FUNZIONI IPERBOLICHE

- COSENO IPERBOLICO: $y = \cosh x = \dfrac{e^{x}+e^{-x}}{2}$

$D_y = \mathbb{R}$ $\quad CD_y = [1, +\infty)$

- SENO IPERBOLICO: $y = \operatorname{senh} x = \dfrac{e^{x}-e^{-x}}{2}$

$D_y = \mathbb{R}$ $\quad CD_y = \mathbb{R}$

<u>OSS</u>:

$$\cosh^2 x - \operatorname{senh}^2 x = 1$$

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

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

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

Quindi il punto $P(\cosh x; \operatorname{senh} x)$ appartiene all'iperbole di equazione $X^2 - Y^2 = 1$.

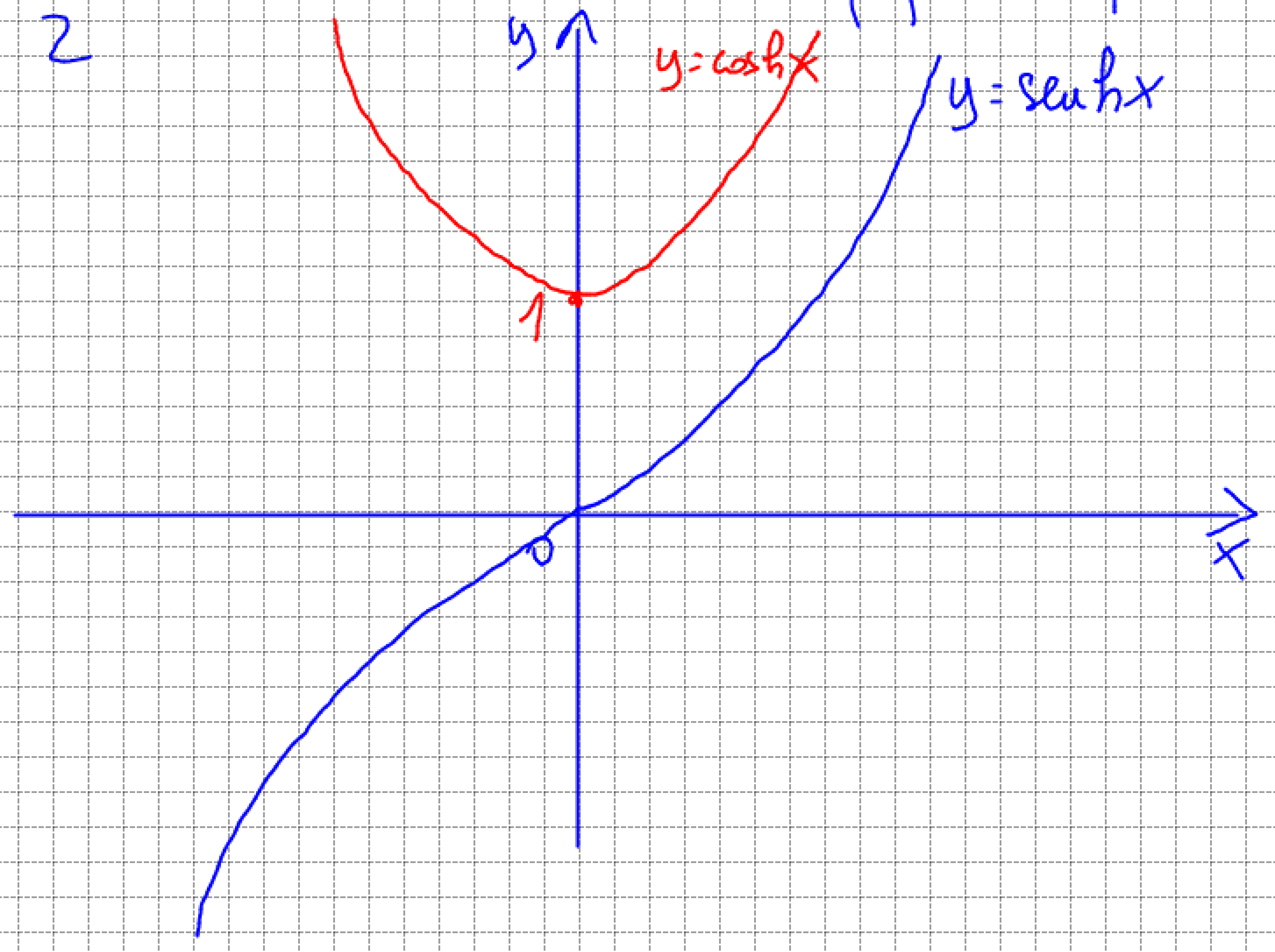
$$\operatorname{Tgh} x = \frac{\operatorname{senh} x}{\cosh x} = \frac{e^{x}-e^{-x}}{e^{x}+e^{-x}} \qquad D: \mathbb{R};\ CD: (-1; 1)$$

$$\operatorname{Ctgh} x = \frac{\cosh x}{\operatorname{senh} x} = \frac{e^{x}+e^{-x}}{e^{x}-e^{-x}} \qquad D: \mathbb{R}_0 \quad CD: (-\infty, -1) \cup (1, +\infty)$$

<u>PROPRIETÀ</u>

$\dfrac{e^{x}-e^{-x}}{2} = \operatorname{senh} x$ è DISPARI $(f(x) = -f(-x))$

$\dfrac{e^{x}+e^{-x}}{2} = \cosh x$ è PARI $(f(x) = f(-x))$



<u>OSS</u> $\operatorname{senh} x < \cosh x \quad \forall x \in \mathbb{R}$