Exercise 52

Find the derivative of the function. Simplify where possible.

$$g(x) = \arccos\sqrt{x}$$

Solution

Use the chain rule and the derivatives of the inverse trigonometric functions listed on page 214.

$$\begin{aligned}
\frac{dg}{dx} &= \frac{d}{dx}\arccos\sqrt{x} \\
&= -\frac{1}{\sqrt{1-(\sqrt{x})^2}} \cdot \frac{d}{dx}\left(\sqrt{x}\right) \\
&= -\frac{1}{\sqrt{1-x}} \cdot \left(\frac{1}{2}x^{-1/2}\right) \\
&= -\frac{1}{\sqrt{1-x}} \cdot \left(\frac{1}{2\sqrt{x}}\right) \\
&= -\frac{1}{2\sqrt{1-x}\sqrt{x}} \\
&= -\frac{1}{2\sqrt{(1-x)x}}
\end{aligned}$$