FP3

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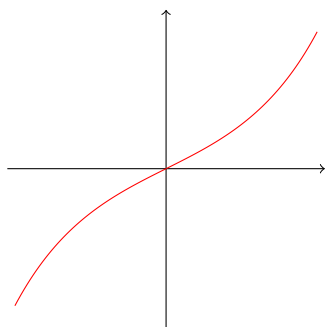
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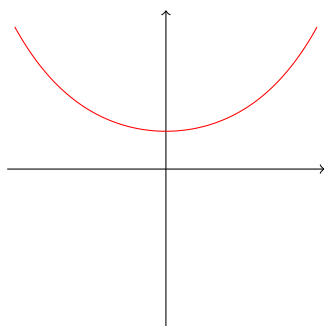# 1 Hyperbolic Functions

$$\sinh: \quad \{x \mid x \in \mathbb{R}\} \to \{y \mid y \in \mathbb{R}\}$$
$$x \mapsto \frac{e^x - e^{-x}}{2}$$
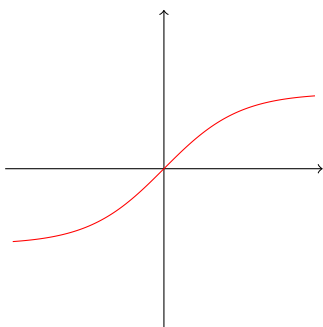
$$\frac{1}{\sinh x} = \operatorname{cosech} x$$

$$\frac{\mathrm{d}}{\mathrm{d}x} \sinh x = \cosh x$$

$$\cosh: \quad \{x \mid x \in \mathbb{R}\} \to \{y \mid y \in \mathbb{R},\ y \geq 1\}$$
$$x \mapsto \frac{e^x + e^{-x}}{2}$$

$$\frac{1}{\cosh x} = \operatorname{sech} x$$

$$\frac{\mathrm{d}}{\mathrm{d}x} \cosh x = -\sinh x$$

$$\tanh: \quad \{x \mid x \in \mathbb{R}\} \rightarrow \{y \mid y \in \mathbb{R}, \ -1 < y < 1\}$$

$$x \mapsto \frac{e^x - e^{-x}}{e^x + e^{-x}}$$

$$\frac{1}{\tanh x} = \coth x$$

$$\frac{\mathrm{d}}{\mathrm{d}x} \tanh x = \operatorname{sech}^2 x$$