Cálculo 1 - Quarta Lista de Exercícios
Cálculo de Limites Infinitos
e Limites no Infinito

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1. Calcule os limites

(a)
$$\lim_{x\to 0^+} \frac{\tan x}{x^3+x^2},$$

(b)
$$\lim_{x\to 0^-} \frac{\tan x}{x^3+x^2},$$

(c)
$$\lim_{x\to 0^+} \frac{1-\cos x}{x^4-x^3},$$

(d)
$$\lim_{x\to 0^-} \frac{1-\cos x}{x^4-x^3},$$

(e)
$$\lim_{x\to 0^+} \frac{1-\sec x}{x^4-x^3},$$

(f)
$$\lim_{x\to 0^-} \frac{1-\sec x}{x^4-x^3},$$

(g)
$$\lim_{x\to 0^+} \frac{\mathrm{csc} x}{x^2+x},$$

(h)
$$\lim_{x\to 0^-} \frac{\mathrm{csc} x}{x^2+x},$$

(i)
$$\lim_{x\to 0^+} \frac{\operatorname{sen}^2 x}{x^4+x^3},$$

(j)
$$\lim_{x\to 0^-} \frac{\operatorname{sen}^2 x}{x^4+x^3},$$

(k)
$$\lim_{x\to 0^+} \frac{1-\cos x}{x^5+x^4},$$

(l)
$$\lim_{x\to 0^-} \frac{1-\cos x}{x^5+x^4},$$

(m)
$$\lim_{x\to \frac{\pi}{2}^+} \frac{\operatorname{sen} x-1}{x^5-\frac{\pi}{2}x^4},$$

(n)
$$\lim_{x\to \frac{\pi}{2}^-} \frac{\operatorname{sen} x-1}{x^5-\frac{\pi}{2}x^4},$$

(o)
$$\lim_{x\to \pi^+} \frac{\cos x+1}{\pi x^4-x^5},$$

(p)
$$\lim_{x\to \pi^-} \frac{\cos x+1}{\pi x^4-x^5},$$

2. Seja
$$f(x)=\frac{x^2+3x-10}{x^3-x^2-2x}.$$

Obtenha o domínio de f.

Calcule

(a)
$$\lim_{x\to 2} f(x),$$

(b)
$$\lim_{x\to 0^+} f(x),$$

(c)
$$\lim_{x\to 0^-} f(x),$$

(d)

$$\lim_{x \to -1^+} f(x),$$

(e)

$$\lim_{x \to -1^-} f(x).$$

3. Seja

$$f(x) = \frac{|x-1|}{x^2-1}.$$

Obtenha o domínio de f.

Calcule

(a)

$$\lim_{x \to 1^+} f(x),$$

(b)

$$\lim_{x \to 1^-} f(x),$$

(c)

$$\lim_{x \to -1^+} f(x),$$

(d)

$$\lim_{x \to -1^-} f(x),$$

4. Seja

$$f(x) = \frac{|x^2+x-2|}{x^2+2x-3}.$$

Obtenha o domínio de f.

Calcule

(a)

$$\lim_{x \to 1^+} f(x),$$

(b)

$$\lim_{x \to 1^-} f(x),$$

(c)

$$\lim_{x \to -3^+} f(x),$$

(d)

$$\lim_{x \to -3^-} f(x),$$

5. Seja
$$f(x) = \frac{x^3 + 5x - 1}{\sqrt{3x^6 + 2}}.$$
   (a) Calcule
   $$\lim_{x \to +\infty} f(x).$$
   (b) Calcule
   $$\lim_{x \to -\infty} f(x).$$
6. Calcule
$$\lim_{x \to +\infty} \sqrt{4x^2 + 3x} - 2x.$$
7. Calcule
$$\lim_{x \to -\infty} \sqrt{16x^2 + 5x} + 4x.$$
8. Seja $f : \mathbb{R} \to \mathbb{R}$ onde
$$f(x) = \begin{cases} \frac{x^2+\alpha x+6}{x-3}, & \text{se } x < 3 \\ 2\beta + 1, & \text{se } x = 3 \\ 2x^2 + 3\gamma x + 1, & \text{se } x > 3. \end{cases}$$
   Obtenha α, β e $\gamma \in \mathbb{R}$ tais que f seja contínua em $\mathbb{R}$.
9. Seja $f : \mathbb{R} \to \mathbb{R}$ onde
$$f(x) = \begin{cases} \frac{x^2+\alpha x-10}{|x-5|}, & \text{se } x < 5 \\ 3x^2 + \beta x - 1, & \text{se } x \geq 5. \end{cases}$$
   Obtenha α e $\beta \in \mathbb{R}$ tais que f seja contínua em $\mathbb{R}$.
10. Seja
$$f(x) = \frac{3x + 1}{\sqrt{x^2 + x - 6}}.$$
    Obtenha o domínio de f.
    Obtenha as assíntotas verticais e horizontais de f.