

Problem Definition

Problem 15. Find the derivative of the following function.

$$y = xe^x - 4e^{-x}$$

Solution Step 1:

The first term requires the use of the product rule and the second term needs an application of the chain rule. The basic calculation is

$$\begin{aligned} y' &= \frac{d}{dx} (xe^x - 4e^{-x}) \\ &= \frac{d}{dx} (xe^x) - 4\frac{d}{dx} (e^{-x}) \\ &= \frac{d}{dx} (x) e^x + x\frac{d}{dx} (e^x) - 4\frac{d}{dx} (e^{-x}) \\ &= (1) e^x + xe^x - 4e^{-x}(-1) \\ &= e^x + xe^x + 4e^{-x} \end{aligned}$$

Solution Step 2:

The last step (if necessary) is to simplify the expression with a little algebra.

$$y' = e^x + xe^x + 4e^{-x} = e^x(1 + x) + 4e^{-x}$$