Exercise 45

Calculate y'.

$$y = \ln(\cosh 3x)$$

Solution

Calculate y' by using the chain rule repeatedly.

$$\begin{aligned} y' &= \frac{d}{dx}[\ln(\cosh 3x)] \\ &= \frac{1}{\cosh 3x} \cdot \frac{d}{dx}(\cosh 3x) \\ &= \frac{1}{\cosh 3x} \cdot (\sinh 3x) \cdot \frac{d}{dx}(3x) \\ &= \frac{1}{\cosh 3x} \cdot (\sinh 3x) \cdot (3) \\ &= 3 \tanh 3x \end{aligned}$$