nome: Kemily Teixeira Cruz   CT11 - 317

Tarefa Básica - Matriz Inversa

01. $B = \begin{bmatrix} 3 & -1_{11} \\ y_{21} & 2 \end{bmatrix}$ $A = B^{-1} = \begin{bmatrix} x_{11} & 1_{12} \\ 5_{21} & 3 \end{bmatrix}$

$B \cdot A = I$

$\begin{bmatrix} 3 & -1 \\ y & 2 \end{bmatrix} \cdot \begin{bmatrix} x & 1 \\ 5 & 3 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ $3x - 5 = 1$ $yx + 10 = 0$

$3x - 5 = 1$
$3x = 1 + 5$
$3x = 6$
$x = 2$

$y + 6 = 1$
$y = 1 - 6$
$y = -5$

$x + y = 2 - 5 = -3$ Letra C

02. $A = \begin{pmatrix} 1 & 0 & 1 \\ K & 1 & 3 \\ 1 & K & 3 \end{pmatrix}$

$1 + 3K + 0$

$\begin{vmatrix} 1 & 0 & 1 \\ K & 1 & 3 \\ 1 & K & 3 \end{vmatrix} \begin{matrix} 1 & 0 \\ K & 1 \\ 1 & K \end{matrix} = 0$

$3 + 0 + K^2$

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

$\Delta = (-3)^2 - 4 \cdot 1 \cdot 2$
$\Delta = 9 - 8$
$\Delta = 1$

$K = \frac{3 \pm 1}{2} =$ $K_1 = 2$ $K_2 = 1$

Letra C

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03. $A = \begin{bmatrix} 3 & 5 \\ 2 & 4 \end{bmatrix}$ $A' = \begin{pmatrix} 4 & -2 \\ -5 & 3 \end{pmatrix} \to \bar{A} = \begin{pmatrix} 4 & -5 \\ -2 & 3 \end{pmatrix} \div 2 =$

$\det A = 12 - 10 = 2$ $A^{-1} = B = \begin{pmatrix} 4/2 & -5/2 \\ -2/2 & 3/2 \end{pmatrix}$

Letra C $B = \begin{pmatrix} 2 & -5/2 \\ -1 & 3/2 \end{pmatrix}$

04. $A = \begin{bmatrix} x & 1 & 2 \\ 3 & 1 & 2 \\ 10 & 1 & x \end{bmatrix}$

$20 + 2x + 3x$

$\begin{vmatrix} x & 1 & 2 \\ 3 & 1 & 2 \\ 10 & 1 & x \end{vmatrix} \begin{matrix} x & 1 \\ 3 & 1 \\ 10 & 1 \end{matrix} \neq 0$

$x^2 + 20 + 6$

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

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

$\Delta = (-5)^2 - 4.1.6$

$\Delta = 25 - 24$

$\Delta = 1$

$x = \frac{5 \pm 1}{2} =$ $x_1 \neq 3$, $x_2 \neq 2$

Letra A

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

$2 + 2 + 2$

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

$1 + 2 + 4$

$A' = \begin{pmatrix} 1 & 0 & 1 \\ 1 & -1 & 0 \\ 0 & 2 & 1 \end{pmatrix}$ $\bar{A} = \begin{pmatrix} 1 & 1 & 0 \\ 0 & -1 & 2 \\ 1 & 0 & 1 \end{pmatrix} \div 1$ $A^{-1} = \begin{pmatrix} 1 & 1 & 0 \\ 0 & -1 & 2 \\ 1 & 0 & 1 \end{pmatrix}$

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

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

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

$X \cdot A = B^t$

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

$X = B^t \cdot A^{-1}$ – Letra B

07. $B = \begin{bmatrix} x \\ y \end{bmatrix}_{2\times1}$ $C = \begin{bmatrix} 4x+5y \\ 5x+6y \end{bmatrix}_{2\times1}$ $A.B = C$

$\begin{bmatrix} a & b \\ c & d \end{bmatrix}_{2\times2} \cdot \begin{bmatrix} x \\ y \end{bmatrix}_{2\times1} = \begin{bmatrix} 4x+5y \\ 5x+6y \end{bmatrix}_{2\times1}$ $A = \begin{bmatrix} 4 & 5 \\ 5 & 6 \end{bmatrix} \rightarrow \begin{pmatrix} 6 & -5 \\ -5 & 4 \end{pmatrix}$

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

08. $A = \begin{bmatrix} 2 & K \\ -2 & 1 \end{bmatrix}$ $-2K$, 2 $\det A = 2-(-2K) = 2K+2$

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

$2K+2 = \dfrac{1}{2K+2}$

$(2K+2)\cdot(2K+2) = 1$

$4K^2+4K+4K+4-1=0$

$4K^2+8K+3=0$

$\det A^{-1} = \dfrac{1}{2K+2}$

$K_1 + K_2 = -\dfrac{1}{2} - \dfrac{3}{2} = \dfrac{-4}{2} = -2$

$\Delta = 8^2 - 4.4.3$

$\Delta = 64 - 48$

$\Delta = 16$

Letra B

$K = \dfrac{-8 \pm \sqrt{16}}{2.4} = \dfrac{-8 \pm 4}{8} =$ $K_1 = -1/2$ $K_2 = -3/2$

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09.

a) $(A+B).(A-B)$
$= A^2 - AB + BA - B^2$

b) Para que $(A+B)^2 = A^2 + 2AB + B^2$, AB precisa ser igual a BA.

c) $\dfrac{\det A}{\det(-A)} = \dfrac{ad-cb}{ad-cb} = 1$

$A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ $\quad -A = \begin{bmatrix} -a & -b \\ -c & -d \end{bmatrix}$ $\quad \det A = ad - cb$
$\det -A = ad - cb$

d) De acordo com a propriedade: $\det A^{-1} = \dfrac{1}{\det A}$, a relação seria: $\det B = \dfrac{1}{\det A}$.