① fatore ↓

Calcular o limite $\lim_{x\to 5}\left(\frac{x^2-3x-10}{x^2-10x+25}\right)=\frac{7}{0}$ O limite é indefinido p/ $x=5$ portanto deve calcular os limites laterais. se ≠ então não existe

③ $\lim_{x\to 3^-}\left(\frac{1}{|x-3|}\right)=\frac{1}{|0^-|}=\frac{1}{0^+}=+\infty$

④ definição formal de limites $\lim_{x\to -\frac{1}{2}}\left(\frac{4x^2-1}{2x+1}\right)=2$ $\left|\left(\frac{4x^2-1}{2x+1}\right)-(-2)\right|<\varepsilon$ Soma a fração = ou Divida o Polinomio $|2x+1|<\varepsilon$ $|2|\cdot|x+\frac{1}{2}|<\varepsilon$ $|x+\frac{1}{2}|<\frac{\varepsilon}{2}$ $\delta=\frac{\varepsilon}{2}$

Pontos de descontinuidade através dos limites $f(x)=\left(\frac{2x+1}{4x^2+4x+5}\right)$ não será contínua quando o denominador for zero. Como denominador Ñ possui Raízes, é contínua

calcular o limite $\lim_{x\to 0}\left(\frac{\text{sen}(2x)}{\text{sen}(4x)}\right)=\lim\left(\frac{\frac{\text{sen}(2x)}{2x}\cdot 2x}{\frac{\text{sen}(4x)}{4x}\cdot 4x}\right)=\lim\left(\frac{\frac{\text{sen}\,2x}{2x}}{\frac{\text{sen}\,4x}{4x}}\cdot\frac{2x}{4x}\right)=$

$\lim_{x\to 0}\left(\frac{\frac{\text{sen}\,2x}{2x}}{\frac{\text{sen}\,4x}{4x}}\right)\cdot\lim_{x\to 0}\left(\frac{2x}{4x}\right)=\frac{\lim\left(\frac{\text{sen}\,2x}{2x}\right)}{\lim\left(\frac{\text{sen}\,4x}{4x}\right)}\cdot\lim\left(\frac{2x}{4x}\right)=\frac{1}{1}\cdot\frac{2}{4}=\frac{2}{4}$

⑦ $\lim_{x\to 1}\left(\frac{e^{x-1}-a^{x-1}}{x^2-1}\right)=\lim_{x\to 1}\left(\frac{e^{x-1}-a^{x-1}}{(x+1)(x-1)}\right)$ $u=x-1$ $x\to 1$ $x=u+1$ $u\to 0$ $\lim_{u\to 0}\left(\frac{e^u-a^u}{u((u+1)+1)}\right)=\lim\left(\frac{e^u-a^u}{u\,(u+2)}\right)$ 1 ln a

$=\lim_{u\to 0}\left(\frac{e^u-a^u}{u}\cdot\frac{1}{u+2}\right)=\lim\left(\frac{e^u-a^u}{u}\right)\cdot\lim\left(\frac{1}{u+2}\right)$ Soma $+1-1$ $\lim\left(\frac{e^u-1-(a^u-1)}{u}\right)\cdot\frac{1}{2}=\lim\left(\frac{e^u-1}{u}\right)-\lim\left(\frac{a^u-1}{u}\right)$

$\cdot\frac{1}{2}=1-\ln a\cdot\frac{1}{2}=\frac{1-\ln a}{2}$

$\lim_{x\to\infty}\left(\frac{2x+3}{2x+1}\right)^{x+1}=\lim_{\infty}\left(\frac{2x\cdot(1+\frac{3}{2x})}{2x\cdot(1+\frac{1}{2x})}\right)^{x+1}=\lim_{\infty}\left(\frac{1+\frac{3}{2x}}{1+\frac{1}{2x}}\right)^{x+1}$ denominador ≠ zero $\lim\left(\frac{1+\frac{3}{2x}}{1+\frac{1}{2x}}\right)^x\cdot\lim_{\infty}\left(\frac{1+\frac{3}{2x}}{1+\frac{1}{2x}}\right)^1$

$=\lim_{\infty}\left(\frac{1+\frac{3}{2x}}{1+\frac{1}{2x}}\right)^x\cdot\left(\frac{1+0}{1+0}\right)=\frac{\lim\,(1+\frac{3}{2x})^x}{\lim\,(1+\frac{1}{2x})^x}$ ← Parte 1 ← Parte 2 [Parte 1] $\frac{3}{2x}=\frac{1}{u}$ $u=\frac{2x}{3}$ $x=\frac{3u}{2}$

[Parte 2] $\frac{1}{2x}=\frac{1}{u}$ $u=2x$ $x=\frac{u}{2}$ $=\frac{\lim_{u\to\infty}\left(1+\frac{1}{u}\right)^{\frac{3u}{2}}}{\lim_{u\to\infty}\left(1+\frac{1}{u}\right)^{\frac{u}{2}}}=\frac{\left[\lim\left(1+\frac{1}{u}\right)^u\right]^{\frac{3}{2}}}{\left[\lim\left(1+\frac{1}{u}\right)^u\right]^{\frac{1}{2}}}=\frac{e^{\frac{3}{2}}}{e^{\frac{1}{2}}}=e^{\frac{3}{2}-\frac{1}{2}}=e^1=e$

