

FUNZIONI IPERBOLICHE

• COSENO IPERBOLICO: $y = \cosh x = \frac{e^x + e^{-x}}{2}$
 $D_y = \mathbb{R}$ $CD_y = [1, +\infty)$

• SENO IPERBOLICO: $y = \sinh x = \frac{e^x - e^{-x}}{2}$
 $D_y = \mathbb{R}$ $CD_y = \mathbb{R}$

OSS:

$$\cosh^2 x - \sinh^2 x = 1$$

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

$$= \frac{\cancel{e^{2x}} + \cancel{e^{-2x}} + 2e^{x-x}}{4} - \frac{\cancel{e^{2x}} + \cancel{e^{-2x}} - 2e^{x-x}}{4} =$$

$$= \frac{4}{4} = 1$$

Quindi il punto $P(\cosh x, \sinh x)$ appartiene all'iperbole di equazione $X^2 - Y^2 = 1$.

$$\tanh x = \frac{\sinh x}{\cosh x} = \frac{e^x - e^{-x}}{e^x + e^{-x}}$$

$$D: \mathbb{R}; CD = (-1; 1)$$

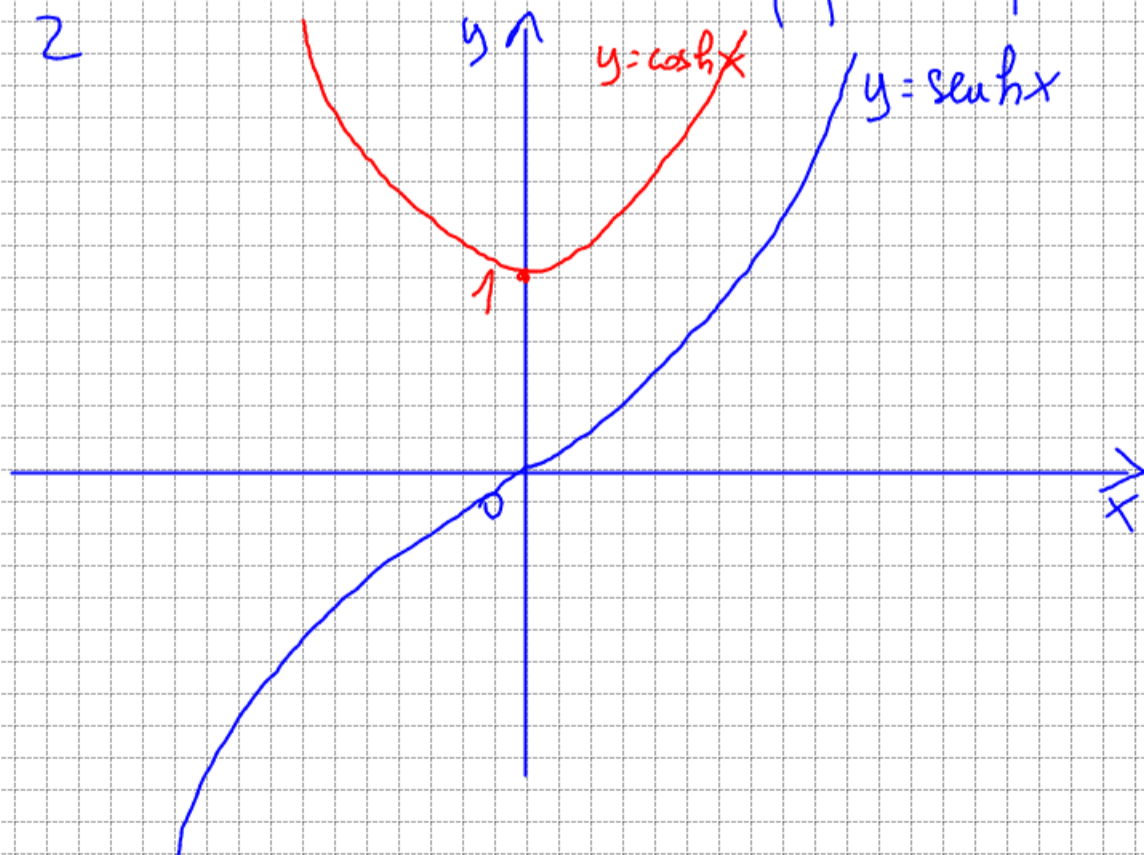
$$\operatorname{ctgh} x = \frac{\cosh x}{\sinh x} = \frac{e^x + e^{-x}}{e^x - e^{-x}}$$

$$D: \mathbb{R}_0 \quad CD = (-\infty; -1) \cup (1; +\infty)$$

PROPRIETA

$$\frac{e^x - e^{-x}}{2} = \sinh x \quad \bar{e} \text{ DISPARI } (f(x) = -f(-x))$$

$$\frac{e^x + e^{-x}}{2} = \cosh x \quad \bar{e} \text{ PARI } (f(x) = f(-x))$$



OSS $\sinh x < \cosh x \quad \forall x \in \mathbb{R}$