

Exercise 31

Find the derivative. Simplify where possible.

$$f(x) = \tanh \sqrt{x}$$

Solution

Take the derivative using the chain rule.

$$\begin{aligned} f'(x) &= \frac{d}{dx} \tanh \sqrt{x} \\ &= (\operatorname{sech}^2 \sqrt{x}) \cdot \frac{d}{dx} \sqrt{x} \\ &= (\operatorname{sech}^2 \sqrt{x}) \cdot \frac{1}{2} x^{-1/2} \\ &= (\operatorname{sech}^2 \sqrt{x}) \cdot \frac{1}{2\sqrt{x}} \\ &= \frac{\operatorname{sech}^2 \sqrt{x}}{2\sqrt{x}} \end{aligned}$$