Resolução p2 de cálculo – Clarisse Midori

05/0...

Prova P2 · Cálculo I - prof. Claudio Pessoa

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

$\lim_{x \to 1} \frac{x^2-1}{x-1} = 2 \quad \therefore \lim_{x \to} \frac{x^2-1}{x-1} = 2$

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

$2 - 1 \quad 2.(-1)$

$\lim_{x \to 1} \frac{1+2}{1} = 3 \quad \therefore \lim_{x \to 1} \frac{x^2+x-2}{x^2-x} = 3$

c) $\lim_{x \to \infty} \frac{2x(x-1)}{4+9x^2} = \lim \frac{2x^2-2x}{4+9x^2} = \frac{2\cancel{x^2}}{9\cancel{x^2}} = \frac{2}{9}$

$\therefore \lim_{x \to \infty} \frac{2x(x-1)}{4+9x^2} = \frac{2}{9}$

d) $\lim_{x \to -\infty} \frac{\sqrt{3x^4+x}}{x^2-8} = \lim_{x \to -\infty} \frac{\sqrt{\frac{3x^4}{x^4} + \frac{x}{x^4}}}{\frac{x^2}{x^2} - \frac{8}{x^2}} = \lim_{x \to -\infty} \frac{\sqrt{3 + \frac{1}{x^3}}}{1 - \frac{8}{x^2}}$

$= \lim_{x \to -\infty} \frac{\sqrt{3 + \cancel{\frac{1}{x^3}}^{0}}}{1 - \cancel{\frac{8}{x^2}}^{0}} = \lim_{x \to -\infty} \frac{\sqrt{3}}{1} \quad \therefore \lim_{x \to -\infty} \frac{\sqrt{3x^4+x}}{x^2-8} = \sqrt{3}$

2) o teorema do confronto define um limite por "exclusão", ou seja, tendo $a(x) \leq b(x) \leq c(x)$, se $\lim_{x \to K} a(x) = \lim_{x \to K} c(x) = C$, então $\lim_{x \to K} b(x) = C$.

$\lim_{x \to 0} x^2 \operatorname{sen} \frac{1}{x^2}$

$0 \leq \operatorname{sen} \frac{1}{x} \leq 1 \quad . x^2$

$0 \leq x^2 . \operatorname{sen} \frac{1}{x} \leq x^2$

$\lim_{x \to 0} 0 \leq \lim_{x \to 0} x^2 . \operatorname{sen} \frac{1}{x} \leq \lim_{x \to 0} x^2$

$\therefore \lim_{x \to 0} x^2 \operatorname{sen} 1/x^2 = 0$

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③ $f(x) = -\frac{8}{x^2-4}$

será assímtota vertical se $\lim_{x \to a^+} f(x) = +\infty$, $\lim_{x \to a^-} f(x) = -\infty$

$\lim_{x \to a^+} f(x) = -\infty$, $\lim_{x \to a^-} f(x) = +\infty$

$f(x) = \frac{-8}{(x+2)(x-2)}$, portanto x não pode ser 2 e nem -2

∴ as assímtotas verticais estão localizadas em $x = -2$ e $x = 2$.

④ ⓐ $f(x) = (\cos x)(\ln x + x^2 - 2)$

$f'(x) = \cos x \cdot (\frac{1}{x} + 2x) + (\ln x + x^2 - 2) \cdot (-\text{sen}\, x)$

$f'(1) = \cos 1 \cdot (\frac{1}{1} + 2 \cdot 1) + (\ln 1 + 1^2 - 2) \cdot (-\text{sen}\, 1)$

$f'(1) =$

ⓑ $f(x) = \frac{2x^2 + 3x - 6}{x - 2} \iff f'(x) = \frac{(x-2) \cdot (4x+3) - (2x^2+3x-6) \cdot 1}{(x-2)^2}$

$f'(x) = \frac{4x^2 + 3x - 8x - \cancel{6} - 2x^2 - \cancel{3x} + \cancel{6}}{(x-2)^2} = \frac{2x^2 - 8x}{(x-2)^2}$

$f'(x) = \frac{2x^2 - 8x}{(x-2)^2}$ $f'(1) = \frac{2 \cdot 1^2 - 8 \cdot 1}{(1-2)^2} = \frac{2-8}{-1^2} = -6$

$f'(1) = -6$

ⓒ $f(x) = \ln(\cos(e^{x^3+2x+3})) = \frac{1}{\cos(e^{x^3+2x+3})} \cdot -\text{sen}\, e^{x^3+2x+3} \cdot e^{x^3+2x+3} \cdot 3x^2+2$

$f'(x) = \frac{1}{\cos(e^{x^3+2x+3})} \cdot -\text{sen}\, e^{x^3+2x+3} \cdot e^{x^3+2x+3} \cdot 3x^2+2$

ⓓ $f(x) = \frac{\overbrace{2x^2(x-3)}^{2x^3-6x^2}}{2+3x^2} = \frac{(2+3x^2) \cdot (6x^2-12x) - 6x \cdot (2x^3-6x^2)}{(2+3x^2)^2}$

$\frac{12x^2 - 24x + \cancel{18x^4}^{6x^4} - \cancel{36x^3} - \cancel{12x^4} + \cancel{36x^3}}{(2+3x^2)^2} = \frac{6x^4 + 12x^2 - 24x}{(2+3x^2)^2}$

$f'(x) = \frac{6x^4 + 12x^2 - 24x}{(2+3x^2)^2}$ $f'(1) = \frac{6 + 12 - 24}{(2+3)^2} = \frac{-6}{25}$

$f'(1) = \frac{-6}{25}$

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5) $y = \sqrt{x^2+16}$ eq. da reta tangente a C no ponto $(3,5)$ $x = 3$ $y = 5$

$y - y_0 = m(x - x_0)$ $y - 5 = \frac{x}{\sqrt{x^2+16}}(x-3)$

$m = f'(x)$ $y = \frac{x}{\sqrt{x^2+16}} \cdot (x-3) - 5$

$m = \frac{x}{\sqrt{x^2+16}}$

$y = \frac{x}{\sqrt{x^2+16}} \cdot (x-3) - 5$