

Nome: Rodrigo Moreira da Silva Sala: CTII - 317

Tarefa Básica - Calculus Geral

1.

$$A = \begin{bmatrix} 1 & a & 0 \\ 0 & 1 & 1 \\ 0 & -1 & 1 \end{bmatrix}$$

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

$$B = \begin{bmatrix} 1 & 0 & 0 & 3 \\ a & 1 & -1 & 4 \\ 0 & 0 & 0 & 3 \\ 0 & 1 & 1 & 4 \end{bmatrix}$$

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

$$0 + (3) + 0 - 0 - 3 - 0 = 0$$

2.

$$\begin{vmatrix} x^2 & 0 & x & -\frac{1}{10} \\ 7,5 & 0 & 5 & 2 \\ 10 & 0 & 4 & 2 \\ 1 & 1 & 1 & 1 \end{vmatrix} = 0 \quad \begin{vmatrix} x^2 & x & -\frac{1}{10} \\ 7,5 & 5 & 2 \\ 10 & 4 & 2 \end{vmatrix}$$

$$\det \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix} = a \cdot \det \begin{bmatrix} e & f \\ h & i \end{bmatrix} - b \cdot \det \begin{bmatrix} d & f \\ g & i \end{bmatrix} + c \cdot \det \begin{bmatrix} d & e \\ g & h \end{bmatrix}$$

$$x^2 \cdot \det \begin{bmatrix} 5 & 2 \\ 4 & 2 \end{bmatrix} - x \cdot \det \begin{bmatrix} 7,5 & 2 \\ 10 & 2 \end{bmatrix} + \frac{-1}{10} \det \begin{bmatrix} 7,5 & 5 \\ 10 & 4 \end{bmatrix}$$

$$\det \begin{bmatrix} 5 & 2 \\ 4 & 2 \end{bmatrix} = 2 \quad \det \begin{bmatrix} 7,5 & 2 \\ 10 & 2 \end{bmatrix} = -5 \quad \det \begin{bmatrix} 7,5 & 5 \\ 10 & 4 \end{bmatrix} = -20$$

$$x^2 - 2x(-5) + \frac{1}{10}(-20) = 0$$

$$2x^2 + 5x + 2 = 0$$

$$\Delta = b^2 - 4ac$$

$$\Delta = (5)^2 - 4 \cdot 2 \cdot 2$$

$$\Delta = 25 - 16$$

$$\boxed{\Delta = 9}$$

$$x = \frac{-b \pm \sqrt{\Delta}}{2a} \rightarrow \frac{-5 \pm \sqrt{9}}{2 \cdot 2}$$

$$x' = \frac{-5 + 3}{4} = \frac{-2}{4} = \boxed{-\frac{1}{2}} = A$$

$$x'' = \frac{-5 - 3}{4} = \frac{-8}{4} = \boxed{-2}$$

3.

$$\begin{vmatrix} x & 0 & 0 & 3 \\ -1 & x & 0 & 0 \\ 0 & -1 & x & 1 \\ 0 & 0 & -1 & -2 \end{vmatrix} = -1$$

$$\begin{vmatrix} x(-1) & 0(-1) & 0(-1) & 3 \\ -1 & x(-1) & 0(-1) & 0(-1) \\ 0(-1) & 0(-1) & -1 & -2 \end{vmatrix} = 0$$

$$= \begin{vmatrix} -x & 0 & 0 & 3 \\ 1 & x & 0 & 0 \\ 0 & -1 & x & 1 \\ 0 & 0 & -1 & -2 \end{vmatrix} \xrightarrow{(-1)} \begin{vmatrix} -x & 0 & 0 & 3 \\ 1 & x & 0 & 0 \\ 0 & -1 & x & 1 \\ 0 & 0 & -1 & -2 \end{vmatrix} = \begin{vmatrix} -1 & x & 0 & 0 \\ -x & 0 & 0 & 3 \\ 0 & -1 & x & 1 \\ 0 & 0 & -1 & -2 \end{vmatrix} =$$

$$\begin{vmatrix} 0 - (-x) \cdot x & 0 - (-x) \cdot 0 & 3 - (-x) \cdot 0 \\ -1 - 0 \cdot x & x - 0 \cdot 0 & 1 - 0 \cdot 0 \\ 0 - 0 \cdot x & -1 - 0 \cdot 0 & -2 - 0 \cdot 0 \end{vmatrix} = \begin{vmatrix} x^2 & 0 & 3 \\ -1 & x & 1 \\ 0 & -1 & -2 \end{vmatrix}$$

$$= 2x^3 + x^2 + 3$$

4.

$$\begin{vmatrix} x & 1 & 0 & 0 & 0 \\ 0 & x & 1 & 0 & 0 \\ 0 & 0 & x & 1 & 0 \\ 0 & 0 & 0 & x & K \\ 0 & 0 & 0 & 1 & x \end{vmatrix}$$

$$= \begin{vmatrix} x & K \\ 1 & x \end{vmatrix} = x^2 - 1K = K^3$$

$$f(x) = x^5 - K \cdot x^3$$

$$f(-2) = -32 + 8K = 8$$

$$8K = 40$$

$$K = \frac{40}{8} = \boxed{5}$$