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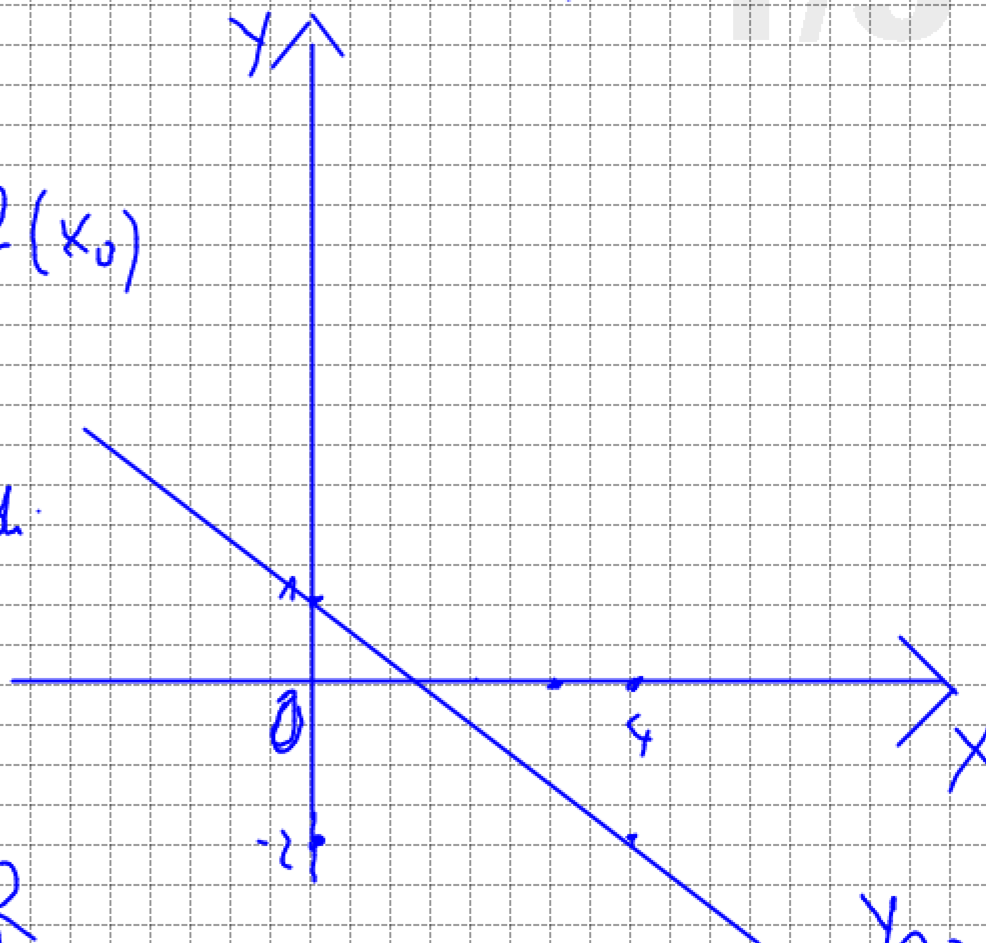
$f: \mathbb{R} \to \mathbb{R} \mid x \to -\frac{3}{4}x + 1 = y$

$f'(x)$ $f'(x_0)$

$(f^{-1})'(y_0)$ $y_0 = f(x_0)$



La funzione f(x) è decrescente quindi invertibile

$f'(x) = -\frac{3}{4}$

$f'(x_0) = -\frac{3}{4} \ \forall x_0 \in \mathbb{R}$

$(f^{-1})'(y_0) = \frac{1}{D(f(x_0))} = \frac{1}{-\frac{3}{4}} = -\frac{4}{3}$

$y_0 = f(x_0) = -\frac{3}{4}x_0 + 1$

$y = -\frac{3}{4}x + 1$

$y - 1 = -\frac{3}{4}x$

$x = -\frac{4(y-1)}{3} = -\frac{(4y-4)}{3} = \frac{4-4y}{3}$

$x = f(y)$

$y = f^{-1}(x)$

$$D(y) = \lim_{h \to 0} \frac{f^{-1}(x+h) - f^{-1}(x)}{h} = \lim_{x \to x_0} \frac{f^{-1}(x_0) - f^{-1}(x)}{x_0 - x} =$$

