Exercise 56

Find the derivative of the function. Simplify where possible.

$$R(t) = \arcsin(1/t)$$

Solution

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

$$\frac{dR}{dt} = \frac{d}{dt}\arcsin\left(\frac{1}{t}\right)$$

$$= \frac{1}{\sqrt{1 - \left(\frac{1}{t}\right)^2}} \cdot \frac{d}{dt}\left(\frac{1}{t}\right)$$

$$= \frac{1}{\sqrt{1 - \frac{1}{t^2}}} \cdot \left(-\frac{1}{t^2}\right)$$

$$= -\frac{1}{t^2\sqrt{1 - \frac{1}{t^2}}}$$

$$= -\frac{1}{t\sqrt{t^2\left(1 - \frac{1}{t^2}\right)}}$$

$$= -\frac{1}{t\sqrt{t^2 - 1}}$$