Exercícios - Determinantes - Cálculo Geral - Tarefa Básica – Matemática – CTII 317

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Tarefa Básica - Cálculo geral de determinantes

01.

$$0 - 1 + 0 = -1$$

$$A = \begin{vmatrix} 1 & \alpha & 0 \\ 0 & 1 & 1 \\ 0 & -1 & 1 \end{vmatrix} \begin{matrix} 1 & \alpha \\ 0 & 1 \\ 0 & -1 \end{matrix} \Rightarrow 1 - (-1) = \underline{\underline{2}} = \det A$$

$$1 + 0 + 0 = 1$$

$$B = \begin{vmatrix} 1 & 0 & 0 & 3 \\ \alpha & 1 & -1 & 4 \\ 0 & 0 & 0 & 3 \\ 0 & 1 & 1 & 4 \end{vmatrix}$$

laplace 3

$$\det B = (-1 . cof(2,3)) + (1 . cof(4,3))$$

$cof(2,3)$ $2+3 =$ ímpar

$$0 + 3 + 0 = 3$$

$$-1 . \begin{vmatrix} 1 & 0 & 3 \\ 0 & 0 & 3 \\ 0 & 1 & 4 \end{vmatrix} \begin{matrix} 1 & 0 \\ 0 & 0 \\ 0 & 1 \end{matrix} \Rightarrow 0 - 3 = -3 \Rightarrow 3 . -1 = \underline{\underline{-3}}$$

$$0 + 0 + 0 = 0$$

$$0 + 0 + 0 = 0$$

$cof(4,3) = 4+3 =$ ímpar

$$1 . \begin{vmatrix} 1 & 0 & 3 \\ \alpha & 1 & 4 \\ 0 & 0 & 3 \end{vmatrix} \begin{matrix} 1 & 0 \\ \alpha & 1 \\ 0 & 0 \end{matrix} = 3 - 0 = 3 \Rightarrow -3 . 1 = \underline{\underline{-3}}$$

$$3 + 0 + 0 = 3$$

$$\underline{\underline{\det B}} = -3 + (-3) = \underline{\underline{-6}}$$

02.

$$A = \begin{vmatrix} x^2 & \boxed{0} & x & -\frac{1}{10} \\ 7{,}5 & 0 & 5 & 2 \\ 10 & 0 & 4 & 2 \\ 1 & 1 & 1 & 1 \end{vmatrix} = 0 \qquad 0 = 1.\text{cof}(4,2)$$

$$\begin{vmatrix} x^2 & x & -\frac{1}{10} \\ 7{,}5 & 5 & 2 \\ 10 & 4 & 2 \end{vmatrix} \begin{matrix} x^2 & x \\ 7{,}5 & 5 \\ 10 & 4 \end{matrix}$$

$-5+8x^2+15x$

$10x^2+20x-3$

0

$10x^2+20x-3-(-5+8x^2+15x)=0$

$10x^2-8x^2+20x-15x-3+5=0$

$2x^2+5x+2=0 \Rightarrow b^2+4.a.c = 5^2-4.2.2 = 25-16 = \underline{9} = \underline{\Delta}$

$a=2,\ b=5,\ c=2$ // $x = \dfrac{-b\pm\sqrt{\Delta}}{2.a} = \dfrac{-5\pm\sqrt{9}}{2.2} = \dfrac{-5\pm 3}{4}$

$x_1 = \dfrac{-5+3}{4} = \dfrac{-2}{4} = -\dfrac{1}{2}$ | $x_2 = \dfrac{-5-3}{4} = \dfrac{-8}{4} = -2$

$S = \{x \in \mathbb{R} \mid x=-2 \text{ ou } x = \dfrac{-1}{2}\}$

03.

$$\begin{vmatrix} x & 0 & 0 & 3 \\ -1 & x & 0 & 0 \\ 0 & -1 & x & 1 \\ 0 & 0 & -1 & -2 \end{vmatrix} \rightarrow \text{laplace} \Rightarrow \det f = -1.\text{cof}(2,1) + x.\text{cof}(2,2)$$

I

$$-1.\begin{vmatrix} 0 & 0 & 3 \\ -1 & x & 1 \\ 0 & -1 & -2 \end{vmatrix} \begin{matrix} 0 & 0 \\ -1 & x \\ 0 & -1 \end{matrix} = 3-0 = 3.-1 = -3 = \cancel{+}3 = -1.\text{cof}(2,1)$$

$0+0+0$

$0+0+3=3$

cof(2,1) 2+1 = impar

III

$\underline{\det f} = -2x^3+x^2+\underline{3} = (A)$

II

$0-1x+0=-x$

$$x.\begin{vmatrix} x & 0 & 3 \\ 0 & x & 1 \\ 0 & -1 & -2 \end{vmatrix} \begin{matrix} x & 0 \\ 0 & x \\ 0 & -1 \end{matrix} \Rightarrow -2x^2-(-x) = \underline{(-2x^2+x).x}$$

$-2x^2+0+0=-2x^2$

$x.\text{cof}(2,2) = \underline{-2x^3+x^2}$

04.

$$A=\begin{bmatrix} x & 1 & 0 & 0 & 0 \\ 0 & x & 1 & 0 & 0 \\ 0 & 0 & x & 1 & 0 \\ 0 & 0 & 0 & x & k \\ 0 & 0 & 0 & 1 & x \end{bmatrix} \Rightarrow -1 \cdot \begin{vmatrix} x & 1 & 0 & 0 \\ 0 & x & 1 & 0 \\ 0 & 0 & x & 0 \\ 0 & 0 & 0 & k \end{vmatrix} \Rightarrow k \cdot x^3 \Rightarrow -(k \cdot x^3) \cdot 1 = -\underline{kx^3}$$

$-1 \cdot cof(5,4)$

$5+4 =$ ímpar

matriz triangular

laplace

$x \cdot cof(5,5)$

$$x \cdot \begin{vmatrix} x & 1 & 0 & 0 \\ 0 & x & 1 & 0 \\ 0 & 0 & x & 1 \\ 0 & 0 & 0 & x \end{vmatrix} \Rightarrow x^4 \cdot x = \underline{x^5}$$

matriz triangular

$\det A = x^5 + (-kx^3)$

$\det A = x^5 - kx^3$

$\det A = x^3 \cdot \underline{(x^2 - k)}$

$f(x) = \det A$

$f(x) = x^3 \cdot (x^2 - k)$

$f(-2) \Rightarrow (-2)^3 \cdot ((-2)^2 - k) = 8$

$-8 \cdot (4 - k) = 8$

$-32 + 8k = 8$

$8k = 32 + 8$

$k = \frac{40}{8} = \underline{5} \Rightarrow$ (D)