$$f(x) = \frac{x^2 - x - 4}{x - 1} \rightarrow \begin{array}{ll} (-1, \cancel{\tfrac{-2}{-2}} 1) & A \\ (0, 4) & B \end{array}$$

$I \in [\underbrace{-1, 0}]$ x

t_g in x_p // corda per -1 0

$$y = mx + q$$

$B \quad 4 = q \longrightarrow y = mx + 4$

$A \rightarrow 1 = -m + 4 \rightarrow m = 3 \Rightarrow \boxed{y = 3x + 4}$

Se è $\parallel$ $\Rightarrow$ stesso coeff. angolare

ma il coeff. angolare è $f'(x_P)$

$$f'(x_P) = \underline{3}$$

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

$$= \frac{x^2 - 2x + 5}{(x-1)^2}$$

$$3 = \frac{x_p^2 - 2x_p + 5}{(x_p - 1)^2}$$

$$3(x_p^2 + 1 - 2x_p) = x_p^2 - 2x_p + 5$$

$$2x_p^2 - 4x_p - 2 = 0$$

NO

$1 + \sqrt{2}$

$$x_p^2 - 2x_p - 1 = 0$$

$$x_p = \frac{2 \pm \sqrt{4+4}}{2} = \frac{2 \pm 2\sqrt{2}}{2} = 1 \pm \sqrt{2}$$