⑨ $\lim_{x\to-\infty}\left(\frac{\sqrt{x^2+2}}{3x-6}\right)=\lim\left(\frac{\sqrt{x^2\left(1+\frac{2}{x^2}\right)}}{x\left(3-\frac{6}{x}\right)}\right)=\lim_{-\infty}\left(\frac{-|x|\cdot\sqrt{1+\frac{2}{x^2}}}{x\cdot\left(3-\frac{6}{x}\right)}\right)=\lim\left(\frac{-\sqrt{1+\frac{2}{x^2}}}{3-\frac{6}{x}}\right)=\frac{-1}{3}$

⑩ $\lim_{h\to 0}\left(\frac{f(x+h)-f(x)}{h}\right)$, $y=5\sqrt[3]{x}$ $\lim\left(\frac{5\sqrt[3]{x+h}-5\sqrt[3]{x}}{h}\right)=5\cdot\lim\left(\frac{\sqrt[3]{x+h}-\sqrt[3]{x}}{h}\right)$

$5\cdot\lim\left(\frac{\sqrt[3]{x+h}-\sqrt[3]{x}}{h}\cdot\frac{(\sqrt[3]{x+h})^2+\sqrt[3]{x}\sqrt[3]{x+h}+(\sqrt[3]{x})^2}{(\sqrt[3]{x+h})^2+\sqrt[3]{x}\sqrt[3]{x+h}+(\sqrt[3]{x})^2}\right)=\lim 5\left(\frac{\cancel{x}+\cancel{h}-\cancel{x}}{\cancel{h}\,(\cdots)}\right)=\lim 5\left(\frac{1}{(\cdots)}\right)$

$=5\cdot\frac{1}{\sqrt[3]{x^2}+(\sqrt[3]{x})\cdot(\sqrt[3]{x})+\sqrt[3]{x^2}}=\frac{5}{3\sqrt[3]{x^2}}$

2° Prova

① Reta tangente $x=2$ $f(x)=x^2-2x-8$ $f'(x)=2x-2$ $f'(2)=2$ $y=f(2)=-8$ $-8=2\cdot 2+n$ $-12=n$

② $f(x)$ é derivavel no ponto $x=-1$ faça os limites laterais

③ $f(x)=\text{sen}\,x$ a derivada é $f'(x)=\cos x$

$\lim_{h\to 0}\left(\frac{\text{sen}(x+h)-\text{sen}\,x}{h}\right)=\lim\left(\frac{(\text{sen}\,x\cdot\cos h+\cos x\cdot\text{sen}\,h)-\text{sen}\,x}{h}\right)$

$\lim_{h\to 0}\left(\frac{\text{sen}\,x\cdot(\cos h+\cos x\cdot\text{sen}\,h-1)}{h}\right)=\lim(\text{sen}\,x)\cdot\lim\left(\frac{\cos h-1+\text{sen}\,h\cdot\cos x}{h}\right)$

$=\text{sen}\,x\cdot\lim\left(\frac{\cos h-1}{h}\right)+\lim\left(\frac{\text{sen}\,h}{h}\right)\cdot\lim_{h\to 0}(\cos x)$

$=\text{sen}\,x\cdot 0+1\cdot\cos x=\boxed{\cos x}$

⑥ $y=\frac{3}{e^{2x}}$ use o quociente. Para derivar e^{2x} use cadeia

⑪ $y=[\log(x)]^{(10x^2)}$

$(\ln y)'=(10x^2\cdot\ln(\log x))'$ Produto

$\frac{y'}{y}=20x\cdot\ln(\log x)+10x^2\cdot\frac{1}{x\cdot\ln a\cdot\log x}$

$y'=\left(20x\cdot\ln(\log x)+\frac{10x^2}{x\ln a\cdot\log x}\right)\cdot[\log(x)]^{10x^2}$

③ $\ln\left(\frac{x^3+x^2}{x+2}\right)$ $f(x) = \ln x$ $f'(x) = \frac{1}{x}$

$g(x) = \left(\frac{x^3+x^2}{x+2}\right)$ quociente $g'(x) = \frac{3x+2x(x-2) - (x^3+x^2)\cdot 1}{(x+2)^2}$

$\frac{1}{\left(\frac{x^3+x^2}{x+2}\right)} \cdot g'(x) = \frac{x+2}{x^3+x^2} \cdot \frac{3x+2x(x-2)-(x^3+x^2)}{(x+2)^2} = \frac{(\ldots)}{(x^3+x^2)(x+2)}$ //

Implicita

⑯ $(x^2y)' - (5x^3)' + (y^3)' = (\cos x)'$

$= (2x\cdot y + x^2\cdot y') - 15x^2 + 3y^2\cdot y' = -\operatorname{sen}(x)$

$= y'(x^2+3y^2) + 2x\cdot y - 15x^2 = -\operatorname{sen} x$

$\Rightarrow y' = \frac{-\operatorname{sen} x - 2xy + 15x^2}{(x^2+3y^2)}$

Inflexão

$g(x) = 4(x+2)^9$

$g'(x) = 36(x+2)^8 =$

PC

$g'(x) = \cancel{36}(x+2)^8$

$= (x+2)^8$

$\boxed{PC = -2}$

$g''(x) = 288(x+2)^7$

$g''(-2) = 0$ $-3 \quad -2 \quad -1$

concava

$g''(-3) = 288(-1)^7 < 0$

$g(-1) = 288(1)^7 > 0$

inflexão

$\therefore -2$ é um ponto de inflexão

Taylor

$P_n(x) = f(c) + f'(c)(x-c) + \frac{f''(c)(x-c)^2}{2!} \ldots$

$R_N(x) = \frac{f^{(n+1)}(z)(x-c)^{n+1}}{(n+1)!}$

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