Prova 1 - Calculo 1

Igor Rosllke

2 - (i) $\lim_{x \to 4} \frac{x^2 - 4x}{x^3 - 4x^2 + x - 4}$: Simplificando: $\frac{x}{x^2+1}$

$\frac{4}{4^2+1} = \frac{4}{17}$ ← $\lim_{x \to 4} \left(\frac{x}{x^2+1}\right)$

2 - (ii) $\lim_{x \to 2} \frac{\sqrt{4x+1} - 3}{x - 2}$; = $\lim_{x \to 2^+} \left(\frac{\sqrt{4x+1-3}}{x-2}\right) = \infty$

$\lim_{x \to 2^-} \left(\frac{\sqrt{4x+1-3}}{x-2}\right) = -\infty$

se $\lim_{x \to a^-} f(x) \neq \lim_{x \to a^+} f(x)$

Então o limite não existe

Não existe

2 - (iii) $\lim_{x \to +\infty} \frac{3x^4 - 6x^2 + 1}{6x - x^3 - 2x^4}$; = $\frac{3 - \frac{6}{m^2} + \frac{1}{m^4}}{\frac{6}{m^3} - \frac{1}{m} - 2}$

$$\frac{\lim_{m \to -\infty}\left(3 - \frac{6}{m^2} + \frac{1}{m^4}\right)}{\lim_{m \to -\infty}\left(\frac{6}{m^3} - \frac{1}{m} - 2\right)} = \lim_{m \to -\infty}\left(3 - \frac{6}{m^2} + \frac{1}{m^4}\right) = 3$$

$$\lim_{m \to -\infty}\left(\frac{6}{m^3} - \frac{1}{m} - 2\right) = -2$$

$\frac{3}{-2} = -\frac{3}{2}$

credeal

/ /

2-(iv) $\lim_{x \to +\infty} \left(1 + \frac{4}{x}\right)^{x+2} = \lim_{m \to \infty} \left(\left(1+\frac{4}{m}\right)^m \left(1+\frac{4}{m}\right)^2\right)$

$\lim_{m \to \infty} \left(\left(1+\frac{4}{m}\right)^m\right) = e^4$

$\lim_{m \to} \left(\left(1+\frac{4}{m}\right)^2\right) = 1 \quad = e^4 \cdot 1 = e^4 = 54{,}598$

4- $x^2 - e^x + 2 = 0$

usando 1,3 e 1,4

$1{,}3^2 - 2{,}72^{1,3} + 2 = 0$

$1{,}69 - 3{,}67 + 2$

$0{,}02$

$1{,}4^2 - 2{,}72^{1,4} + 2 = 0$

$1{,}96 - 4{,}05 + 2 =$

$-2{,}09 + 2$

$-0{,}09$

$\{0{,}02 ; -0{,}09\}$

6-(i) $y = \frac{x^2 - 1}{x^3 - \text{sen}(x)} = \frac{d}{dx}\left(\frac{x^2-1}{x^3 - \text{sen}(x)}\right)$

Regra do quociente

$\left(\frac{f}{g}\right)' = \frac{f' \cdot g - g' \cdot f}{g^2} = \frac{\frac{d}{dx}(x^2-1) \cdot (x^3 - \text{sen}\, x) - \frac{d}{dx}(x^3 - \text{sen}\, x)(x^2-1)}{(x^3 - \text{sen}\, x)^2}$

$\frac{d}{dx}(x^2-1) = 2x \qquad \frac{d}{dx}(x^3 - \text{sen}\, x) = 3x^2 - (\text{sen}\, 1) =$

$$\frac{2x(x^3 - \text{sen}\, x) - (3x^2 - (\text{sen}\, 1)) \cdot (x^2 - 1)}{(x^3 - \text{sen}\, x)^2}$$

6-(ii) $y = (x - \cos x^2)\ \ln(3x^4 - 2)$

Aplicando a regra do Produto: $f = x - \cos(x^2)$

$g = \ln(3x^4 - 2)$

$(x - \cos(x^2))' \ln(3x^4 - 2) + (\ln(3x^4 - 2))'.(x - \cos(x^2))$

$$\frac{d}{dx}(\ln(3x^4 - 2)) = \frac{12x^3}{3x^4 - 2}$$

$$(1 + 2x\ \mathrm{sen}(x^2))\ \ln(3x^4 - 2) + \frac{12x^3}{3x^4 - 2}(x - \cos(x^2))$$

Multiplicando frações:

$$\ln(3x^4 - 2).(1 + 2x\ \mathrm{sen}(x^2)) + \frac{12x^3(x - \cos(x^2))}{3x^4 - 2}$$

