Trovare max, min, flessi e tang. oriz.

82 $y = \dfrac{\ln x}{x}$ $[x = e \text{ max}]$

$D: x > 0 \qquad D = (0, +\infty)$

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

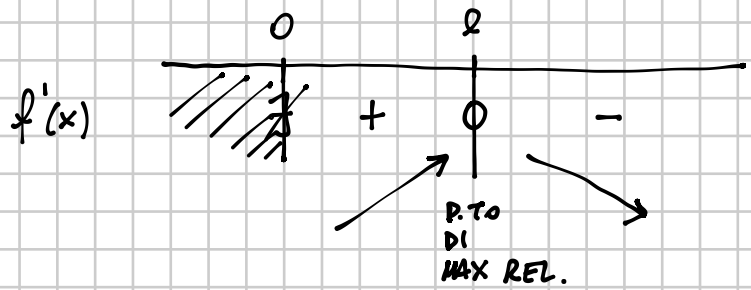
$f'(x) = 0$ CANDIDATI MAX, MIN, FLESSI ORIZZ. → PUNTI STAZIONARI (punti in cui la derivata si annulla)

$$\frac{1 - \ln x}{x^2} = 0 \Rightarrow 1 - \ln x = 0$$

$$\ln x = 1 \Rightarrow x = e$$

$f'(x) > 0$

$$\frac{1 - \ln x}{x^2} > 0 \Rightarrow 1 - \ln x > 0 \qquad \ln x < 1 \qquad x < e$$



$x = e$ P.to di MAX RELATIVO

86 $y = e^{2x-1} + \frac{2}{3}e^{-3x} + 6$ $\left[x = \frac{1}{5}\ \text{min}\right]$

$D = \mathbb{R} = (-\infty, +\infty)$

$f'(x) = 2e^{2x-1} - 2e^{-3x}$

$f'(x) = 0 \Rightarrow \quad 2e^{2x-1} - 2e^{-3x} = 0 \qquad \cancel{2}e^{2x-1} = \cancel{2}e^{-3x}$

$2x - 1 = -3x$

$5x = 1$

$x = \frac{1}{5}$

$f'(x) > 0 \Rightarrow \quad 2e^{2x-1} - 2e^{-3x} > 0$

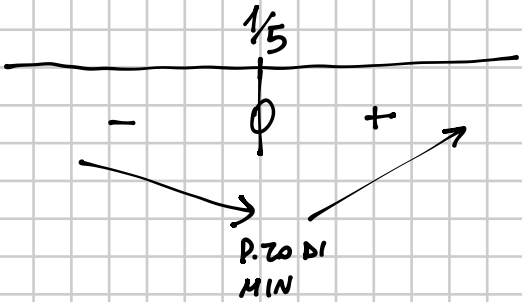
$e^{2x-1} > e^{-3x}$

$2x - 1 > -3x$

$5x > 1$

$x > \frac{1}{5}$

$f'(x)$



$x = \frac{1}{5}$ P.TO DI MINIMO REL.

Trovare max, min, flessi ecc.

104 $y = \begin{cases} x^3 + 1 & \text{se } x \le 0 \\ x^4 - 4x + 1 & \text{se } x > 0 \end{cases}$ [$x = 0$max; $x = 1$min (staz.)]

$$f(x) = \begin{cases} x^3 + 1 & \text{se } x \le 0 \\ x^4 - 4x + 1 & \text{se } x > 0 \end{cases} \qquad D = (-\infty, +\infty)$$

È CONTINUA?

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

$$\lim_{x \to 0^+} f(x) = \lim_{x \to 0^+} (x^4 - 4x + 1) = 1$$

CONTINUA

$$f'(x) = \begin{cases} 3x^2 & \text{se } x < 0 \\ 4x^3 - 4 & \text{se } x > 0 \end{cases}$$

$$f'_+(0) = \lim_{x \to 0^+} f'(x) = -4$$

$$f'_-(0) = \lim_{x \to 0^-} f'(x) = 0$$

f NON È DERIVABILE IN 0

0 È UN P.TO ANGOLOSO

PUNTI STAZIONARI

$$f'(x) = 0 \Rightarrow \begin{cases} 3x^2 = 0 \\ x < 0 \end{cases} \quad \vee \quad \begin{cases} 4x^3 - 4 = 0 \\ x > 0 \end{cases}$$

$$\emptyset$$

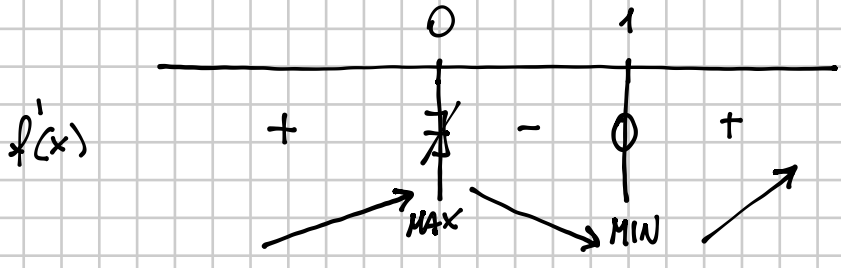
$$\begin{cases} x^3 = 1 \\ x > 0 \end{cases} \quad \begin{cases} x = 1 \\ x > 0 \end{cases} \Rightarrow x = 1$$

