FUNZIONI

3 mar '21

Funzioni esponenziali

ex $y = x \cdot e^{x}$ CE $x \in \mathbb{R}$

in questi casi può servire De L'Hôpital

limiti

$$\lim_{x \to -\infty} f(x) = [0 \cdot \infty] = \lim_{x \to -\infty} \frac{x}{e^{-x}} = \left[\frac{\infty}{\infty}\right] \overset{H}{=} \lim_{x \to -\infty} \frac{1}{-e^{-x}} = 0^{-}$$

$y = 0$ A.O. sx

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

asintoti obliqui? NO (...)

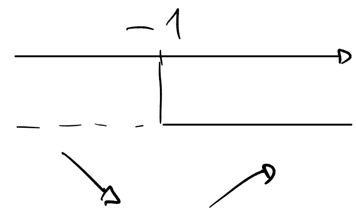
zeri $f(x)=0 \iff x=0 \leadsto f(x)>0 \iff x>0$

y'

$y'=e^x(x+1)$

$y'=0 \leadsto x=-1$

$y'>0$



$A\left(-1; -\frac{1}{e}\right)$

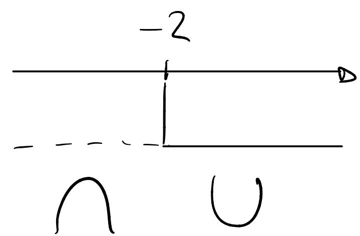
min

y''