$x_0 = x + h$

$$= \lim_{y \to y_0} \frac{y_0 - y}{f(y_0) - f(y)} = \frac{1}{D(f(y))}$$

$y_0 = f^{-1}(x_0)$

$x_0 = f(y_0)$

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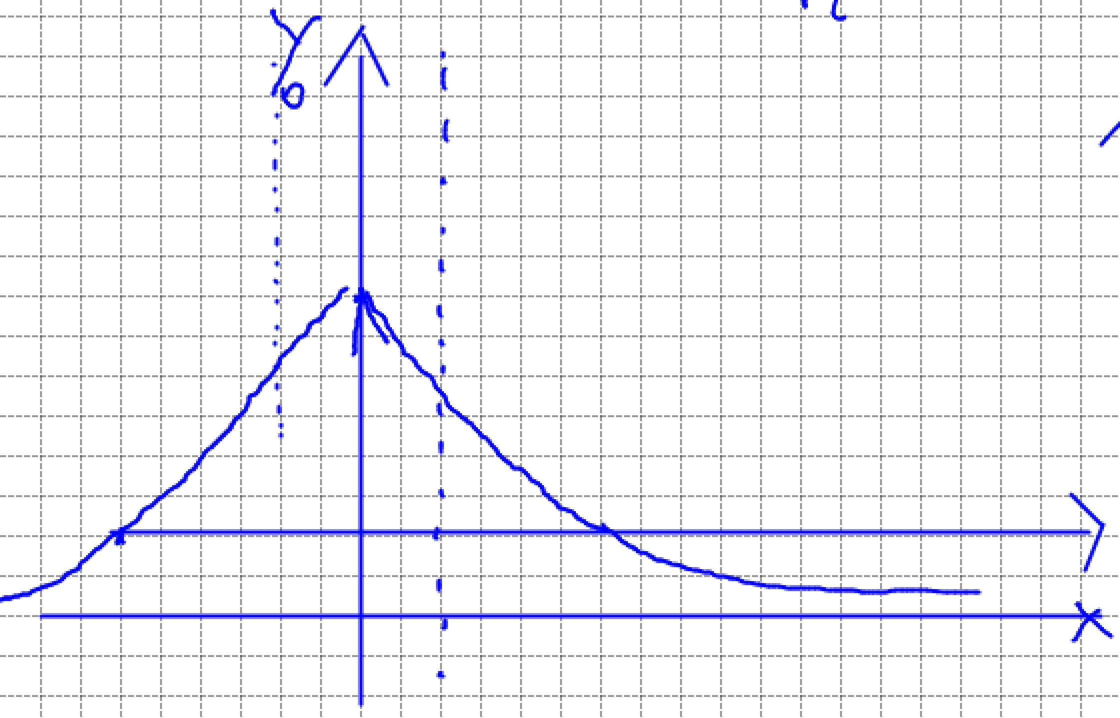
$$f(x) = \frac{3-|x|}{1+|x|}$$

$x \geq 0 \quad f_1(x) = \frac{3-x}{1+x} \quad D_{f_1}[0;+\infty)$ $\qquad y = \frac{ax+b}{cx+d}$

asintoti:

$x < 0 \quad f_2(x) = \frac{3+x}{1-x} \quad D_{f_2}(-\infty;0)$ $\qquad x = -\frac{d}{c} \quad y = +\frac{a}{c}$



① $x = -1$ N

$y = -1$

② $x = -\frac{1}{-1} = 1$

$y = -1$

$$\lim_{x \to 0^-} \frac{3+x}{1-x} = 3 \qquad f(0) = 3$$

$$f'(x) = \begin{cases} f_2'(x) & D_{f_1} \cap D_{f_1'} \\ f_1'(x) & D_{f_2} \cap D_{f_2'} \end{cases}$$

la funzione $y = f(x)$ è continua per $x = 0$

$$f_1(x) = \frac{3-x}{1+x} \qquad f_1'(x) = \frac{-1(1+x) - (3-x) \cdot 1}{(1+x)^2} =$$

$$f_1'(x) = \frac{\cancel{-x} - 1 - 3 \cancel{+x}}{(1+x)^2} = -\frac{4}{(1+x)^2}$$

