FP3

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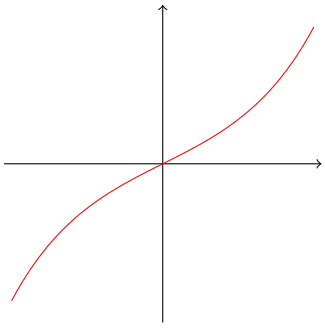
Contents

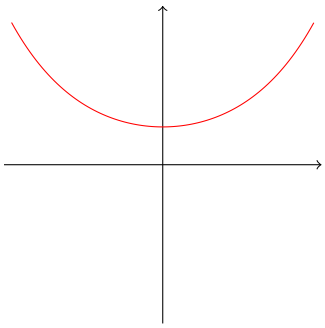
1 Hyperbolic Functions

1.1 Hyperbolic Sine & Cosecant



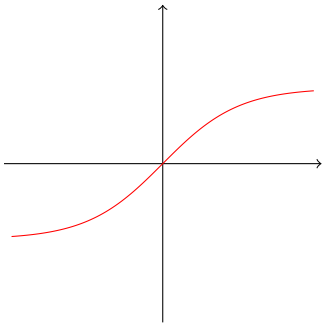
$$\begin{aligned}\sinh: \quad & \{x \mid x \in \mathbb{R}\} \to \{y \mid y \in \mathbb{R}\} \\ & x \mapsto \frac{e^x - e^{-x}}{2} \\ & \frac{1}{\sinh x} \;=\; \operatorname{cosech} x \\ & \frac{\mathrm{d}}{\mathrm{d}x} \sinh x \;=\; \cosh x\end{aligned}$$

1.2 Hyperbolic Cosine & Secant



$$\begin{aligned}\cosh: \quad & \{x \mid x \in \mathbb{R}\} \to \{y \mid y \in \mathbb{R},\ y \geq 1\} \\ & x \mapsto \frac{e^x + e^{-x}}{2} \\ & \frac{1}{\cosh x} \;=\; \operatorname{sech} x \\ & \frac{\mathrm{d}}{\mathrm{d}x} \cosh x \;=\; -\sinh x\end{aligned}$$

1.3 Hyperbolic Tangent & Cotangent



$$\begin{aligned}\tanh: \quad & \{x \mid x \in \mathbb{R}\} \to \{y \mid y \in \mathbb{R},\ -1 < y < 1\} \\ & x \mapsto \frac{e^x - e^{-x}}{e^x + e^{-x}} \\ & \frac{1}{\tanh x} \;=\; \coth x \\ & \frac{\mathrm{d}}{\mathrm{d}x} \tanh x \;=\; \operatorname{sech}^2 x\end{aligned}$$