatrix} 2 & -5/2 \\ -1 & 3/2 \end{bmatrix}$

4) matriz inversível, $det \neq 0.$

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

I) $20 + 2x + 3x \rightarrow 20 + 5x$

II) $x^2 + 20 + 6 \rightarrow x^2 + 26$

$det = x^2 + 26 - (20 + 5x)$

$x^2 + 26 - 20 - 5x \neq 0$

$x^2 - 5x + 6 \neq 0$

$\Delta = 25 - 4.1.6$

$\Delta = 25 - 24 = 1$

$x \neq \frac{5 \pm \sqrt{1}}{2.1}$

$\frac{5+1}{2} \neq \frac{6}{2} \rightarrow 3,$

$\frac{5-1}{2} \neq \frac{4}{2} \rightarrow 2,$

$\{x \neq 3 \text{ e } x \neq 2\}$

Alternativa A)

5) $A = \begin{bmatrix} -1 & -1 & 2 \\ 2 & 1 & -2 \\ 1 & 1 & -1 \end{bmatrix}$ $\quad A + A^{-1} = ?$

$\det A = \begin{bmatrix} -1 & -1 & 2 \\ 2 & 1 & -2 \\ 1 & 1 & -1 \end{bmatrix} \begin{matrix} -1 & -1 \\ 2 & 1 \\ 1 & 1 \end{matrix} = 7 - 6 = \underline{1}$

I) $2+2+2=6$
II) $1+2+4=7$

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

$A' = \begin{bmatrix} (-1-(-2)) & (-2-(-2)) & (2-1) \\ (1-2) & (1-2) & (-1-(-1)) \\ (2-2) & (2-4) & (-1-(-2)) \end{bmatrix}$

$A' = \begin{bmatrix} 1 & 0 & 1 \\ 1 & -1 & 0 \\ 0 & 2 & 1 \end{bmatrix}$ $\quad \bar{A} = (A')^t = \begin{bmatrix} 1 & 1 & 0 \\ 0 & -1 & 2 \\ 1 & 0 & 1 \end{bmatrix}$

$A^{-1} = \dfrac{\bar{A}}{1} \cdot \begin{bmatrix} 1 & 1 & 0 \\ 0 & -1 & 2 \\ 1 & 0 & 1 \end{bmatrix}$

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

Alternativa (B)

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

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

$X \cdot A = B^t$

$X \cdot A \cdot A^{-1} = B^t \cdot A^{-1} \rightarrow X = B^t \cdot A^{-1} \rightarrow$ alternativa B)

7) $B = \begin{bmatrix} x \\ y \end{bmatrix}$ $\qquad A^{-1} = ?$

$C = \begin{bmatrix} 4x + 5y \\ 5x + 6y \end{bmatrix}$ $\qquad AB = C$

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$A \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 4x + 5y \\ 5x + 6y \end{bmatrix} \rightarrow A = \begin{bmatrix} 4 & 5 \\ 5 & 6 \end{bmatrix}$

$\det A = 24 - 25$
$= -1$

Usei regra matriz de ordem 2

$A^{-1} = \begin{bmatrix} 6 & -5 \\ -5 & 4 \end{bmatrix} \div -1 \rightarrow A^{-1} = \begin{bmatrix} -6 & 5 \\ 5 & -4 \end{bmatrix}$

Alternativa D)

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

$\det A = \det A^{-1}$

$\det A = 2 - (-2k)$
$\det A = 2 + 2k$

$\det A . \det A^{-1} = 1$
$(2+2k).(2+2k) = 1$
$4 + 4k + 4k + 4k^2 = 1$

$4k^2 + 8k + 4 - 1 = 0$
$4k^2 + 8k + 3 = 0$

$\rightarrow \Delta = 64 - 4.4.3$

$\Delta = 64 - 48 = 16$

$k_1 = \frac{-8 + \sqrt{16}}{2.4} = \frac{-8+4}{8} = \frac{-4}{8} = \frac{-1}{2}$

$k_{11} = \frac{-8 - \sqrt{16}}{2.4} = \frac{-8-4}{8} = \frac{-12}{8} \rightarrow k_{11} = \frac{-3}{2}$

soma dos valores do k: $-\frac{1}{2} - \frac{3}{2} \rightarrow -\frac{4}{2} \rightarrow -2$
até agora

Alternativa B)

9) $A_{2\times 2}$

$B_{2\times 2}$

$\mathrm{Det}\,A \neq 0$

$\mathrm{Det}\,B \neq 0$

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

$(AB \neq BA)$

B) $(A+B)^2 \rightarrow A^2 + \underbrace{2.A.B}_{} + B^2 \leftarrow AB = BA$,,

C) $\dfrac{\det(A)}{\det(-A)} \rightarrow \det(-A) = (-1)^2 \cdot \det A = \det$

$\dfrac{\det A}{\det(-A)} = 1$,,

D) $B = A^{-1} \rightarrow \mathrm{Det}\,A \times \mathrm{Det}\,B = 1$

$\rightarrow \boxed{\mathrm{Det}\,B = \dfrac{1}{\det A}}$