

Hyperbolic Functions and Their Derivatives

Hyperbolic functions –

Even function

Odd function

Every function that is defined on an interval centered at the origin can be

$$f(x) =$$

$$e^x =$$

Identities

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

Proof:

Identities

$$\frac{d}{dx}(\sinh x) =$$

$$\frac{d}{dx}(\cosh x) =$$

$$\frac{d}{dx}(\tanh x) =$$

$$\frac{d}{dx}(\sinh u) =$$

$$\frac{d}{dx}(\operatorname{sech} u) =$$

$$\frac{d}{dx}(\operatorname{coth} u) =$$

$$\frac{d}{dx}(\operatorname{csch} u) =$$

Restrict domains to make them all one-to-one  
Identities

$$y = \sinh^{-1} x$$

Ex.

$$\cosh x = \frac{13}{5}, x > 0$$

$$\sinh(2 \ln x) =$$

$$y = y^2 \tanh\left(\frac{1}{t}\right)$$