

$$f(x) = \ln(x)$$

$$f'(x) = \frac{1}{x}$$

$$(cond f)(x) = \begin{cases} \left| \frac{x f'(x)}{f(x)} \right| & \text{if } x \neq 1 \\ |x f'(x)| & \text{if } x = 1 \\ \text{und} & \text{if } x \leq 0 \end{cases}$$

we are not working with complex numbers

$$x f'(x) = x \frac{1}{x} = 1$$

$$\left| \frac{x f'(x)}{f(x)} \right| = \left| \frac{1}{\ln(x)} \right|$$

$$\lim_{x \rightarrow 0} \left| \frac{1}{\ln(x)} \right| \rightarrow 0$$

$$\lim_{x \rightarrow 0} \ln(x) \rightarrow -\infty$$

$$\lim_{x \rightarrow \infty} \left| \frac{1}{\ln(x)} \right| \rightarrow 0$$

$$\lim_{x \rightarrow \infty} \ln(x) \rightarrow \infty$$

$$\lim_{x \rightarrow 1} \left| \frac{1}{\ln(x)} \right| \rightarrow \infty$$

$$\lim_{x \rightarrow 1} \ln(x) \rightarrow 0$$