

Exercise 27

Find the derivative of the function.

$$r(t) = 10^{2\sqrt{t}}$$

Solution

First rewrite the function.

$$r(t) = e^{\ln 10^{2\sqrt{t}}} = e^{2\sqrt{t} \ln 10} = e^{(2 \ln 10)\sqrt{t}}$$

Then take the derivative using the chain rule.

$$\begin{aligned} r'(t) &= \frac{dr}{dt} = \frac{d}{dt} \left[e^{(2 \ln 10)\sqrt{t}} \right] \\ &= e^{(2 \ln 10)\sqrt{t}} \cdot \frac{d}{dt} \left[(2 \ln 10)\sqrt{t} \right] \\ &= e^{(2 \ln 10)\sqrt{t}} \cdot \left[\frac{1}{2} (2 \ln 10) t^{-1/2} \right] \\ &= \frac{\ln 10}{\sqrt{t}} e^{(2 \ln 10)\sqrt{t}} \end{aligned}$$