

Exercise 10

Prove the identity.

$$\cosh x - \sinh x = e^{-x}$$

Solution

Use the definitions listed on page 259.

$$\begin{aligned}\cosh x - \sinh x &= \left(\frac{e^x + e^{-x}}{2} \right) - \left(\frac{e^x - e^{-x}}{2} \right) \\ &= \frac{(e^x + e^{-x}) - (e^x - e^{-x})}{2} \\ &= \frac{2e^{-x}}{2} \\ &= e^{-x}\end{aligned}$$