Lista 6

5f

p/ $+\infty$ vai p/ real $\neq 0$

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

p/ $+\infty$ p/ real $\neq 0$

$\to -1$

$$= \lim_{x \to +\infty} \left(\frac{2}{3}\right)^x \left(\frac{2^{-x}-1}{3^{-x}-1}\right) = 0$$

$0 < \frac{2}{3} < 1$

$x \to +\infty$

0

-1

7e

$\ln a - \ln b = \ln\left(\frac{a}{b}\right)$

$$\lim_{x \to +\infty} \left[\ln(2x+1) - \ln(x+3)\right]$$

$$= \lim_{x \to +\infty} \ln\left(\frac{2x+1}{x+3}\right) = \ln 2$$

composta de contínuas

$$\text{☆} \lim_{x \to +\infty} \frac{2x+1}{x+3} = \lim_{x \to +\infty} \frac{\cancel{x}}{\cancel{x}} \cdot \frac{\overbrace{\left(2+\frac{1}{x}\right)}^{\to 2}}{\underbrace{\left(1+\frac{3}{x}\right)}_{\to 1}} = \frac{2}{1} = 2$$

9d $$\lim_{x \to 0^+} \frac{3^x - 1}{x^2} = \lim_{x \to 0^+} \underbrace{\frac{1}{x}}_{\to +\infty} \cdot \underbrace{\frac{3^x - 1}{x}}_{\to \ln 3 > 0} = +\infty$$

$$\lim_{x \to 0^+} \frac{e^{(\ln 3)x} - 1}{(\ln 3)x} \cdot \ln 3 = \lim_{y \to 0^+} \underbrace{\frac{e^y - 1}{y}}_{\to 1} \cdot \ln 3$$

$\ln 3 x = y$

$x \to 0^+ \Rightarrow y \to 0^+$

$$= \ln 3$$

23m

$$\left((1+\sqrt{x})\cdot e^{x}\cdot tg\,x\right)'$$

$$= \left((1+\sqrt{x})\cdot\left[e^{x}\cdot tg\,x\right]\right)'$$

$$= (1+x^{\frac{1}{2}})'\cdot\left[e^{x}\cdot tg\,x\right] - (1+\sqrt{x})\cdot\left[e^{x}\cdot tg\,x\right]'$$

$$= \left(0+\frac{1}{2}x^{-\frac{1}{2}}\right)\cdot\left[e^{x}\cdot tg\,x\right] - (1+\sqrt{x})\left[(e^{x})'\cdot tg\,x + e^{x}(tg\,x)'\right]$$

$$= \frac{1}{2}\frac{1}{\sqrt{x}}\cdot\left(e^{x}\cdot tg\,x\right) - (1+\sqrt{x})\left(e^{x}\,tg\,x + e^{x}\sec^{2}x\right)$$