6-(iii) $y = tg(x^3 - 7x) - 3 + cotg(5x)$

Aplicando a regra da soma e diferença

$$\frac{d}{dx}(\tan(x^3 - 7x)) - \frac{d}{dx}(3) + \frac{d}{dx}(\cot an(5x))$$

$$\frac{d}{dx}(\tan(x^3 - 7x)) = \mathrm{sen}^2(x^3 - 7x).(3x^2 - 7) \quad = (3) = 0$$

$$\frac{d}{dx}(\cot an(5x)) = \mathrm{cosec}^2(5x).5$$

$$\mathrm{sen}^2(x^3 - 7x).(3x^2 - 7) - 0 + \mathrm{cosec}^2(5x).5$$

$$\mathrm{sen}^2(x^3 - 7x).(3x^2 - 7) + 5\,\mathrm{cosec}^2(5x)$$

/ /

6-(iv) = $y = 3(4x^3-5)^5 - \frac{3}{x^6} + e^{x-x^2}$

Soma e diferença = $\frac{d}{dx}\left(\tan(3).(4x^3-5)^5\right) - \left(\frac{3}{x^6}\right) + \frac{d}{dx}\left(e^{x-x^2}\right)$

$\frac{d}{dx}\left(\tan(3)(4x^3-5)^5\right) = 60\tan(3)x^2(4x^3-5)^4$

$\frac{d}{dx}\left(\frac{3}{x^6}\right) = -\frac{18}{x^7}$; $\frac{d}{dx}\left(e^{x-x^2}\right) = e^{x-x^2}(1-2x)$

$60\tan(3)x^2(4x^3-5)^4 - \left(-\frac{18}{x^7}\right) + e^{x-x^2}(1-2x) =$

$60\tan(3)x^2(4x^3-5)^4 + \frac{18}{x^7} + e^{x-x^2}(1-2x)$

6-(v) = $y = \sec(3-2x^3) + \operatorname{cosec}^3(2x+4) + \sqrt{1+x^2}$

simplificando $\tan\left(\sec(3-2x^3) + \operatorname{cosec}^3(2x+4) + \sqrt{1+x^2}\right)$:

$\frac{d}{dx}\tan\left(\sec(3-2x^3) + \operatorname{cosec}^3(2x+4) + 1 + x^2\right)$:

$\frac{d}{dx}\left(\tan\left(\sec(3-2x^3) + \operatorname{cosec}^3(2x+4) + 1 + x^2\right)\right)$

Regra cadeia:

$\sec^2\left(\sec(3-2x^3) + \operatorname{cosec}^3(2x+4) + 1 + x^2\right)$

$d/dx\left(\sec(3-2x^3) + \operatorname{cosec}^3(2x+4) + 1 + x^2\right) =$

$\sec^2\left(\sec(3-2x^3) + \operatorname{cosec}^3(2x+4) + 1 + x^2\right) d/dx\left(\sec(3-2x^3) + \operatorname{cosec}^3(2x+4) + 1 + x^2\right)$

$= \sec^2\left(\sec(3-2x^3) + \operatorname{cosec}^3(2x+4) + 1 + x^2\right)\left(-6x^2\sec(-2x^3+3)\tan(-2x^3+3) + 2x - 6\operatorname{cosec}^3(2x+4)\cot(2x+4)\right)$

3- $f(x) = \frac{2x^2}{x^2-4}$ $\cdot 2^2 - 4 = 0$ $f(x) = \frac{2x^2}{x^2-4}$; $x \neq -2, x \neq 2$

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

$\lim_{x \to 2} \frac{2x^2}{x^2-4} = \frac{-2 = -\infty}{+2 = +\infty}$ $y = -2;\ x = 2$

$f(x) = \frac{2x^2}{x^2-4}$; $\lim_{x \to +\infty} \frac{2x^2}{x^2-4} = \frac{+\infty}{+\infty}$ = Indeterminado

$\frac{2x^2}{\cancel{x^2} \cdot 4 - \frac{4}{x^2}} = \frac{2}{1 - \frac{4}{x^2}} = \frac{2}{1 - 4 \cdot 0} = \frac{2}{1} = 2$

$\lim_{x \to -\infty} \frac{2x^2}{x^2-4}$ = Indeter. $\frac{2x^2}{x^2 \cdot \left(1 - \frac{4}{x^2}\right)} = \frac{2}{1 - \frac{4}{x^2}} = \frac{2}{1 - 4 \cdot 0} = 2$

(horizontal 2, vertical 2, e -2)