Ministério da Educação
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Professor(a): _____	**Disciplina:** Cálculo 1
Aluno(a): _____	**Data:**__ / __ / __

Lista de Exercícios 2 - Limites

1. Calcule os limites no infinito, se existir:

(a) $\lim\limits_{x\to+\infty} \dfrac{x^2+x-3}{3x^2-4}$

(b) $\lim\limits_{x\to-\infty} \dfrac{3x-2}{5x^2+3}$

(c) $\lim\limits_{x\to+\infty} \sqrt{\dfrac{x-3}{2x^2+6}}$

(d) $\lim\limits_{x\to+\infty} \sqrt{\dfrac{4x+3}{2+x}}$

(e) $\lim\limits_{x\to+\infty} \sqrt{x^2+1}-x$

(f) $\lim\limits_{x\to+\infty} \sqrt{x^2+x}-x$

(g) $\lim\limits_{x\to+\infty} \dfrac{1}{\sqrt{x}}$

(h) $\lim\limits_{x\to+\infty} 2+\dfrac{1}{\sqrt{x}}$

(i) $\lim\limits_{x\to+\infty} x+\sqrt{x^2+4}$

(j) $\lim\limits_{x\to-\infty} e^x$

(k) $\lim\limits_{x\to+\infty} \left(1+\dfrac{2}{x}\right)^2$

(l) $\lim\limits_{x\to+\infty} \left(1-\dfrac{1}{x}\right)^3$

(m) $\lim\limits_{x\to-\infty} \left(3+e^{-\frac{1}{x}}\right)$

(n) $\lim\limits_{x\to+\infty} \ln(x^2+1)$

(o) $\lim\limits_{x\to-\infty} \ln(x^2-1)$

(p) $\lim\limits_{x\to+\infty} x-\sqrt{x^2-1}$

2. Calcule:

(a) $\lim\limits_{x\to+\infty} (5x^3-3x^2-2x-1)$

(b) $\lim\limits_{x\to-\infty} (2x^5-x^4+2x^2-1)$

(c) $\lim\limits_{x\to-\infty} (-3x^4+2x^2-1)$

(d) $\lim\limits_{x\to+\infty} (3x^4+5x^2+8)$

(e) $\lim\limits_{x\to-\infty} (-5x^3+3x-2)$

(f) $\lim\limits_{x\to+\infty} (-x^2+3x-2)$

(g) $\lim\limits_{x\to+\infty} \dfrac{2x^3-3x^2+x-1}{x^2+x-3}$

(h) $\lim\limits_{x\to-\infty} \dfrac{2x^2+1}{x^2-1}$

(i) $\lim\limits_{x\to-\infty} \dfrac{3x}{x^2-3}$

(j) $\lim\limits_{x\to-\infty} \dfrac{3x^3-5x^2+2x+1}{9x^3-5x^2+x-3}$

(k) $\lim\limits_{x\to-\infty} \dfrac{2x^3+5x^2-8}{4x^5-8x+7}$

(l) $\lim\limits_{x\to-\infty} \dfrac{5x^3-2x^2+1}{x+7}$

(m) $\lim\limits_{x\to-\infty} \dfrac{x^2+x+1}{(x+1)^3-x^3}$

(n) $\lim\limits_{x\to-\infty} \dfrac{(3x+2)^3}{2x(3x+1)(4x-1)}$

(o) $\lim\limits_{x\to+\infty} \dfrac{\sqrt{x^2+x+1}}{x+1}$

(p) $\lim\limits_{x\to-\infty} \dfrac{\sqrt{x^2+x+1}}{x+1}$

(q) $\lim\limits_{x\to+\infty} \dfrac{2x^2-3x-5}{\sqrt{x^4+1}}$

(r) $\lim\limits_{x\to-\infty} \dfrac{2x^2-3x-5}{\sqrt{x^4+1}}$

3. Determine o limite das funções trigonométricas, se existirem:

(a) $\lim_{x\to+\infty} \cos\frac{1}{x}$

(b) $\lim_{\theta\to 0} \frac{\theta}{\cos\theta}$

(c) $\lim_{x\to 0} \frac{\operatorname{sen} x}{5x}$

(d) $\lim_{x\to\frac{\pi}{2}} \left(\frac{\cos x}{x-\frac{\pi}{2}}\right)$

(e) $\lim_{x\to\pi} \frac{\operatorname{sen} x - \operatorname{sen}\pi}{x-\pi}$

(f) $\lim_{x\to 0} \frac{\operatorname{sen} x(1-\cos x)}{2x^2}$

(g) $\lim_{t\to 0} \frac{\operatorname{sen}(3t)}{2t}$

(h) $\lim_{x\to 0} \frac{\operatorname{sen}(2x)}{\operatorname{sen}(3x)}$

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

(j) $\lim_{x\to 0} \frac{\tan^2(x)}{x}$

(k) $\lim_{t\to\pi^+} \frac{\operatorname{sen}(t)}{t-\pi}$

(l) $\lim_{x\to 0} \frac{1-\cos x}{x}$

