

Exercise 45

If $f(x) = e^x g(x)$, where $g(0) = 2$ and $g'(0) = 5$, find $f'(0)$.

Solution

Calculate the derivative using the product rule.

$$\begin{aligned} f'(x) &= \frac{d}{dx}[e^x g(x)] \\ &= \left[\frac{d}{dx}(e^x) \right] g(x) + e^x g'(x) \\ &= (e^x)g(x) + e^x g'(x) \end{aligned}$$

Evaluate it at $x = 0$.

$$f'(0) = g(0) + g'(0) = 2 + 5 = 7$$