

## Formulae

$$\begin{aligned}\cosh x &= \frac{e^x + e^{-x}}{2}, & \sinh x &= \frac{e^x - e^{-x}}{2}, & \tanh x &= \frac{e^x - e^{-x}}{e^x + e^{-x}} \\ \cosh^2 x - \sinh^2 x &= 1, & \cosh(-x) &= \cosh x, & \sinh(-x) &= -\sinh x \\ \cosh(2x) &= \cosh^2 x + \sinh^2 x, & \sinh(2x) &= 2 \sinh x \cosh x, & \tanh(2x) &= \frac{2 \tanh x}{1 + \tanh^2 x} \\ \cosh^2 x &= \frac{\cosh 2x + 1}{2}, & \sinh^2 x &= \frac{\cosh 2x - 1}{2}, & 1 - \tanh^2 x &= \operatorname{sech}^2 x = \frac{1}{\cosh^2 x} \\ \frac{d \cosh x}{dx} &= \sinh x, & \frac{d \sinh x}{dx} &= \cosh x, & \frac{d \tanh x}{dx} &= \operatorname{sech}^2 x = \frac{1}{\cosh^2 x}\end{aligned}$$

$$\begin{aligned}\cos(A \pm B) &= \cos A \cos B \mp \sin A \sin B \\ \sin(A \pm B) &= \sin A \cos B \pm \cos A \sin B \\ \tan(A \pm B) &= \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}\end{aligned}$$

$$\begin{aligned}\cos A \cos B &= \frac{1}{2} [\cos(A - B) + \cos(A + B)] \\ \sin A \sin B &= \frac{1}{2} [\cos(A - B) - \cos(A + B)] \\ \sin A \cos B &= \frac{1}{2} [\sin(A + B) + \sin(A - B)] \\ \cos A \sin B &= \frac{1}{2} [\sin(A + B) - \sin(A - B)]\end{aligned}$$

$$\begin{aligned}\cosh(A \pm B) &= \cosh A \cosh B \pm \sinh A \sinh B \\ \sinh(A \pm B) &= \sinh A \cosh B \pm \cosh A \sinh B \\ \tanh(A \pm B) &= \frac{\tanh A \pm \tanh B}{1 \pm \tanh A \tanh B}\end{aligned}$$

$$\begin{aligned}\cosh A \cosh B &= \frac{1}{2} [\cosh(A + B) + \cosh(A - B)] \\ \sinh A \sinh B &= \frac{1}{2} [\cosh(A + B) - \cosh(A - B)] \\ \sinh A \cosh B &= \frac{1}{2} [\sinh(A + B) + \sinh(A - B)] \\ \cosh A \sinh B &= \frac{1}{2} [\sinh(A + B) - \sinh(A - B)]\end{aligned}$$