INSTITUTO FEDERAL FLUMINENSE

CAMPUS CAMPOS CENTRO

SEGUNDA LISTA DE LIMITES PARA O CURSO DE SISTEMAS DE INFORMAÇÃO

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Como pedido pela turma, as duas listas de limites JUNTAS somarão 1 ponto na média. Com isso, temos a média M = Teste•0,3 + Lista•0,1 + Prova•0,6.

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1. Considerando o limite $\lim_{x\to 0}\frac{\sin(x)}{x}=1$, calcule os limites abaixo:

(a) $\lim_{x\to 0}\frac{\tan(x)}{x}$ (b) $\lim_{x\to 0}\frac{\sin(3x)}{x}$ (c) $\lim_{x\to 0}\frac{x^2}{\sin(x)}$ (d) $\lim_{x\to 0}\frac{\tan(3x)}{\sin(4x)}$

(e) $\lim_{x\to 0}\frac{x}{\sin(x)}$ (f) $\lim_{x\to \pi}\frac{\sin(x)}{x-\pi}$ (g) $\lim_{x\to 0}\frac{\sin(3x^2)}{\tan(x)\cdot\sin(x)}$ (h) $\lim_{x\to 0} x\cdot\sin\frac{1}{x}$

(i) $\lim_{x\to 0}\frac{x-\sin(x)}{x^2}$ (j) $\lim_{x\to 0}\frac{\sin(x)-\sin(p)}{x-p}$ (k) $\lim_{x\to 0}\frac{\sin(7x)}{\sin(9x)}$ (l) $\lim_{x\to 0}\frac{\sin(12x)}{14x}$

(m) $\lim_{x\to 0}\frac{\sin(3x)}{\sin(x)}$ (n) $\lim_{x\to 0}\frac{\sin(4x)}{2x}$ (o) $\lim_{x\to 0}\frac{1-\cos(x)}{x}$ (p) $\lim_{x\to 0}\frac{2x}{\sin(3x)}$

2. Considerando o limite $\lim_{x\to\infty}\left(1+\frac{1}{x}\right)^x=e$, calcule os itens abaixo:

(a) $\lim_{x\to\infty}\left(1+\frac{1}{2x}\right)^x$ (b) $\lim_{x\to\infty}\left(1+\frac{1}{3x}\right)^x$ (c) $\lim_{x\to\infty}\left(1+\frac{1}{3x}\right)^{2x}$ (d) $\lim_{x\to\infty}\left(1+\frac{1}{3x}\right)^{2x+5}$

(e) $\lim_{x\to\infty}\left(\frac{x+1}{x}\right)^x$ (f) $\lim_{x\to\infty}\left(1+\frac{2}{5x}\right)^{3x}$ (g) $\lim_{x\to\infty}\left(1+\frac{1}{2x}\right)^x$ (h) $\lim_{x\to\infty}\left(1+\frac{1}{3x}\right)^{2x}$

(i) $\lim_{x\to\infty}\left(\frac{x+2}{x+1}\right)^x$ (j) $\lim_{x\to 0}(1+x)^{\frac{1}{x}}$ (k) $\lim_{x\to 0}(1+x)^{\frac{1}{2x}}$ (l) $\lim_{x\to 0}(x^2+2x+1)^{\frac{1}{x}}$

(m) $\lim_{x\to 0}(1+2x)^{\frac{2}{3x}}$ (n) $\lim_{x\to 0}(1+2x)^{\frac{2}{x}+1}$ (o) $\lim_{x\to 0}(1+3x)^{\frac{1}{x}}$ (p) $\lim_{x\to 0}(2x^2+3)^{\frac{1}{x}}$

3. Considerando o limite $\lim_{x\to 0}\frac{a^x-1}{x}=\ln a$, calcule os itens abaixo:

(a) $\lim_{x\to 0}\frac{2^x-1}{x}$ (b) $\lim_{x\to 0}\frac{e^x-1}{x}$ (c) $\lim_{x\to 0}\frac{2^x-1}{3x}$ (d) $\lim_{x\to 0}\frac{3^x+3x-1}{5x}$

(e) $\lim_{x\to 0}\frac{3^x-5^x}{x}$ (f) $\lim_{x\to 0}\frac{3^{x^2}-1}{x}$ (g) $\lim_{x\to 0}\frac{4^{5x}-1}{7x}$ (h) $\lim_{x\to 0}\frac{1-e^x}{7x}$

(i) $\lim_{x\to 0}\frac{e^x-e^{-x}}{x}$ (j) $\lim_{x\to 0}\frac{x}{e^x-1}$ (k) $\lim_{x\to 0}\frac{3x}{2^x-1}$ (l) $\lim_{x\to 0}\frac{e^x+\sin(x)-1}{x}$

(m) $\lim_{x\to 0}\frac{3^x-2^x}{x}$ (n) $\lim_{x\to 0}\frac{6^{x^3}-1}{x}$ (o) $\lim_{x\to 0}\frac{3x}{2^x-1+x\cos(x)}$ (p) $\lim_{x\to 0}\frac{7^x+x\cos(x)-1}{x}$

