KERBY LOVINCE

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a) $\lim\limits_{x \to 2} \frac{x^2+x-6}{x-2} = \frac{0}{0}$

$\lim\limits_{x \to 2} \frac{(x-2)(x+3)}{x-2}$

$\lim\limits_{x \to 2} x+3 \Rightarrow$

$\boxed{\lim\limits_{x \to 2} = 5}$

b) $\lim\limits_{x \to -4} \frac{x^2+5x+4}{x^2+3x-4} = \frac{0}{0}$

$\lim\limits_{x \to -4} \frac{(x+4)(x+1)}{(x+4)(x-1)}$

$\lim\limits_{x \to -4} \frac{x+1}{x-1} = \frac{-3}{-5}$

$\boxed{\lim\limits_{x \to -4} = 3/5}$

c) $\lim\limits_{x \to 2} \frac{x^2-x+6}{x-2} = \frac{8}{0}$

Pois o limite não Existe

d) $\lim\limits_{x \to 4} \frac{x^2-4x}{x^2-3x-4} = \frac{0}{0}$

$\lim\limits_{x \to 4} \frac{x(x-4)}{(x+1)(x-4)} = \frac{4}{4+1}$

$\boxed{\lim\limits_{x \to 4} = 4/5}$

e) $\lim\limits_{t \to -3} \frac{t^2-9}{2t^2+7t+3} = \frac{0}{0}$

$\lim\limits_{t \to -3} \frac{(t+3)(t-3)}{(t+3)(2t+1)} = \frac{-3}{2(-3)+1}$

$\boxed{\lim\limits_{t \to -3} = 6/5}$

f) $\lim\limits_{x \to -1} \frac{x^2-4x}{x^2-3x-4} = \frac{5}{0}$

O limite não existe

Questão 2

$\lim\limits_{x \to 3} \frac{x^4-8x^3+18x^2-27}{x^4-10x^3+36x^2-54x+27} = \frac{0}{0}$

$\lim\limits_{x \to 3} \frac{(x-3)(x^3-5x^2+3x+9)}{(x-3)(x^3-7x^2+15x-9)}$

$\lim\limits_{x \to 3} \frac{x^3-5x^2+3x+9}{x^3-7x^2+15x-9} = \frac{0}{0}$

$\lim\limits_{x \to 3} \frac{(x-3)(x^2-2x-3)}{(x-3)(x^2-4x+3)} = \frac{0}{0}$

$\lim\limits_{x \to 3} \frac{(x-3)(x+1)}{(x-3)(x-1)} = 4/2$

$\boxed{\lim\limits_{x \to 3} = 2}$

b) $\lim\limits_{x \to 2} \frac{x-2}{\sqrt{2x}-4} = \frac{0}{-2} = 0$

c) $\lim\limits_{x \to 4} \frac{x-4}{\sqrt{x}-2} = \frac{0}{0}$

$\lim\limits_{x \to 4} \frac{x-4(\sqrt{x}+2)}{(\sqrt{x}-2)(\sqrt{x}+2)} = \frac{x-4(\sqrt{x}+2)}{(\sqrt{x})^2-(2)^2}$

$\lim\limits_{x \to 4} \frac{\cancel{x-4}(\sqrt{x}+2)}{\cancel{x-4}} = \sqrt{x}+2 = 4$

