$$f(x) = \begin{cases} \dfrac{\operatorname{sen} 2x}{x} & x < 0 \\[2ex] 2 \cdot e^{\frac{ax+b}{x-c}} & x \geq 0 \\ & x \neq c \end{cases}$$

$a, b, c \in \mathbb{R}$

1 continua in $x = 0$

$$\lim_{x \to 0^-} \frac{2 \cdot \operatorname{sen} 2x}{2x} = \cancel{\frac{0}{0}} \quad \text{FORMA IND.}$$

$$\lim_{x \to 0} \frac{\operatorname{sen} x}{x} = 1$$

$$\lim_{x \to 0^-} 2 \cdot \underbrace{\lim \frac{\operatorname{sen} 2x}{2x}}_{1}$$

$$= 2$$

$$\lim_{x \to 0^+} 2 e^{\frac{2x+b}{x-c}} = 2 \underbrace{e^{-b/c}}_{1}$$

$$e^{-b/c} = 1$$

$$\underbrace{-b/c}_{0} \longrightarrow -\frac{b}{c} = 0 \Longrightarrow \boxed{b = 0}$$

$$-\lim_{x\to\infty} f(x) = 2e$$

$$\lim_{x\to\infty} 2\cdot e^{\overbrace{\frac{ax+\cancel{b}}{x-c}}^{\to 1}} = 2e$$

per $x\to\infty$

$$\frac{\cancel{x}(a)}{\cancel{x}\left(1-\underbrace{\cancel{\frac{c}{x}}}_{\to 0}\right)}$$

$$\longrightarrow \frac{a}{1} = 1 \longrightarrow \boxed{a = 1}$$

$$\Rightarrow \lim_{x \to 3^-} f(x) = 0 \quad ?$$

$$\lim_{x \to 3^-} 2 \cdot e^{\frac{x}{x-c}} = 0$$

$e^{\infty} = \infty$

$e^{-\infty} = \frac{1}{e^{\infty}} = \frac{1}{\infty} = 0$

per $x \to 3^-$

$$\frac{x}{x-c} = -\infty$$

0^-

$$\frac{3^{-}}{3^{-} - c} \rightarrow 0^{-}$$

$-0{,}001$

3 $\sim$ $-0{,}01$

$-0{,}001$

0^{-}

$2{,}99$

$2{,}999$

$\boxed{c = 3}$

$a=1$, $b=0$, $c=3$

$$f(x)=2e^{\frac{x}{x-3}}$$

$$\lim_{x\to 3^+} 2e^{\frac{x}{x-3}} = 2e^{\frac{3^+}{3^+-3}} = 2e^{\frac{3^+}{0^+}}$$

