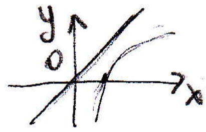
EX2
Studiare il grafico di $f(x) = \frac{\ln x}{x} - 1 = x^{-1}\ln x - 1 = \frac{\ln x - x}{x}$

Ris

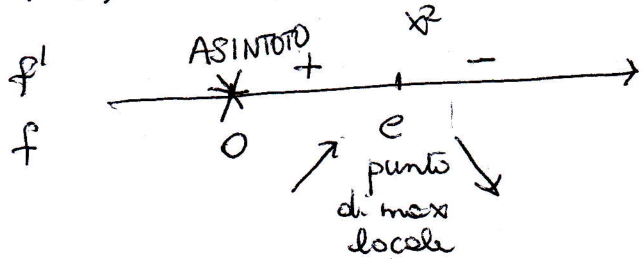
- dominio $A = \{x \in \mathbb{R} : x > 0\}$
- segno $\frac{\ln x}{x} - 1 > 0$ sse $\ln x > x$ $\nexists x$



$\Rightarrow f(x) < 0 \quad \forall x > 0$

- nessuna intersezione con gli assi
- $f \in C^{\infty}(A)$ $\quad f'(x) = \left(\frac{\ln x}{x} - 1\right)' = \frac{1 - \ln x}{x^2}$

$f'(x) > 0$ sse $\frac{1-\ln x}{x^2} > 0$ sse $1 - \ln x > 0$ sse $\ln x < 1$ sse $0 < x < e$

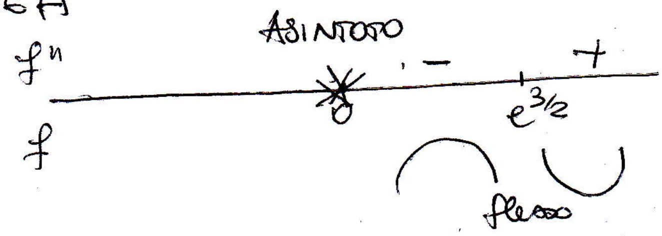


$f(e) = \frac{\ln e}{e} - 1 = e^{-1} - 1$ max locale

- $f''(x) = \frac{-\frac{1}{x} \cdot x^2 - (1 - \ln x)\,2x}{x^4} = \frac{-x - 2x + 2x\ln x}{x^4} = \frac{x(-3 + 2\ln x)}{x^4} =$

$= \frac{2\ln x - 3}{x^3}$

$f''(x) > 0$ sse $\frac{2\ln x - 3}{x^3} > 0$ sse $2\ln x - 3 > 0$ sse $\ln x > \frac{3}{2}$ sse $x > e^{\frac{3}{2}}$
$\forall x \in A$



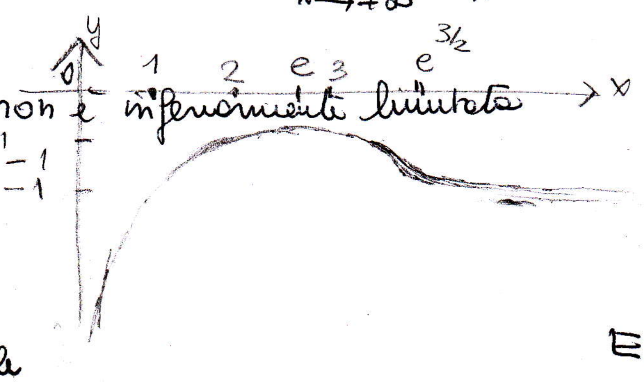
$f(e^{3/2}) = \frac{\ln(e^{3/2})}{e^{3/2}} - 1 = \frac{3}{2}e^{-\frac{3}{2}} - 1$

$\lim_{x \to +\infty} \frac{\ln x}{x} \quad \left[\frac{\infty}{\infty}\right]$

$y = -1$ asintoto orizzontale

$\stackrel{H}{=} \lim_{x \to +\infty} \frac{\frac{1}{x}}{1} = \lim_{x \to +\infty} \frac{1}{x} = 0 \Rightarrow \lim_{x \to +\infty} \frac{\ln x}{x} - 1 = -1$

$\lim_{x \to 0^+} \frac{\overset{\to -\infty}{\ln x}}{\underset{\to 0^+}{x}} - 1 = -\infty \Rightarrow f$ non è inferiormente limitata



$\Rightarrow x_0 = e$ punto di max assoluto

$X = 0$ asintoto verticale

EX2 fila B