$\boxed{\lim\limits_{x \to 4} = 4}$

D) $\lim_{x \to 0} \frac{x}{2-\sqrt{4-x}} = \frac{0}{0}$

$\lim_{x \to 0} \frac{x(2+\sqrt{4-x})}{(2-\sqrt{4-x})(2+\sqrt{4+x})}$

$= \frac{x(2+\sqrt{4-x}}{2^2-(\sqrt{4-x})^2}$

$= \frac{x(2+\sqrt{4-x})}{4-(4+x)} = \frac{x(2+\sqrt{4-x}}{x}$

$= 2+\sqrt{4-0} = 2+2$

$\boxed{\lim_{x \to 0} = 4}$

questão 3

a) $\lim_{x \to \infty} \frac{1}{2x+3}$ Não existe

b) $\lim_{x \to \infty} \frac{3x+5}{x-4} = \frac{\infty}{\infty}$

$= \frac{x(3+5/x)}{x(1-4/x)} = 3$

$\boxed{\lim_{x \to \infty} = 3}$

c) $\lim_{x \to -\infty} \frac{1-x-x^2}{2x^2-7} = \frac{-x^2-x+1}{2x^2-7}$

$\lim_{x \to -\infty} \frac{x^2(-1-1/x+1/x^2)}{x^2(2-7/x^2)}$

$\boxed{\lim_{x \to -\infty} -1/2}$

d) $\lim_{x \to \infty} \frac{2-3y^2}{5y^2+4y} = \frac{\infty}{\infty}$ $x=y$

$= \frac{x^2(-3+2/x^2)}{x^2(5+4/x^2)} = -3/5$

$\boxed{\lim_{x \to \infty} = -3/5}$

E) $\lim_{x \to \infty} \frac{x^3+5x}{2x^3-x^2+4}$

$= \frac{x^3(1+\frac{5}{x^2})}{x^3(2-1/x+4/x^3)} =$

$\boxed{\lim_{x \to \infty} 1/2}$

F) $\lim_{t \to \infty} \frac{t^2+2}{t^3+t^2-1} =$

$= \frac{x^2(1+2/x^2)}{x^3(1+1/x-1/x^3} = \frac{1}{\infty} = 0$

G) $\lim_{x \to +\infty} (5x^3-3x^2-2x-1)$

$= x^3(5-3/x^3-2/x^2-1/x^3) = x^3(5)$

$\boxed{\lim_{x \to +\infty} = +\infty}$

H) $\lim_{x \to -\infty} (2x^5-x^4+2x^2-1)$

$= x^5(2-1/x+2/x^3-1/x^5) = x^3(2)$

$\boxed{\lim_{x \to +\infty} = -\infty}$

Questão 4

a) $\lim_{x\to 5^+} \frac{6}{x-5} = \frac{6}{0^+}$

$\boxed{\lim_{x\to 5^+} = +\infty}$

b) $\lim_{x\to 5^-} \frac{6}{x-5} = \frac{6}{0^-}$

$\boxed{\lim_{x\to 5^-} = -\infty}$

c) $\lim_{x\to 3} \frac{1}{(x-3)^2}$ não Existe

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

$\boxed{\lim_{x\to 0} = -\infty}$

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

$\boxed{\lim_{x\to 2^+} = +\infty}$

f) $\lim_{x\to 5^+} \ln(x-5)$ não Existe

Questão 5

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

$\lim_{x\to 0} \lim \frac{2 sen\, 2x}{2x} \cdot \lim \frac{x}{sen 3x}$

$= 2 \lim_{x\to 0} \frac{sen\, 2x}{2x} \cdot 1/3 \lim \frac{3x}{sen\, 3x}$

$\lim_{x\to 0} 2 \cdot 1 \cdot \frac{1}{3} \cdot 1$

$\boxed{\lim_{x\to 0} = 2/3}$

$\lim_{x\to 0} \frac{sen(3t)}{2t} = \frac{0}{0} \quad x = t$

$\lim_{x\to 0} \frac{sen\, 3x}{2x} = \frac{1}{2} \lim_{x\to 0} \frac{sen\, 3x}{3x}$

$= \frac{3}{2} \lim_{x\to 0} \frac{sen\, 3x}{3x} = \frac{3}{2} \cdot 1$

$\boxed{\lim_{x\to 0} = 3/2}$

$\lim_{x\to +\infty} \left(1+\frac{2}{x}\right)^x \begin{cases} z = x \\ x = z \\ x \to +\infty,\ z \to +\infty \end{cases}$

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

$\lim_{z\to +\infty} \left[\left(1+2/z\right)^z\right]^2 =$

$\boxed{\lim_{z\to +\infty} = \sqrt{e}}$

Questão 6

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

$\lim_{x\to \pm\infty} \frac{3x}{x(1-1/x)} = 3 \quad \boxed{y = 3}$

$AH = 3$

$\lim_{x\to 1^+} \frac{3x}{x-1} = +\infty$

$\lim_{x\to 1^-} \frac{3x}{x-1} = -\infty \quad x = 1\ AV$

b) $f(x) = \frac{2x}{\sqrt{x^2+4}}$

$\lim_{x\to \pm\infty} \frac{\frac{2x}{x}}{\frac{\sqrt{x^2+4}}{\sqrt{x^2}}} = \frac{2}{\sqrt{1+\frac{4}{x^2}}}$

$\lim_{x\to \pm\infty} = 2 \quad \boxed{y = 2}$ A H $\boxed{y = -2}$ A·H

A·V não Existe

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

$\lim_{x \to \pm\infty} \frac{\frac{x}{x}}{\frac{\sqrt{x^2-1}}{\sqrt{x^2}}} = \frac{1}{\sqrt{1+\frac{4}{x^2}}}$

$\lim_{x \pm \infty} = \pm 1$ $\boxed{y=1}$ A.H. $\boxed{y=-1}$ A.H

$\lim_{1^-} = \frac{1}{0^-}$ $\boxed{x=-1}$ A.V

Questão 7

$f(x) = \begin{cases} \frac{x^2-4}{x+2} & x \neq 2 \\ & x = -2 \end{cases}$

$f(-2) = 1$

$\lim_{x \to -2} \frac{x^2-4}{x+2} = \frac{0}{0}$

$\lim_{x \to -2} \frac{(x-2)(x+2)}{x+2} = -4$

$\lim f(-2) \neq \lim f(x)$

não é continua

b) $f(x) = x^3 - 2x + 3$

$= (-2)^3 - 2(-2) + 3 = -1$

$\lim f(x) \neq \lim f(-2)$

Não é continua

c) $f(x) = \frac{x}{x^2-1} = \frac{-2}{(-2)^2-1} = -2/3$

Não é continua

$f(-2) \neq \lim f(x)$

Questão 8

$f(x) = 1 + ax$, se $x \leq 0$

$x^4 + 2a$, se $x > 0$

a função define em $x=0$

Verificação de existencia de limite de $f=0$

$\lim f(x) = \lim 1 + ax = 1 + ax$

$a = a$

$\lim f(a) \neq f(x)$ pois $\nexists \lim f(x)$

Questão 9

a) $f(x) = x^3 + x - 1$ $[0,1]$

$P(1) = 0^3 + 0 - 1 = -1$

$P(2) = 2^2 + 2 - 1 = 5$

$P_1 < 0$

$P_2 > 0$

B) $f(x) = x^3 + 3x - 5$ $[1,2]$

$P(1) = 1^3 + 3(1) - 5 = -1$

$P(2) = 2^2 + 6 - 5 = 5$

$P_1 < 0$

$P_2 > 0$

c) $f(x) = 1 + x\cos(\pi \frac{x}{2})$ $[1/2, 3/2]$

$P_1 = 1 + 1/2 \cos(0) = 3/2$

$P_2 = 1 + 3/2 \cos(0) = 4/3$

$P_1 > 0$

$P_2 > 0$