

Resolução p2 de cálculo – Clarisse Midori

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Prova P2 - Cálculo I - prof. Claudio Pessoa

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

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

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

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

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

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

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

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

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

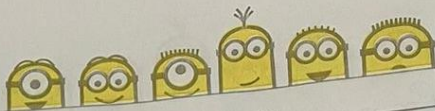
$0 \leq \sin \frac{1}{x} \leq 1 \cdot x^2$

$\lim_{x \rightarrow 0} x^2 \sin \frac{1}{x^2} \quad 0 \leq x^2 \sin \frac{1}{x^2} \leq x^2$

$\lim_{x \rightarrow 0} 0 \leq \lim_{x \rightarrow 0} x^2 \sin \frac{1}{x^2} \leq \lim_{x \rightarrow 0} x^2$

$\therefore \lim_{x \rightarrow 0} x^2 \sin \frac{1}{x^2} = 0$

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③ $f(x) = -\frac{8}{x^2-4}$

sendo assíntota vertical se $\lim_{x \rightarrow a^+} f(x) = +\infty$ ou $\lim_{x \rightarrow a^-} f(x) = -\infty$
 $\lim_{x \rightarrow a^+} f(x) = -\infty$, $\lim_{x \rightarrow a^-} f(x) = +\infty$, $\lim_{x \rightarrow a} f(x) = -\infty$

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

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

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

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

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

$f'(1) =$

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

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

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

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

$f'(1) = -6$

⑦ $f(x) = \ln(\cos(e^{x^3+2x+3})) = \frac{1}{\cos(e^{x^3+2x+3})} \cdot -\sin e^{x^3+2x+3} \cdot (3x^2+2)$

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

⑧ $f(x) = \frac{2x^3-6x^2}{2+3x^2} = \frac{(2+3x^2)(6x^2-12x)-6x \cdot (2x^3-6x^2)}{(2+3x^2)^2}$

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

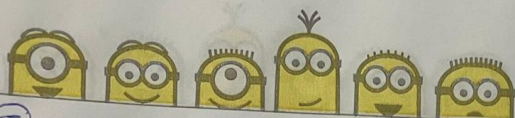
$f'(x) = \frac{6x^4+12x^2-24x}{(2+3x^2)^2}$

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

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

spiral

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5) $y = \sqrt{x^2 + 16}$ eq. da reta tangente a C

no ponto (3,5) $x=3$ $y=5$

$$y - y_0 = m(x - x_0)$$

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

$$m = f'(x)$$

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

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

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