

**Exercise 37**

Find the derivative of the function.

$$y = \cot^2(\sin \theta)$$

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**Solution**

Take the derivative using the chain rule.

$$\begin{aligned} y' &= \frac{dy}{d\theta} = \frac{d}{d\theta} [\cot(\sin \theta)]^2 \\ &= 2 [\cot(\sin \theta)] \cdot \frac{d}{d\theta} [\cot(\sin \theta)] \\ &= 2 [\cot(\sin \theta)] \cdot [-\csc^2(\sin \theta)] \cdot \frac{d}{d\theta}(\sin \theta) \\ &= 2 [\cot(\sin \theta)] \cdot [-\csc^2(\sin \theta)] \cdot (\cos \theta) \\ &= -2 \cot(\sin \theta) \csc^2(\sin \theta) \cos \theta \end{aligned}$$