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Lista de exercícios

1. a) $\begin{vmatrix} 2 & 3 \\ 1 & 5 \end{vmatrix}$ $\quad 3 \quad 10$

$\det = 10 - 3 = 7$ //

b) $\begin{vmatrix} -2 & -4 \\ 3 & 6 \end{vmatrix}$ $\quad -12$

-12

$\det = -12 - (-12) = -12 + 12 = 0$ //

c) $\begin{vmatrix} 3 & -1 & 1 \\ 2 & 1 & -1 \\ 1 & 4 & -2 \end{vmatrix}$ $\begin{matrix} 3 & -1 \\ 2 & 1 \\ 1 & 4 \end{matrix}$ $\quad 1 \quad -12 \quad 4$

$-6 \quad 1 \quad 8$

$\det = 3 - (-7) = 10$ //

$1 + (-12) + 4 = 1 - 12 + 4 = -7$

$-6 + 1 + 8 = 3$

d) $\begin{vmatrix} 3 & 2 & -1 \\ 2 & 3 & 1 \\ 1 & 1 & 4 \end{vmatrix}$ $\quad -3 \quad 3 \quad 16$

$36 \quad -2 \quad 2 \quad 16$

$\det = 36 - 16 = 20$ //

$36 + (-2) + 2 = 36 - 2 + 2 = 36$

$-3 + 3 + 16 = 16$

2. $A = (a_{ij})_{3\times3}$ $\quad a_{ij} \begin{cases} -3 & \text{se } i=j \\ 0 & \text{se } i\neq j \end{cases}$

$$\begin{matrix} & \begin{vmatrix} -3 & 0 & 0 \\ 0 & -3 & 0 \\ 0 & 0 & -3 \end{vmatrix} \\ 0 & -27 \\ 0 & -3 \quad 0 \quad 0 \\ 0 & 0 \quad -3 \quad 0 \\ & 0 \quad 0 \quad -3 \end{matrix}$$

$\det = -27 - 0 = -27$ //

3

$$\begin{matrix} & \begin{vmatrix} x & 1 & x \\ 3 & x & 4 \\ 1 & 3 & 3 \end{vmatrix} & = -3 \\ x^2 & & 3x^2 \\ 12x & x \quad 1 \quad x & 9x \\ 9 & 3 \quad x \quad 4 & 4 \end{matrix}$$

$3x^2 + 9x + 4$

$x^2 + 12x + 9$

$(3x^2 + 9x + 4) - x^2 + 12x + 9$

$2x^2 - 3x - 5 + 3$

$2x^2 - 3x - 2 = 0$

$2x^2 + x - 4x - 2 = 0$

$x(2x+1) - 4x - 2 = 0$

$(2x+1)(x-2) = 0$

$2x + 1 = 0 \qquad x' = -1/2$ //

$x - 2 = 0 \qquad x'' = 2$ //

alternativa (E) //

4.

$$\begin{matrix} & \begin{vmatrix} x-1 & -1 & 0 \\ 0 & x+1 & -1 \\ 2 & -1 & x+1 \end{vmatrix} \\ & x-1 \quad -1 \quad 0 \\ & 0 \quad x+1 \quad -1 \end{matrix}$$

5. $A = (a_{ij})_{3\times 2}$

$a_{ij} = 2i - 3j$

$B = (b_{jk})_{2\times 3}$

$b_{jk} = k - j$

$$B = \begin{bmatrix} 0 & 1 & 2 \\ -1 & 0 & -1 \end{bmatrix}$$

$b_{11} = 1 - 1 = 0$

$b_{12} = 2 - 1 = 1$

$b_{13} = 3 - 1 = 2$

$b_{21} = 1 - 2 = -1$

$b_{22} = 2 - 2 = 0$

$b_{23} = 3 - 2 = -1$

$$A = \begin{bmatrix} -1 & -4 \\ 1 & -2 \\ 3 & 0 \end{bmatrix}$$

$a_{11} = 2.1 - 3.1 = 2 - 3 = -1$

$a_{12} = 2.1 - 3.2 = 2 - 6 = -4$

$a_{21} = 2.2 - 3.1 = 4 - 3 = 1$

$a_{22} = 2.2 - 3.2 = 4 - 6 = -2$

$a_{31} = 2.3 - 3.1 = 6 - 3 = 3$

$a_{32} = 2.3 - 3.2 = 6 - 6 = 0$

$$\begin{bmatrix} (-1.0)(-4.-1) & (-1.1)(-4.0) & (-1.2)(-4.-1) \\ (1.0)(-2.-1) & (1.1)(-2.0) & (1.2)(-2.-1) \\ (3.0)(0.-1) & (3.1)(0.0) & (3.2)(0.-1) \end{bmatrix}$$

$$\begin{bmatrix} -0+4 & -1-0 & -2-4 \\ 0+2 & 1-0 & 2-2 \\ 0+0 & 3+0 & 6-0 \end{bmatrix}$$

$\exists \; A_{3\times 2} \cdot B_{2\times 3}$

$=$

$$\begin{bmatrix} 4 & -1 & -6 \\ 2 & 1 & 0 \\ 0 & 3 & 6 \end{bmatrix}$$

$$\begin{array}{|ccc|c} \hline 4 & -1 & -6 & \\ 2 & 1 & 0 & \\ 0 & 3 & 6 & 24 \\ \hline \end{array}$$

$$\begin{array}{ccc|c} 0 & -1 & -6 & -36 \\ -12 & 1 & 0 & 0 \end{array}$$

$\det A.B = (24 + 0 + 36) - (0 - 12 + 0)$

$\det A.B = -12 + 12$

$\det A.B = 0$ //

alternativa (c) //

6. $A = \begin{bmatrix} 2 & 0 & -1 \\ -1 & 1 & 0 \end{bmatrix}_{2\times3}$ $B = \begin{bmatrix} 1 & -1 \\ -1 & 1 \\ 0 & 2 \end{bmatrix}_{3\times2}$

$$\begin{bmatrix} (2\cdot1)(0\cdot-1)(-1\cdot0) & (2\cdot-1)(0\cdot1)(-1\cdot2) \\ (-1\cdot1)(1\cdot-1)(0\cdot0) & (-1\cdot-1)(1\cdot1)(0\cdot2) \end{bmatrix}$$

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

$$\begin{bmatrix} 2 & -4 \\ -2 & 2 \end{bmatrix} \qquad A_{2\times3} \cdot B_{3\times2} = \begin{bmatrix} 2 & -4 \\ -2 & 2 \end{bmatrix}$$

8 4

$\det A.B = 4 - 8 = -4$ //

alternativa (D) //