

Exercise 44Calculate y' .

$$y = \frac{\sin mx}{x}$$

SolutionCalculate y' by using the chain and quotient rules.

$$\begin{aligned} y' &= \frac{d}{dx} \left(\frac{\sin mx}{x} \right) \\ &= \frac{\left[\frac{d}{dx}(\sin mx) \right] (x) - \left[\frac{d}{dx}(x) \right] (\sin mx)}{x^2} \\ &= \frac{\left[(\cos mx) \cdot \frac{d}{dx}(mx) \right] (x) - (1)(\sin mx)}{x^2} \\ &= \frac{[(\cos mx) \cdot (m)](x) - (1)(\sin mx)}{x^2} \\ &= \frac{mx \cos mx - \sin mx}{x^2} \end{aligned}$$