$\boxed{1 - \sqrt{2}}$

$f(x) = |x+1| - 2x$

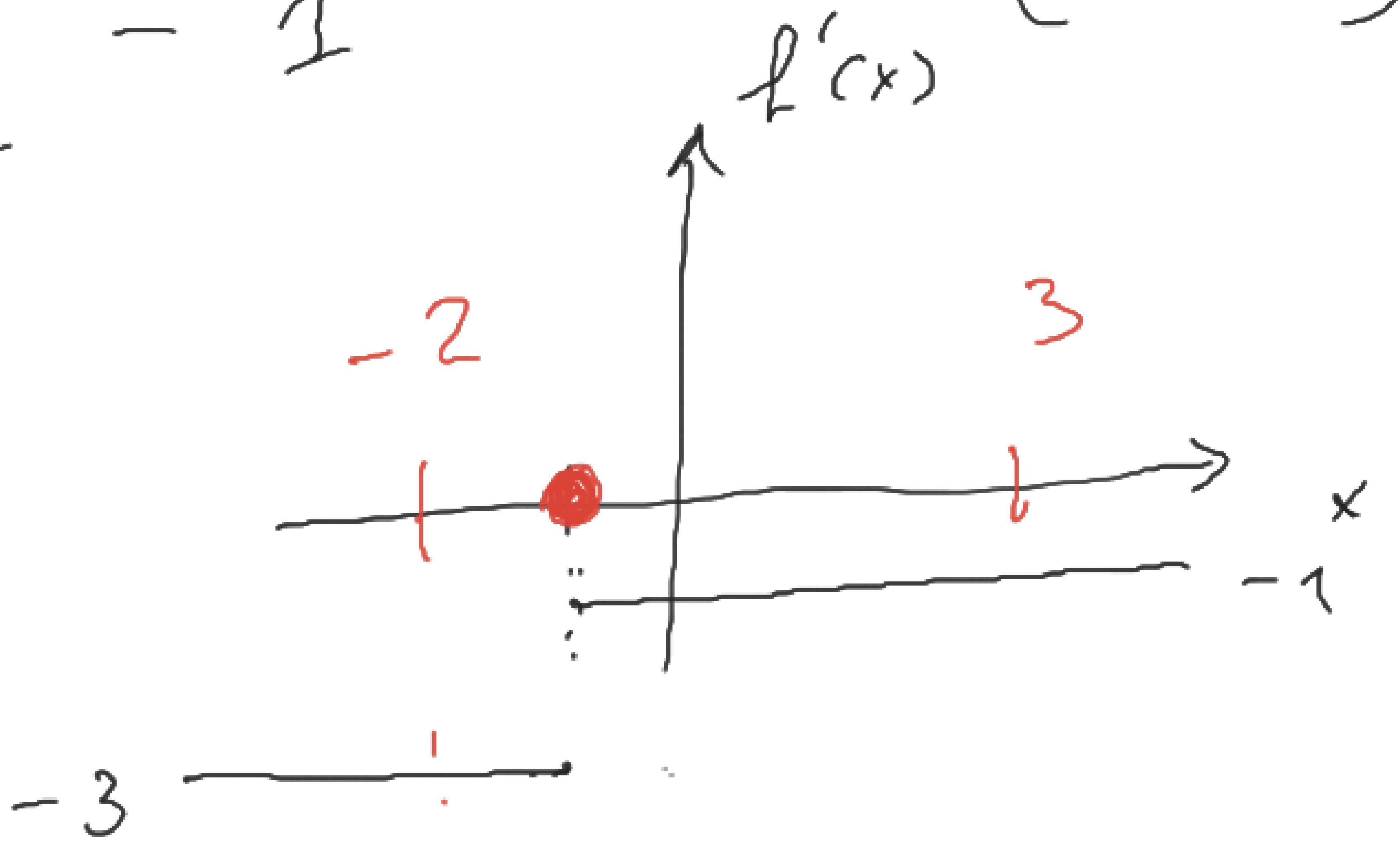
$I \subset [-2, 3]$

? th. Lagrange ? punto

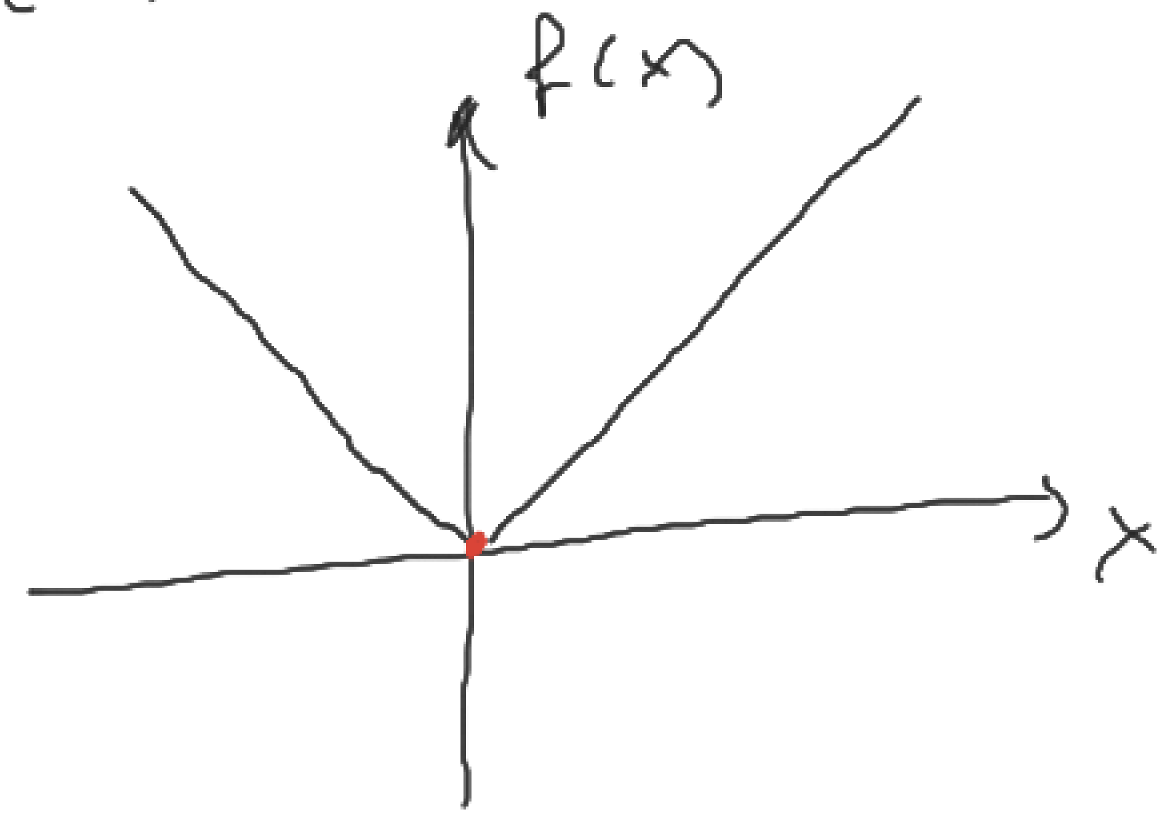
$$\begin{cases} x \geq -1 \\ 1 - x \end{cases} \cup \begin{cases} x < -1 \\ -1 - 3x \end{cases}$$

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

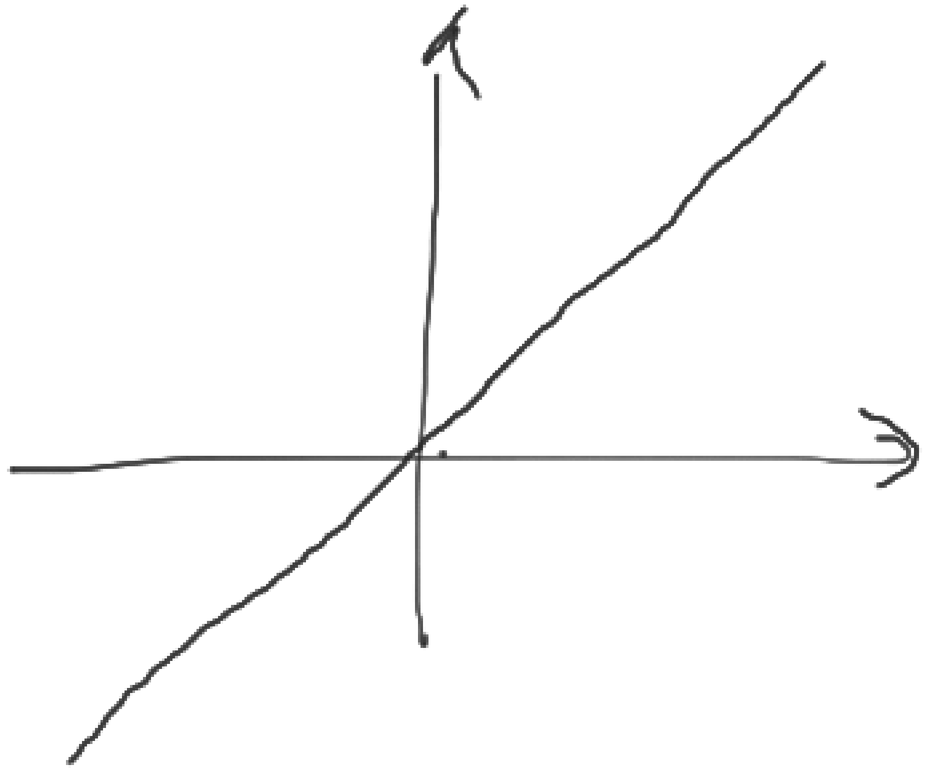
$$\begin{cases} x \geq -1 \\ -1 \end{cases} \cup \begin{cases} x < -1 \\ -3 \end{cases}$$