(m) $\lim_{x\to 0} \frac{1-\cos x}{x\operatorname{sen} x}$

(n) $\lim_{x\to 0} \frac{1-\sec x}{x^2}$

(o) $\lim_{x\to 0} \frac{\tan x + \operatorname{sen} x}{x}$

(p) $\lim_{x\to\frac{\pi}{4}} \frac{\operatorname{sen} x - \cos x}{1-\tan x}$

(q) $\lim_{x\to 0} \frac{\tan x - \operatorname{sen} x}{\operatorname{sen}^2 x}$

(r) $\lim_{x\to\frac{\pi}{4}} \frac{\cos 2x}{\cos x - \operatorname{sen} x}$

(s) $\lim_{x\to 0} \frac{x-\operatorname{sen} x}{x+\operatorname{sen} x}$

(t) $\lim_{x\to 0} \frac{x-\operatorname{sen} 2x}{x+\operatorname{sen} 3x}$

(u) $\lim_{x\to\pi} \frac{1-\operatorname{sen}\frac{x}{2}}{\pi-x}$

(v) $\lim_{x\to 0} \frac{1-\cos 2x}{3x^2}$

(w) $\lim_{x\to 0} \frac{\tan x - \operatorname{sen} x}{x^3}$

(x) $\lim_{x\to 0} \frac{\operatorname{sen}(x-a) - \operatorname{sen} a}{x}$

(y) $\lim_{x\to 0} \frac{\cos(x-a) - \cos a}{x}$

(z) $\lim_{x\to 0} \frac{1-\cos x}{x^2}$

(a_1) $\lim_{x\to 0} \frac{-x^2}{\cos^2 x - 1}$

(b_1) $\lim_{x\to 0} \frac{x\operatorname{sen} x}{1-\cos x}$

(c_1) $\lim_{x\to 0} \frac{\operatorname{sen} 5x}{\tan 4x}$

(d_1) $\lim_{x\to 0} \frac{1-\cos x}{x^2}$

4. Calcule os seguintes limites:

(a) $\lim_{n\to+\infty} \left(1+\frac{1}{n}\right)^{n+2}$

(b) $\lim_{n\to+\infty} \left(1+\frac{3}{n}\right)^{n}$

(c) $\lim_{x\to+\infty} \left(\frac{x}{1+x}\right)^{x}$

(d) $\lim_{x\to+\infty} \left(1+\frac{5}{x}\right)^{x+1}$

(e) $\lim_{x\to 0} (1+\operatorname{sen} x)^{\frac{1}{\operatorname{sen} x}}$

5. Mostre que:

(a) $\lim_{x\to 0} (1+3x)^{\frac{4}{x}} = e^{12}$

(b) $\lim_{x\to 0} (1+2x)^{\frac{1}{x}} = e^{2}$

(c) $\lim_{x\to 0} \left(1+\frac{x}{3}\right)^{\frac{1}{x}} = e^{\frac{1}{3}} = \sqrt[3]{e}$

(d) $\lim_{x\to 0} \left(1+\frac{4x}{7}\right)^{\frac{1}{x}} = e^{\frac{4}{7}}$

(e) $\lim_{x\to 0}(1-x)^{\frac{1}{x}} = e^{-1} = \frac{1}{e}$

(f) $\lim_{x\to 0}\left(1+\frac{x}{\pi}\right)^{\frac{1}{x}} = e^{\frac{1}{\pi}}$

6. Calcule os limites abaixo:

(a) $\lim_{x\to -1}\frac{\ln(2+x)}{x+1}$

(b) $\lim_{x\to -2}\frac{\ln(3+x)}{x+2}$

(c) $\lim_{x\to 0}\frac{2^x-1}{x}$

(d) $\lim_{x\to 0}\frac{e^{\sin x}-1}{\sin x}$

(e) $\lim_{x\to 0}\frac{\ln(1+x)^2}{x}$

(f) $\lim_{x\to 1}\frac{\ln x^3}{x-1}$

(g) $\lim_{x\to 0}(1+\sin x)^{cossecx}$

(h) $\lim_{x\to 4}\left(\frac{1+x}{5}\right)^{\frac{1}{x-4}}$

(i) $\lim_{x\to 0}\frac{10^x-1}{5^x-1}$

(j) $\lim_{x\to +\infty}\left(1+\frac{2}{x}\right)^x$

7. Calcule o limite:

(a) $\lim_{x\to +\infty} 2^x$

(b) $\lim_{x\to -\infty}\left(\frac{1}{3}\right)^x$

(c) $\lim_{x\to 0}\left(\frac{1}{3}\right)^x$

(d) $\lim_{x\to 1} 2^{4x-1}$

(e) $\lim_{x\to \frac{\pi}{6}} 2^{\sin x}$

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

(g) $\lim_{x\to +\infty} log_3 x$

(h) $\lim_{x\to 0^+} log_3 x$

(i) $\lim_{x\to +\infty}\ln x$

(j) $\lim_{x\to 0^+}\ln 2x$

(k) $\lim_{x\to +\infty} log_{\frac{1}{2}} x$

(l) $\lim_{x\to 0^+} log_{\frac{1}{2}} x$