4. Calcule os limites laterais abaixo:

(a) $\lim_{x\to 0^+}\frac{2^x-1}{3x^2}$ (b) $\lim_{x\to 0^-}\frac{2^x-1}{3x^2}$ (c) $\lim_{x\to 0^+}\frac{\sin(x)}{x^2}$ (d) $\lim_{x\to 1^-}\frac{2x}{x-1}$

(e) $\lim_{x\to 0^+}\frac{2^x-1}{3x^3}$ (f) $\lim_{x\to 0^-}\frac{2^x-1}{3x^3}$ (g) $\lim_{x\to 0^-}\frac{\sin(x)}{x^2}$ (h) $\lim_{x\to 3^+}\frac{5x+8}{x^2-9}$

(i) $\lim_{x\to 0^-}\frac{\cos(x)}{x}$ (j) $\lim_{x\to 0^-}\frac{\cos(x)}{x^2}$ (k) $\lim_{x\to\frac{\pi}{2}^+}\sec(x)$ (l) $\lim_{x\to\frac{\pi}{2}^-}\sec(x)$

(m) $\lim_{x\to\frac{\pi}{2}^+}\tan(x)$ (n) $\lim_{x\to\frac{\pi}{2}^-}\tan(x)$ (o) $\lim_{x\to 0^-}\frac{1}{x^2}$ (p) $\lim_{x\to 0^+}\frac{1}{x^2}$

5. Calcule os limites no infinito abaixo:

(a) $\lim_{x\to\infty} e^x$ (b) $\lim_{x\to\infty} e^{\frac{1}{x}}$ (c) $\lim_{x\to-\infty} e^{2x^2-3x+1}$ (d) $\lim_{x\to-\infty}\frac{x^2-3x+1}{3x^2+2x-4}$

(e) $\lim_{x\to\infty} e^{\frac{1}{x}}$ (f) $\lim_{x\to\infty}\ln\left(\frac{x}{x-1}\right)$ (g) $\lim_{x\to\infty}\cos\left(\frac{3x+4}{x^2-1}\right)$ (h) $\lim_{x\to\infty}\frac{x^3+2x-8}{3x^4-x+1}$

(i) $\lim_{x\to\infty} x^2$ (j) $\lim_{x\to-\infty}\frac{\cos(x)}{x}$ (k) $\lim_{x\to-\infty} 3+\frac{2}{x^3}$ (l) $\lim_{x\to\infty}\left(\frac{3x+1}{x-2}\right)^{\frac{1}{3}}$

(m) $\lim_{x\to-\infty} x^2$ (n) $\lim_{x\to\infty}\frac{\sin(x)}{x}$ (o) $\lim_{x\to\infty} e^{\frac{1}{x}}+e^{-x}$ (p) $\lim_{x\to-\infty} 2-\frac{2}{x^2}$

6. Calcule os limites abaixo:

(a) $\lim_{x\to 1} \frac{x^2-1}{x-1}$ (b) $\lim_{x\to \frac{-3}{2}} \frac{4x^2-9}{2x+3}$ (c) $\lim_{x\to 1} \frac{\frac{1}{x^2}-1}{x-1}$ (d) $\lim_{x\to 3} \frac{\frac{1}{x}-\frac{1}{3}}{x-3}$

(e) $\lim_{x\to 2} \frac{x^2-4}{x-2}$ (f) $\lim_{x\to -2} \frac{x^2+3x+2}{x^2+5x+6}$ (g) $\lim_{x\to 1} \frac{x^2+5x-6}{x^2-3x+2}$ (h) $\lim_{x\to 1} \frac{x^2-6x+5}{x^2+4x-5}$

(i) $\lim_{x\to 3} \frac{x^2-9}{x^2+9}$ (j) $\lim_{x\to 1} \frac{x^4-8}{x+3} + \ln(x)$ (k) $\lim_{x\to 10} \frac{x^2-100}{x-10}$ (l) $\lim_{x\to p} \frac{x^2-p^2}{x-p}$

(m) $\lim_{x\to 1} \frac{3x-1}{x+3}$ (n) $\lim_{x\to 3} \ln\left(\frac{x^2-4x+3}{x^2-5x+6}\right)$ (o) $\lim_{x\to 1} \cos(\pi x)$ (p) $\lim_{x\to -1} \frac{x^2+2x+1}{x+1}$

7. Verifique se a função abaixo é contínua no ponto p dado:

(a) $f(x) = \frac{|x|}{x}$
p=0

(b) $f(x) = \frac{|x-1|}{x-1}$
p=1

(c) $f(x) = \frac{|x-1|}{x-1}$
p=-1

(d) $f(x) = \frac{x^2-3x+2}{x-1}$
p=1

(e) $f(x) = \frac{x}{x-2}$
p=2

(f) $f(x) = \vdash^{3x+1,\, x\geq 1}_{2x-8,\, x<1}$
p=1

(g) $f(x) = \vdash^{2x-1,\, x\geq 1}_{4x-3,\, x<1}$
p=1

(h) $f(x) = \vdash^{\sin(x),\, x\geq 0}_{\cos\left(\frac{\pi}{2}-x\right),\, x<0}$
p=0

(i) $f(x) = \frac{2}{x}$
p=0

(j) $f(x) = \frac{3}{x-1}$
p=1

(k) $f(x) = e^{3x+2}$
p=1

(l) $f(x) = e^{\frac{1}{x}}$
p=0