Exercise 6

Write the composite function in the form $f(g(x))$. [Identify the inner function $u = g(x)$ and the outer function $y = f(u)$.] Then find the derivative dy/dx.

$$y = \sqrt{2 - e^x}$$

Solution

Here $f(x) = \sqrt{x}$ and $g(x) = 2 - e^x$ so that $f(g(x)) = \sqrt{2 - e^x}$. Take the derivative now.

$$y' = \frac{d}{dx}\left(\sqrt{2 - e^x}\right) = \frac{1}{2}(2 - e^x)^{-1/2} \cdot \frac{d}{dx}(2 - e^x)$$

$$= \frac{1}{2}(2 - e^x)^{-1/2} \cdot (-e^x)$$

$$= -\frac{e^x}{2\sqrt{2 - e^x}}$$