

Exercise 29

Calculate y' .

$$y = \ln \sin x - \frac{1}{2} \sin^2 x$$

Solution

Calculate y' by using the chain rule.

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