$f(x) = |x|$



$f(x) = x$



$[1, x]$ $1 < c < x$ th. Lagrange

$$\underbrace{1 - \frac{1}{x} < \ln x < x - 1}$$

$$\underbrace{\frac{x-1}{x}} < \ln x < x - 1$$

$$f'(c) = \frac{\ln(x) - \cancel{\ln(1)}^{0}}{x - 1}$$

$\ln(x) = (x-1) \cdot f'(c)$

$$\underline{\ln(x)} = (x-1) \cdot \frac{1}{c} = \underline{\frac{x-1}{c}}$$

$$\ln(x) = \frac{x-1}{c}$$

$$\boxed{c > 1}$$

$$\Downarrow$$

$$\frac{1}{c} < \frac{1}{1}$$

$$\frac{x-1}{c} < \frac{x-1}{1}$$

$$\Downarrow$$

$$\ln x < x - 1 \quad *$$

da verificare

$$\frac{x-1}{c} > \frac{x-1}{x}$$

deve essere $\frac{1}{c} > \frac{1}{x}$

$x > c$

vero x ipotesi

x ipotesi

$c < x$

$\rightarrow \frac{1}{x} < \frac{1}{c}$

$\rightarrow \frac{x-1}{x} < \frac{x-1}{c}$

x th.

$\rightarrow \frac{x-1}{x} < \ln x$ $**$

(*) + (**)

$\Downarrow$

$\Rightarrow \boxed{\frac{x-1}{x} < \ln x < x-1}$

$$\lim_{x \to \frac{\pi}{4}} \frac{\operatorname{sen} x + \cos x - \sqrt{2}}{\ln(\operatorname{sen}(2x))} = \frac{\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2} - \sqrt{2}}{\ln\left(\operatorname{sen}\left(\cancel{2} \cdot \frac{\pi}{\cancel{4}_{2}}\right)\right)}$$

$$= \frac{0}{\ln(1)} = \frac{0}{0} \quad \text{IND!}$$

Uso th. de l'Hop.

$\longrightarrow$

$$\lim_{x \to \frac{\pi}{4}} \frac{\cos x - \operatorname{sen} x}{\frac{1}{\operatorname{sen}(2x)} \cdot \cos(2x) \cdot 2} = \frac{0}{\frac{\cancel{\cos\frac{\pi}{2}}}{\cancel{\operatorname{sen}\frac{\pi}{2}}} \cdot 2} = \frac{0}{0}$$

$$\lim_{x \to \pi/4} \frac{-\operatorname{sen} x - \cos x}{-\frac{1}{\operatorname{sen}^2 2x} \cdot 4} = \frac{-\frac{\sqrt{2}}{2} - \frac{\sqrt{2}}{2}}{-4} = \frac{-\sqrt{2}}{-4} = +\frac{\sqrt{2}}{4}$$

1

$$\lim_{x \to 0^+} \frac{2^{3x} - 3^{4x}}{x^2} \longrightarrow \frac{1-1}{0} = \frac{0}{0}$$

$$\lim_{x \to 0^+} \frac{2^{3x} \cdot \ln 2 \cdot 3 - 3^{4x} \cdot \ln 3 \cdot 4}{2x}$$

$$\frac{\overbrace{3 \ln 2 - 4 \ln 3}}{0^+} = -\infty$$

$$\lim_{x \to 0} \frac{x - sen(x)}{x(1 - \cos x)} \to \frac{0 - 0}{0(1-1)}$$

| th. Hop

$$\lim_{x \to 0} \frac{1 - \cos x}{1 - \cos x + x\,sen\,x} = \frac{1 - 1}{\cancel{1 - 1} + 0}$$

$$\lim_{x \to 0} \frac{sen\,x}{+2sen\,x + x\cos x} = \frac{0}{0 + 0}$$

$$\lim_{x \to 0} \frac{\cos x}{2\cos x + \cos x - x\,sen\,x} = \frac{1}{2 + 1 - 0} = \boxed{\frac{1}{3}}$$