VIII Lista 1 -

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28. d) Resolução:

$$\lim_{x\to -1} \frac{3x^2-5x+4}{2x+1} \to \frac{3\cdot(-1)^2-5\cdot(-1)+4}{2(-1)+1} \to \frac{3\cdot 1+5+4}{-2+1} \to \frac{12}{-1} = -12$$

30. h) Resolução:

$$\lim_{x\to -2} \frac{8+x^3}{4-x^2} \to \frac{0}{0} \to \text{indeterminação}, \text{ então } \lim_{x\to -2} \frac{8+x^3}{4-x^2}, \text{ como } x=-2 \text{ é raiz, então } x+2=0$$

$$\begin{array}{r|l} x^3+8 & x+2 \\ -x^3-2x^2 & x^2-2x+4 \\ 0-2x^2+8 & \\ +2x^2+4x & \\ 0+4x+8 & \\ -4x-8 & \\ 0 & \end{array}$$

$\therefore\ x^3+8=(x+2)\cdot(x^2-2x+4)$

e $4-x^2=(x+2)(-x+2)$

Logo: $\lim_{x\to -2} \frac{\cancel{(x+2)}(x^2-2x+4)}{\cancel{(x+2)}(-x+2)} \to$

$$\to \frac{4-2\cdot(-2)+4}{-(-2)+2} \to \frac{4+4+4}{4} = \frac{12}{4} = 3$$

33. $f(x) = \begin{cases} \frac{2x^2+9x+9}{x+3} & \text{se } x \neq -3 \\ 3 & \text{se } x = -3 \end{cases}$ mostre $\lim_{x\to -3} f(x) = -3$

$$\begin{array}{r|l} 2x^2+9x+9 & x+3 \\ -2x^2-6x & 2x+3 \\ 0+3x+9 & \\ -3x-9 & \\ 0 & \end{array}$$

$\therefore\ 2x^2+9x+9=(x+3)(2x+3)$ então $\frac{\cancel{(x+3)}\cdot(2x+3)}{\cancel{(x+3)}} \to \lim_{x\to -3}(2x+3)$

$$\to \lim_{x\to -3} -6+3 = -3$$

41. b) Resolução

$$\lim_{x\to 3} \frac{2-\sqrt{x+1}}{x^2-9} \to \frac{0}{0} \text{ indeterminação, então } \overbrace{\frac{2-\sqrt{x+1}}{x^2-9}\cdot\frac{2+\sqrt{x+1}}{2+\sqrt{x+1}}}^{b^2-a^2} \Rightarrow \frac{2^2-(\sqrt{x+1})^2}{x^2-9\,(2+\sqrt{x+1})}$$

$$\to \frac{4-x-1}{x^2-9\,(2+\sqrt{x+1})} \to \frac{\cancel{-x+3}}{(x-3)\cancel{(-x+3)}(2+\sqrt{x+1})} \to \frac{1}{(-x-3)(2+\sqrt{x+1})} \to \frac{1}{(-3-3)\cdot(2+\sqrt{4})} \to$$

$$\frac{1}{-6\cdot 4} \to \cancel{\frac{1}{36}} \to -\frac{1}{24}$$

43. d) Resolução:

$$\lim_{x\to 2} \frac{\sqrt{x^2+x-2}-\sqrt{x^2-x+2}}{\sqrt{x+2}-2} \to \frac{\sqrt{x^2+x-2}-\sqrt{x^2-x+2}}{\sqrt{x+2}-2} * \frac{\sqrt{x+2}+2}{\sqrt{x+2}+2} \to$$

$$\rightarrow \frac{\left(\sqrt{x^2+x-2}-\sqrt{x^2-x+2}\right)\cdot\left(\sqrt{x+2}+2\right)}{\left(\sqrt{x+2}\right)^2-2^2} \rightarrow \frac{\left(\sqrt{x^2+x-2}-\sqrt{x^2-x+2}\right)\left(\sqrt{x+2}+2\right)}{x-2} * \frac{\left(\sqrt{x^2+x-2}+\sqrt{x^2-x+2}\right)}{\left(\sqrt{x^2+x-2}+\sqrt{x^2-x+2}\right)}$$

$$\rightarrow \frac{\left[\left(\cancel{\sqrt{x^2+x-2}}\right)^{\cancel{2}}-\left(\cancel{\sqrt{x^2-x+2}}\right)^{\cancel{2}}\right]\cdot\left(\sqrt{x+2}+2\right)}{(x-2)\left(\sqrt{x^2+x-2}+\sqrt{x^2-x+2}\right)} \rightarrow \frac{\left[\cancel{x^2}+x-2-(\cancel{x^2}-x+2)\right]\cdot\left(\sqrt{x+2}+2\right)}{(x-2)\left(\sqrt{x^2+x-2}+\sqrt{x^2-x+2}\right)} \rightarrow$$

$$\frac{(2x-4)\cdot\left(\sqrt{x+2}+2\right)}{(x-2)\left(\sqrt{x^2+x-2}+\sqrt{x^2-x+2}\right)} \rightarrow \frac{2\cancel{(x-2)}\cdot\left(\sqrt{x+2}+2\right)}{\cancel{(x-2)}\left(\sqrt{x^2+x-2}+\sqrt{x^2-x+2}\right)} \rightarrow$$

$$\frac{2\left(\sqrt{x+2}+2\right)}{\left(\sqrt{x^2+x-2}+\sqrt{x^2-x+2}\right)} \rightarrow \frac{2\left(\sqrt{2+2}+2\right)}{\sqrt{4+\cancel{2}-\cancel{2}}+\sqrt{4-\cancel{2}+\cancel{2}}} \rightarrow \frac{2\cdot 4}{4}=\frac{8}{4}=2$$

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(55) Resolução:

$$f(x)=\begin{cases}1-x^2 & \text{se } x<2\\ 0 & \text{se } x=2\\ x-1 & \text{se } x>2\end{cases}$$

a) $\lim_{x\to 2^+} f(x) \rightarrow \lim_{x\to 2^+} x-1 \rightarrow 2-1 = 1$

b) $\lim_{x\to 2^-} f(x) \rightarrow \lim_{x\to 2^-} 1-x^2 \rightarrow 1-(2)^2 = -3$

c) $\lim_{x\to 2} f(x) = \nexists$

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(60) Resolução:

$f(x)=\frac{|3x-2|}{2-3x}$, definida em $R-\left\{\frac{2}{3}\right\}$

Lembrando: $|x|=\begin{cases}x, & \text{se } x\geq 0\\ -x, & \text{se } x<0\end{cases}$ então $|3x-2|=\begin{cases}+(3x-2), & \text{se } 3x-2\geq 0\\ -(3x-2) & \text{se } 3x-2<0\end{cases} \Rightarrow$

$\Rightarrow |3x-2|=\begin{cases}+(3x-2), & \text{se } x>2/3\\ -(3x-2), & \text{se } x<2/3\end{cases}$

x > a direita

x < a esquerda

a) $\lim_{x\to \frac{2}{3}^+} f(x) \rightarrow \frac{+(3x-2)}{\underbrace{2-3x}_{-(3x-2)}} \rightarrow \frac{+(3x-2)}{-(3x-2)} = -1$

b) $\lim_{x\to \frac{2}{3}^-} f(x) \rightarrow \frac{-(3x-2)}{\underbrace{2-3x}_{-(3x-2)}}$

$\frac{-(3x-2)}{-(3x-2)} = 1$

$\neq$

$\therefore \lim_{x\to 2/3} f(x) = \nexists$