$y''=e^x(x+2)$

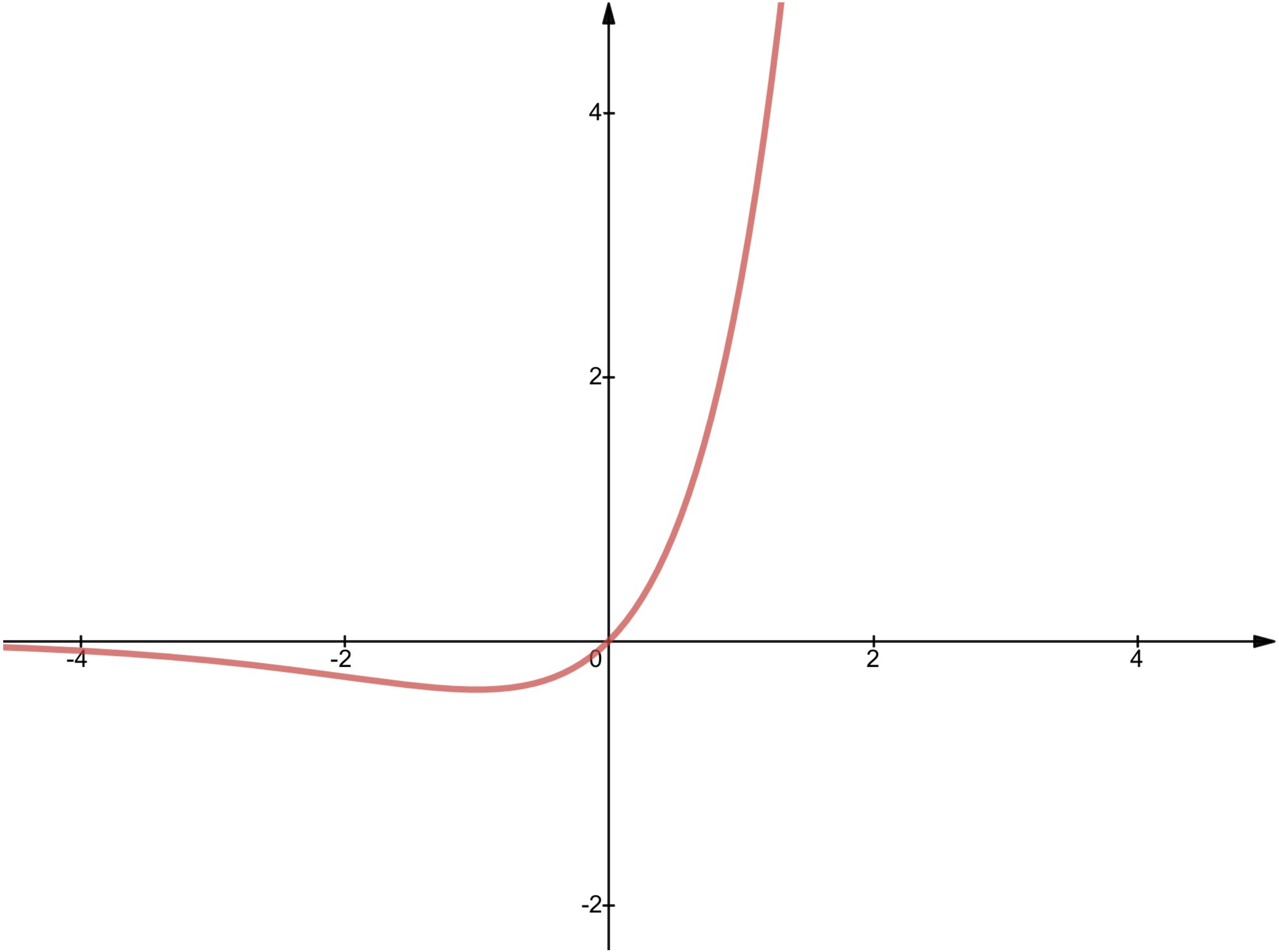
$y''=0 \leadsto x=-2$

$y''>0$



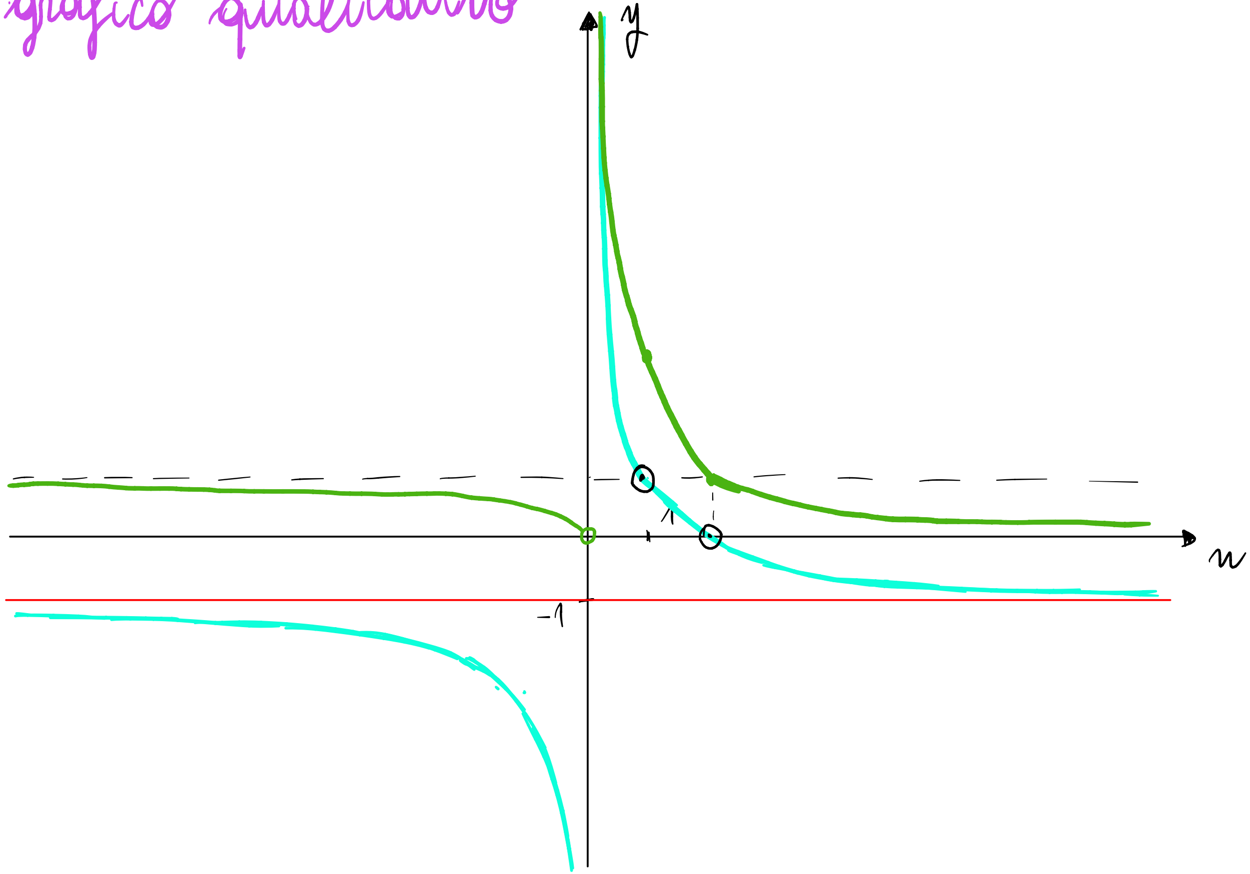
$F\left(-2; -\frac{2}{e^2}\right)$

flesso


4
2
-2
-4
-2
0
2
4

ex $y = e^{\frac{2-x}{x}}$

grafico qualitativo



studio rigoroso

CE $x \in (-\infty; 0) \cup (0; +\infty)$

limiti

$\lim_{x \to -\infty} f(x) = e^{-1}$ $\quad y = e^{-1}$ A.O. sx

$\lim_{x \to +\infty} f(x) = e^{-1}$ $\quad y = e^{-1}$ A.O dx

$y = e^{-1}$ A.O.

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

$x = 0$ p.to discontinuità di seconda specie

$\lim_{x \to 0^+} f(x) = +\infty$

$x = 0$ A.V. dx

$f(x) > 0 \quad \forall x \in CE$

y'

$$y' = e^{\frac{2-x}{x}} \cdot \frac{-x + x - 2}{x^2} = e^{\frac{2-x}{x}} \cdot \left(\frac{-2}{x^2}\right)$$

