

HYPERBOLIC FUNCTIONS

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It is well known that the functions $\sinh x$ and $\cosh x$ are defined by the series

$$\sinh x = x + \frac{x^3}{3!} + \frac{x^5}{5!} + \dots$$
$$\cosh x = 1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \dots$$

and that they satisfy the relations

$$\sinh^2 x - \cosh^2 x = -1$$
$$\sinh x \cosh x = \frac{1}{2} \sinh 2x$$

and so on.

It is also well known that the functions $\sinh x$ and $\cosh x$ are related to the exponential functions e^x and e^{-x} by the relations

$$\sinh x = \frac{e^x - e^{-x}}{2}$$
$$\cosh x = \frac{e^x + e^{-x}}{2}$$

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