$$= 2e^{+\infty}$$

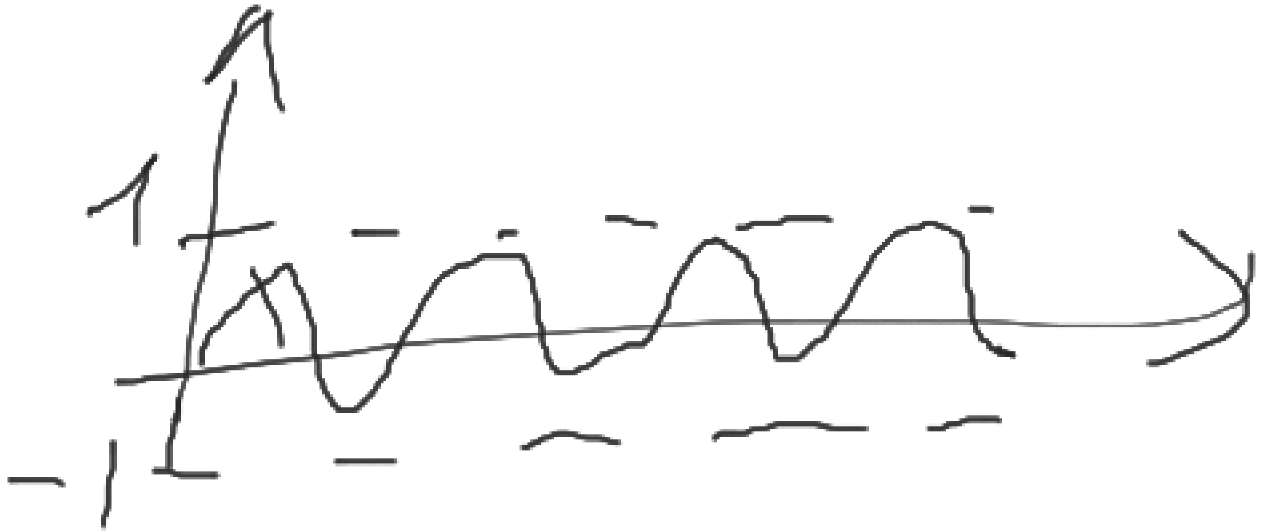
$$= +\infty$$

$3,0001-3$

$\sim 0,001$

0^+

$$\lim_{x\to-\infty} f(x) = \lim_{x\to-\infty} \frac{\operatorname{sen} 2x}{x}$$



$$-1 < n < 1$$

$$\lim_{x\to-\infty} \frac{\operatorname{sen} 2x}{x} = \frac{\text{NUMERO}}{-\infty} = 0$$

$$-\lim_{x \to -\infty} x \cdot f(x) = \lim_{x \to -\infty} \operatorname{sen} 2x$$

$$\cancel{\exists}$$

$$-\lim_{x \to 0^-} \frac{f(x)}{x} = \lim_{x \to 0^-} \frac{\operatorname{sen} 2x}{x^2}$$

$$= \lim_{x \to 0^-} \frac{0}{0} \longrightarrow \text{ \{no\}!}$$

$$\lim_{x \to 0^-} 2 \frac{\operatorname{sen} 2x}{2x \cdot x}$$

$$\lim_{x \to 0^-} \frac{2}{x} = -\infty$$

$$f(x) = ax + b + \frac{x^2}{x+1} \qquad a, b \in \mathbb{R}$$

$$\lim_{x \to \infty} f(x) = 1$$

$$\lim_{x \to \infty} ax + b + \frac{x^2}{x+1} = \lim \frac{ax^2 + ax + bx + b + x^2}{x+1}$$

$$\lim_{x\to\infty} \frac{x^2(a+1) + x(a+b) + b}{x+1}$$

deve FARE 0

$$\Downarrow$$

$$\boxed{a=-1}$$

$$\lim_{x\to\infty} \frac{\cancel{x^2}(\ldots)}{\cancel{x}(\quad)} = \infty$$

$$\lim_{x\to\infty} \frac{x(-1+b)+b}{x+1} = \frac{\cancel{x}\left(-1+b+\cancel{\frac{b}{x}}^{\,0}\right)}{\cancel{x}\left(1+\cancel{\frac{1}{x}}^{\,0}\right)}$$