$$D_{f_1'(x)} = (-\infty;-1) \cup (-1;+\infty) \overset{*}{=} [0;+\infty)$$

$$f_2(x) = \frac{3+x}{1-x} \qquad f_2'(x) = \frac{1 \cdot (1-x) - (3+x) \cdot (-1)}{(1-x)^2} =$$

$$= \frac{1 \cancel{-x} + 3 \cancel{+x}}{(1-x)^2} = \frac{4}{(1-x)^2}$$

$$D_{f_2'(x)} = (-\infty;1) \cup (1;+\infty) \overset{*}{=} (-\infty;0)$$

* limitiamo il dominio della derivata al dominio della funzione

$$f_1'(0) = \frac{4}{1} \neq f_2'(0) = -\frac{4}{1}$$

l'equazione della retta tangente alla funzione

$y = f_2(x)$ è $(y - y_0) = f_2'(x_0) \cdot (x - x_0)$

$O(0;3)$

$$y - 3 = \left(\frac{4}{(1-x)^2}\right)\Bigg|_{x=0} (x-0)$$

$$y - 3 = 4x$$

$$y = 4x + 3$$

$y = f_1(x)$ l'equazione della retta tangente alla funzione

$y = f_1(x)$ è $(y - y_0) = f_1'(x_0) \cdot (x - x_0)$

$$f_1'(x) = -\frac{4}{(1+x)^2} \qquad y - 3 = -4x$$

$$y = -4x + 3$$

$$\left.\begin{aligned} y - y_0 &= f'(x_0)(x - x_0) \\ y &= f'(x)(x - x_0) + y_0 \\ y &= 0 \end{aligned}\right\} \Rightarrow f'(x_-) = 0$$

Tangente // asse y : $x = K$ $\qquad tg\,\alpha \to \infty$

$$f'(x) \to \infty$$

$$f_1'(x) = \frac{-4}{(1+x)^2} \to \infty \qquad x \to -1 \quad \begin{cases} x = -1 \\ D_{f_1} \end{cases}$$

$$f_2'(x) = \frac{4}{(1-x)^2} \to \infty \qquad x \to 1 \quad \begin{cases} x = 1 \\ D_{f_2} \end{cases}$$

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$y=\dfrac{x-1}{x+3}$

$\alpha=\dfrac{\pi}{4}$ $\quad m=\mathrm{Tg}\,\alpha=1 \quad f'(x)=1$

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

$4=x^2+9+6x \qquad x^2+6x+5=0$

$$x_{1/2}=\frac{-3\pm\sqrt{9-5}}{1}=$$

$$=\begin{cases}-1\\-5\end{cases}$$

$A(-1;-1)$

$B(-5;3)$

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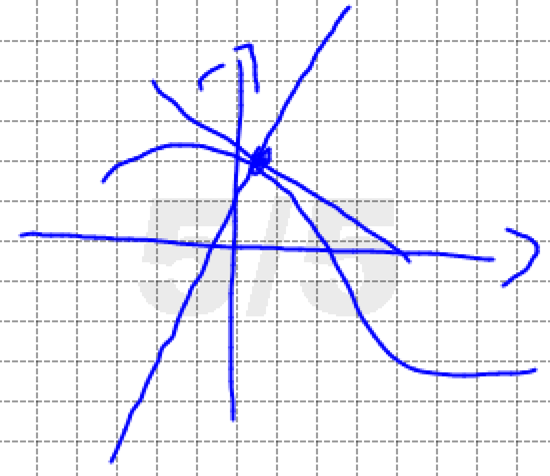
$$y=\frac{x^2}{ax+b}$$



$A(2;-1)$ -> NORMALE È $y=\frac{1}{2}x-2$

$m_\perp=\frac{1}{2}$ $\quad m\cdot m_\perp=-1$

$m=-2$ $\quad f'(x)=m$

$$\frac{2x(ax+b)-ax^2}{(ax+b)^2}=-2$$

$$\begin{cases} ax^2+2bx=-2a^2x^2-2b^2-4abx \\ x=2 \\ y=-1 \end{cases}$$

$4a+4b=-8a^2-2b^2-8ab$

$$\begin{cases} 4a+4b+8a^2+2b^2+8ab=0 \\ \frac{4}{2a+b}=-1 \end{cases}$$

$b=-2a-4$

finire per casa