SEGNO DELLA DERIVATA

$$f'(x) > 0 \quad \begin{cases} 3x^2 > 0 \\ x < 0 \end{cases} \quad \vee \quad \begin{cases} 4x^3 - 4 > 0 \\ x > 0 \end{cases}$$

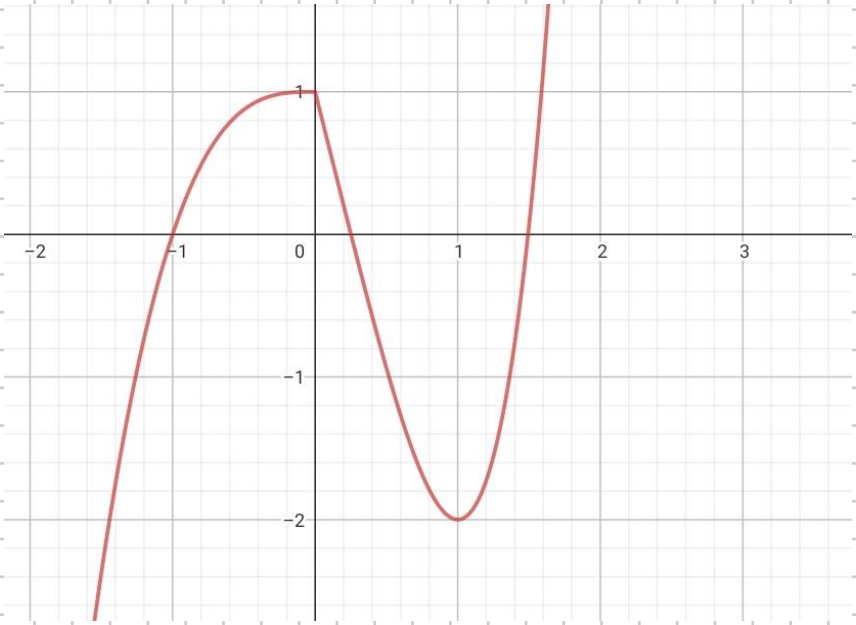
$$\forall x < 0$$

$$\begin{cases} x^3 > 1 \\ x > 0 \end{cases} \quad \begin{cases} x > 1 \\ x > 0 \end{cases} \Rightarrow x > 1$$



$x = 0$ P.TO DI MAX RELATIVO

$x = 1$ P.TO DI MIN RELATIVO


−2
−1
0
1
2
3
1
−1
−2

Trovare max, min, flessi ecc.

101 $y = |x^2 - x| + 3$ $\quad D = (-\infty, +\infty)$

$x^2 - x > 0 \quad x(x-1) > 0 \quad x < 0 \ \vee \ x > 1$

$$f(x) = \begin{cases} x^2 - x + 3 & \text{se} \quad x < 0 \ \vee \ x > 1 \\ -x^2 + x + 3 & \text{se} \quad 0 \le x \le 1 \end{cases}$$

è continua

$$f'(x) = \begin{cases} 2x - 1 & \text{se} \quad x < 0 \ \vee \ x > 1 \\ -2x + 1 & \text{se} \quad 0 < x < 1 \end{cases}$$

$f'_-(0) = -1 \quad f'_+(0) = 1$

$f'_-(1) = -1 \quad f'_+(1) = 1$

$\Downarrow$

$x = 0$, $x = 1$ P.TI ANGOLOSI

$f'(x) = 0$

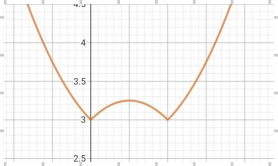
$\begin{cases} 2x - 1 = 0 \\ x < 0 \ \vee \ x > 1 \end{cases} \quad \begin{cases} x = \frac{1}{2} \\ x < 0 \ \vee \ x > 1 \end{cases} \quad \emptyset$

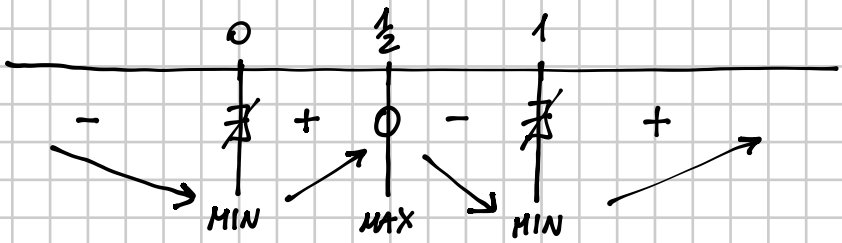
$\begin{cases} -2x + 1 = 0 \\ 0 < x < 1 \end{cases} \quad \begin{cases} x = \frac{1}{2} \\ 0 < x < 1 \end{cases} \Rightarrow x = \frac{1}{2}$ P.TO STAZIONARIO

$f'(x) > 0$

$\begin{cases} 2x - 1 > 0 \\ x < 0 \ \vee \ x > 1 \end{cases} \quad \begin{cases} x > \frac{1}{2} \\ x < 0 \ \vee \ x > 1 \end{cases} \Rightarrow x > 1$

$\begin{cases} -2x + 1 > 0 \\ 0 < x < 1 \end{cases} \quad \begin{cases} x < \frac{1}{2} \\ 0 < x < 1 \end{cases} \Rightarrow 0 < x < \frac{1}{2}$





$x = 0$, $x = 1$ } P.TI DI MINIMO REL.

$x = \frac{1}{2}$ P.TO DI MAX REL.