$$\frac{-1+b}{1} = 1 \Rightarrow \boxed{b = 2}$$

$$\frac{x^2+1}{x-3} \to \infty$$

$$\lim_{x \to \infty} \frac{N}{D}$$

se grado N > D → ∞

stesso grado → NUMERO

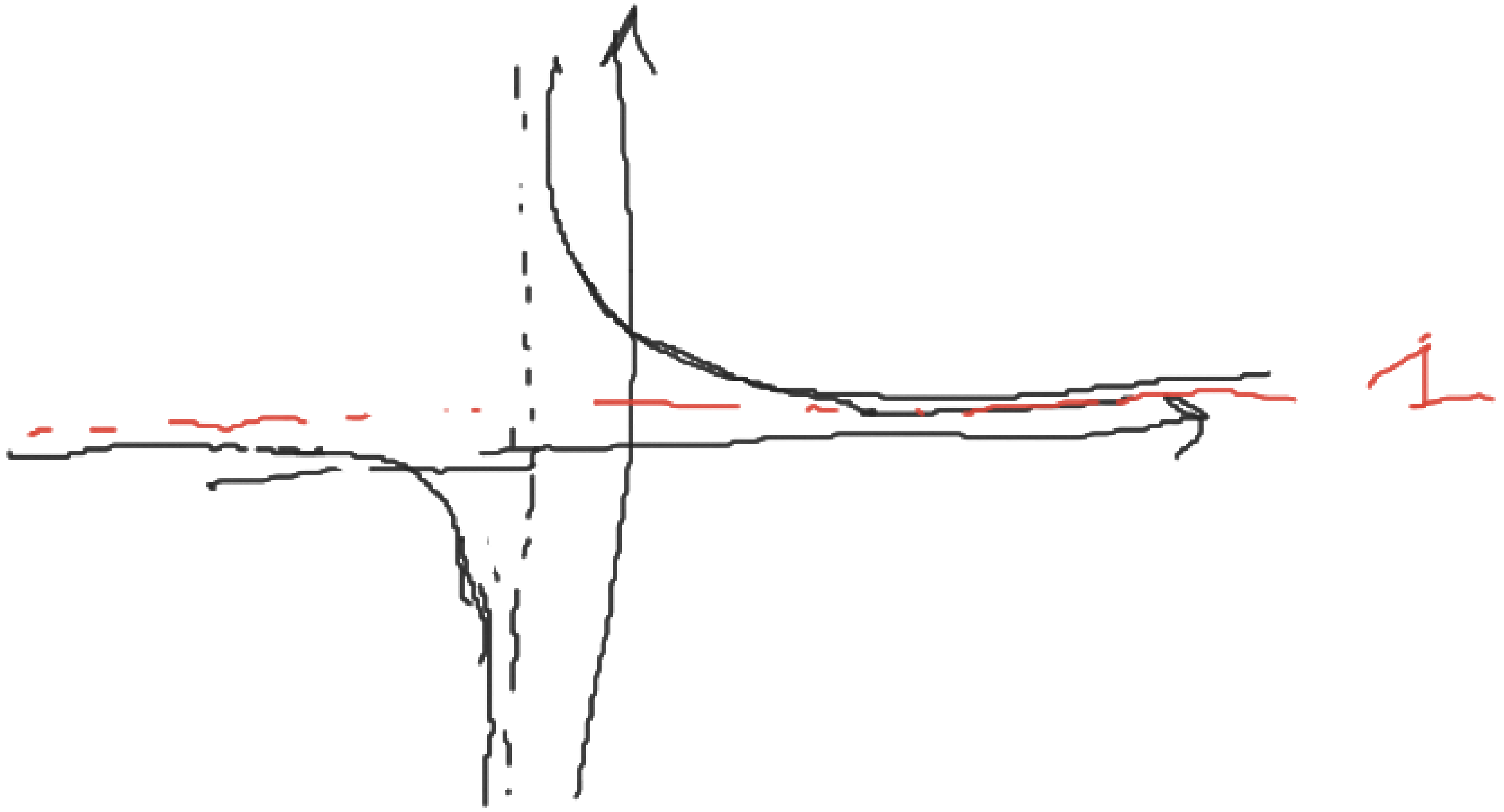
se grado D > N → 0

$$\frac{x+1}{2x-4} = \frac{1}{2}$$

$$\frac{x+1}{x^3-4} \to 0$$

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

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



assi: $x = -2$

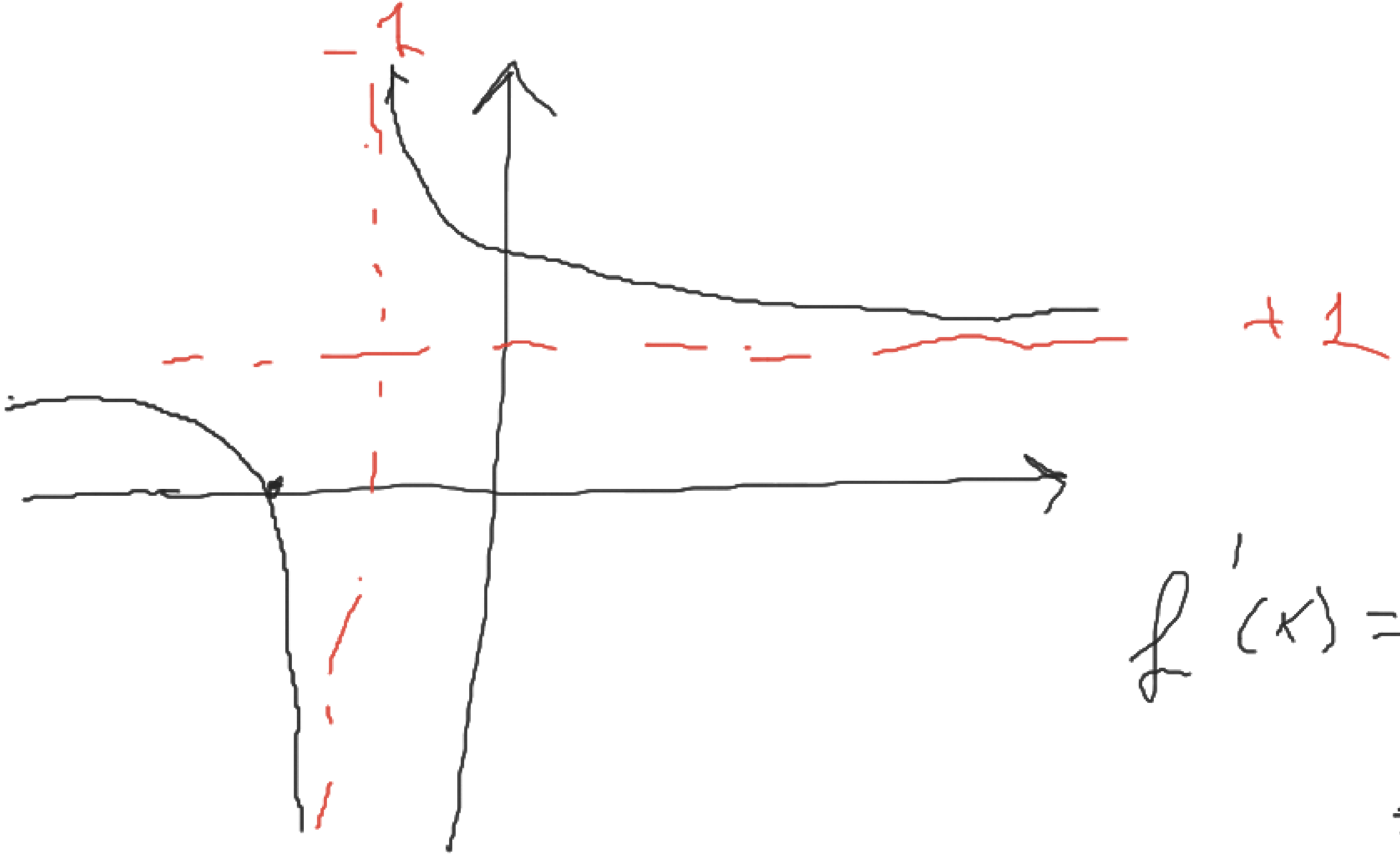
asint. $x = -1$

$$\lim_{x \to -1^-} \frac{x+2}{x+1} = \frac{-1^- + 2}{\underbrace{-1^- + 1}_{0^-}} = -\infty$$

$$\lim_{x \to -1^+} \frac{x+2}{x+1} = \frac{-1^+ + 2}{-1^+ + 1} \quad \frac{1}{0^+}$$

$$\lim_{x\to\infty} \frac{x+2}{x+1} = \cancel{\frac{\infty}{\infty}}$$

$$\frac{\cancel{x}\left(1+\cancelto{0}{\frac{2}{x}}\right)}{\cancel{x}\left(1+\cancelto{0}{\frac{1}{x}}\right)} = 1$$



A: $x = 0$
$y = 2$

$$m = f'(0)$$

$$f'(x) = \frac{x+1-(x+2)}{(x+1)^2} = -\frac{1}{(x+1)^2} \Rightarrow f'(0) = -1$$

$y = mx + q$

$A(0, 2)$

$y = -1x + q$

$2 = 0 + q \rightarrow q = 2$

$\rightarrow \boxed{y = -x + 2}$