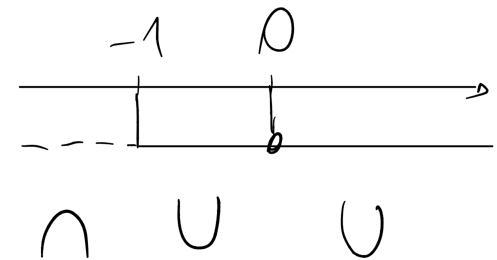
$y' = 0 \quad \nexists x$

$y' < 0 \quad \forall x \in CE$

y''

$$y'' = 4 e^{\frac{2-x}{x}} \left(\frac{1+x}{x^4}\right)$$

$y'' > 0$



$y'' = 0 \iff x = -1$

flesso

AGGIUNGERE GRAFICO

Funzioni logaritmiche

ex $y = \frac{\ln x}{x}$ **CE** $x \in (0; +\infty)$

limiti

$\lim_{x \to 0^+} f(x) = \frac{-\infty}{0^+} = -\infty$ $x = 0$ A.V. dx

$\lim_{x \to +\infty} f(x) = \left[\frac{\infty}{\infty}\right] \overset{H}{=} \lim_{x \to +\infty} \frac{1}{x} = 0^+$ $y = 0$ A.O. dx

zeri $f(x) = 0 \iff x = 1$

$f(x) > 0 \iff x \in (1; +\infty)$

y'

$$y' = \frac{1 - \ln x}{x^2}$$

$y' = 0 \Rightarrow x = e$

$y' > 0 \Rightarrow x \in (0; e)$

$A(e; 1/e)$ max

y''

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

MANCA UN PEZZO

20 p. 1821