

## Lista 3 - Cálculo Diferencial e Integral I

1. Calcule os limites:

$$(a) \lim_{x \rightarrow 0} \frac{\operatorname{tg} x}{x}$$

$$(b) \lim_{x \rightarrow 0} \frac{x}{\operatorname{sen} x}$$

$$(c) \lim_{x \rightarrow 0} \frac{\operatorname{sen} 6x}{x}$$

$$(d) \lim_{x \rightarrow \pi} \frac{\operatorname{sen} x}{x - \pi}$$

$$(e) \lim_{x \rightarrow 0} \frac{x^2}{\operatorname{sen} x}$$

$$(f) \lim_{x \rightarrow 0} \frac{3x^2}{\operatorname{tg} x \cdot \operatorname{sen} x}$$

$$(g) \lim_{x \rightarrow 0} \frac{1 - \cos x}{x}$$

$$(h) \lim_{x \rightarrow \pi/2} \frac{1 - \operatorname{sen} x}{2x - \pi}$$

$$(i) \lim_{x \rightarrow 0} \frac{\operatorname{tg} 3x}{\operatorname{sen} 4x}$$

$$(j) \lim_{x \rightarrow a} \frac{\operatorname{tg}(x - a)}{x^2 - a^2}, \text{ com } a \neq 0$$

$$(k) \lim_{x \rightarrow a} \frac{\operatorname{sen}(x^2 - a^2)}{x - a}, \text{ com } a \neq 0$$

$$(l) \lim_{x \rightarrow 0} \frac{x + \operatorname{sen} x}{x^2 - \operatorname{sen} x}$$

$$(m) \lim_{x \rightarrow 1} \frac{\operatorname{sen} \pi x}{x - 1}$$

$$(n) \lim_{x \rightarrow 0} \frac{x - \operatorname{sen} x}{x^2}$$

$$(o) \lim_{x \rightarrow 0} \frac{x - \operatorname{tg} x}{x + \operatorname{tg} x}$$

$$(p) \lim_{x \rightarrow a} \frac{\operatorname{sen} x - \operatorname{sen} a}{x - a}$$

$$(q) \lim_{x \rightarrow a} \frac{\cos x - \cos a}{x - a}$$

2. Calcule os limites:

$$(a) \lim_{x \rightarrow +\infty} \frac{1}{x^2}$$

$$(b) \lim_{x \rightarrow -\infty} \frac{2}{x^3}$$

$$(c) \lim_{x \rightarrow -\infty} \left( 5 + \frac{1}{x} + \frac{2}{x^2} \right)$$

$$(d) \lim_{x \rightarrow +\infty} \left( 2 - \frac{1}{x} \right)$$

$$(e) \lim_{x \rightarrow +\infty} \frac{2x + 1}{x + 3}$$

$$(f) \lim_{x \rightarrow -\infty} \frac{2x + 1}{x + 3}$$

$$(g) \lim_{x \rightarrow -\infty} \frac{x^2 - 2x + 3}{3x^2 + x + 1}$$

$$(h) \lim_{x \rightarrow +\infty} \frac{5x^4 - 2x + 1}{4x^4 + 3x + 2}$$

$$(i) \lim_{x \rightarrow +\infty} \frac{x}{x^2 + 3x + 1}$$

$$(j) \lim_{x \rightarrow -\infty} \sqrt[3]{\frac{x}{x^2 + 3}}$$

$$(k) \lim_{x \rightarrow +\infty} \frac{\sqrt{x^2 + 1}}{3x + 2}$$

$$(l) \lim_{x \rightarrow +\infty} \frac{\sqrt[3]{x^3 + 2x - 1}}{\sqrt{x^2 + x + 1}}$$

$$(c) \lim_{x \rightarrow +\infty} (2x - \sqrt{x^2 + 3})$$

$$(m) \lim_{x \rightarrow +\infty} \frac{\sqrt{x} + \sqrt[3]{x}}{x^2 + 3}$$

$$(d) \lim_{x \rightarrow +\infty} (x - \sqrt{x + 3})$$

$$(n) \lim_{x \rightarrow +\infty} \frac{3}{\sqrt{x}}$$

6. Calcule:

$$(a) \lim_{x \rightarrow 3^+} \frac{5}{3 - x}$$

$$(o) \lim_{x \rightarrow +\infty} (x - \sqrt{x^2 + 1})$$

$$(b) \lim_{x \rightarrow \frac{1}{2}^+} \frac{-2}{2x - 1}$$

$$(p) \lim_{x \rightarrow -\infty} (\sqrt{2 - x} - \sqrt{1 - x})$$

$$(c) \lim_{x \rightarrow 0^+} \frac{2x + 1}{x}$$

3. Calcule:

$$(a) \lim_{x \rightarrow +\infty} (x^4 - 4x + 1)$$

$$(d) \lim_{x \rightarrow 0^-} \frac{3}{x^2 - x}$$

$$(b) \lim_{x \rightarrow +\infty} (5 - 4x + x^2 - x^5)$$

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

$$(c) \lim_{x \rightarrow -\infty} (3x^3 + 2x + 1)$$

$$(f) \lim_{x \rightarrow 3^+} \frac{x^2 - 3x}{x^2 - 6x + 9}$$

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

$$(g) \lim_{x \rightarrow -1^+} \frac{2x + 1}{x^2 + x}$$

$$(e) \lim_{x \rightarrow +\infty} \frac{5x^3 + 7x - 3}{x^4 - 2x + 3}$$

$$(h) \lim_{x \rightarrow 0^+} \frac{2x + 1}{x^2 + x}$$

$$(f) \lim_{x \rightarrow -\infty} \frac{2x + 3}{x + 1}$$

$$(i) \lim_{x \rightarrow -1^+} \frac{3x^2 - 4}{1 - x^2}$$

$$(g) \lim_{x \rightarrow -\infty} \frac{5 - x}{3 + 2x}$$

$$(j) \lim_{x \rightarrow 0^+} \frac{\text{sen } x}{x^3 - x^2}$$

4. Mostre que  $\lim_{x \rightarrow +\infty} \sqrt{x} = +\infty$ .

5. Calcule:

$$(a) \lim_{x \rightarrow +\infty} \frac{\sqrt{x} + 1}{x + 3}$$

$$(b) \lim_{x \rightarrow +\infty} \frac{x + \sqrt{x + 3}}{2x - 1}$$

7. Dê exemplo de funções  $f$  e  $g$  tais que  $\lim_{x \rightarrow +\infty} f(x) = +\infty$ ,  $\lim_{x \rightarrow +\infty} g(x) = +\infty$  e  $\lim_{x \rightarrow +\infty} [f(x) - g(x)] \neq 0$ .

8. Dê exemplo de funções  $f$  e  $g$  tais que  $\lim_{x \rightarrow +\infty} f(x) = +\infty$ ,  $\lim_{x \rightarrow +\infty} g(x) = +\infty$  e  $\lim_{x \rightarrow +\infty} \left[ \frac{f(x)}{g(x)} \right] \neq 1$ .

9. Dê exemplo de funções  $f$  e  $g$  tais que  $\lim_{x \rightarrow a} f(x) = +\infty$ ,  $\lim_{x \rightarrow a} g(x) = 0$  e  $\lim_{x \rightarrow a} [f(x) \cdot g(x)] \neq 0$ .