

I - lista de exercícios - Cálculo I

$$\textcircled{1} \lim_{x \rightarrow 0} [\log(x^2 - 4x + 1)] = \log(0 - 0 + 1) = \log_5 1 = 0$$

$$\textcircled{2} \lim_{x \rightarrow 5} \frac{x^2 - 7x + 10}{x - 5} = \frac{0}{0} \text{ indeterminação}$$

simplificação:

$$\begin{array}{r|l} x^2 - 7x + 10 & x - 5 \\ \hline -x^2 + 5x & x - 2 \\ \hline -2x + 10 & \\ \hline +2x - 10 & \end{array}$$

Resposta 0 //

$$\lim_{x \rightarrow 5} \frac{x^2 - 7x + 10}{x - 5} = \lim_{x \rightarrow 5} (x - 2) = \boxed{3}$$

$$\textcircled{3} \lim_{x \rightarrow 1} \frac{x^2 - 3x + 4}{1 + x + x} = \frac{2}{3}$$

$$\textcircled{4} \lim_{x \rightarrow -1} [\log_5(x^2 - 4x)] = \log_5((-1)^2 - 4 \cdot (-1)) = \log_5(1 + 4) = \log_5 5 = \boxed{1}$$

$$\textcircled{5} \lim_{x \rightarrow 2} \frac{2x^2 - 5x + 2}{x - 2} = \frac{8 - 10 + 2}{0} = \frac{0}{0} \text{ indeterminação}$$

simplificação:

$$\begin{array}{r|l} 2x^2 - 5x + 2 & x - 2 \\ \hline 2x^2 + 4x & 2x - 1 \\ \hline -x + 2 & \\ \hline x - 2 & \end{array}$$

resposta:

$$\lim_{x \rightarrow 2} \frac{2x^2 - 5x + 2}{x - 2} = \lim_{x \rightarrow 2} (2x - 1) = \boxed{3}$$

$$\textcircled{6} \lim_{x \rightarrow \frac{3}{2}} \frac{x-1}{x} = \frac{\frac{3}{2}-1}{\frac{3}{2}} = \frac{\frac{1}{2}}{\frac{3}{2}} = \frac{1}{2} \cdot \frac{2}{3} = \frac{1}{3}$$

$$\textcircled{7} \lim_{x \rightarrow 1} \frac{x-1}{x^2-1} = \frac{0}{0} = \text{indeterminação}$$

simplificação:

$$\frac{x-1}{x^2-1} = \frac{x-1}{(x-1)(x+1)} = \frac{1}{x+1}$$

Resposta: $\lim_{x \rightarrow 1} \frac{x-1}{x^2-1} = \lim_{x \rightarrow 1} \left(\frac{1}{x+1} \right) = \frac{1}{2}$

$$\textcircled{8} \lim_{x \rightarrow 3} (2^x - 1) = 2^3 - 1 = 7$$

$$\textcircled{9} \lim_{x \rightarrow 3} \sqrt{2^x + 1} = \sqrt{2^3 + 1} = \sqrt{9} = 3$$

$$\textcircled{10} \lim_{x \rightarrow 0} \frac{x^2 + 4x}{x + 5} = \frac{0 + 0}{0 + 5} = \frac{0}{5} = 0$$

$$\textcircled{11} \lim_{x \rightarrow 2} \frac{x^2 - 5x + 6}{x^2 - 3x + 2} = \frac{4 - 10 + 6}{4 - 6 + 2} = \frac{0}{0} = \text{indeterminação}$$

simplificação:

$$\frac{x^2 - 5x + 6}{x^2 - 3x + 2} = \frac{(x-2)(x-3)}{(x-2)(x-1)} = \frac{x-3}{x-1}$$

Resposta:

$$\lim_{x \rightarrow 2} \frac{x^2 - 5x + 6}{x^2 - 3x + 2} = \lim_{x \rightarrow 2} \frac{(x-3)}{(x-1)}$$

$$\textcircled{1} \frac{x^2 - 5x + 6}{x^2 - 3x + 2} \Big|_{x=2} \frac{x-3}{x-1} = -1$$

$$\textcircled{2} \frac{x^2 - 3x + 2}{x^2 - 5x + 6} \Big|_{x=2} \frac{x-1}{x-3} = -1$$

$$\frac{-1}{-1} = 1$$

$$\textcircled{12} \lim_{x \rightarrow 1} \frac{x^3 - 2x^2 + 2x - 1}{x - 1} = \frac{0}{0} \text{ undeterminado}$$

Simplificação

$$\begin{array}{r} x^3 - 2x^2 + 2x - 1 \quad | x - 1 \\ -x^3 + x^2 \\ \hline -x^2 + 2x - 1 \\ +x^2 - x \\ \hline x - 1 \\ -x + 1 \\ \hline 0 \end{array}$$

$$\text{Resposta: } \lim_{x \rightarrow 1} \frac{x^3 - 2x^2 + 2x - 1}{x - 1} = \lim_{x \rightarrow 1} (x^2 - x + 1) \\ = 1 - 1 + 1 = 1 //$$

$$\textcircled{13} \lim_{x \rightarrow 0} e^x = e^0 = 1 //$$

$$\textcircled{14} \lim_{x \rightarrow 0} [\ln(1+x-x^2)] = \ln(1+0-0) = \ln 1 \\ = \log_e 1 = 0 //$$

$$\begin{aligned} \ln(x) &= \log_e x \\ \ln e &= 1 \\ \ln(e^h) &= h \end{aligned}$$

$$\textcircled{15} \lim_{x \rightarrow -1} \frac{x^4 - x^5 + x^3 + 1}{x + 1} = \frac{(-1)^4 - (-1)^5 + 1^3 + 1}{0} = \frac{-1 + 1 - 1 + 1}{0} = \frac{0}{0} \text{ undeterminado}$$