

Exercise 30

Find the derivative of the function.

$$J(\theta) = \tan^2(n\theta)$$

Solution

Take the derivative using the chain rule twice.

$$\begin{aligned} J'(\theta) &= \frac{dJ}{d\theta} = \frac{d}{d\theta} [\tan^2(n\theta)] \\ &= 2[\tan(n\theta)] \cdot \frac{d}{d\theta} [\tan(n\theta)] \\ &= 2[\tan(n\theta)] \cdot [\sec^2(n\theta)] \cdot \frac{d}{d\theta} (n\theta) \\ &= 2[\tan(n\theta)] \cdot [\sec^2(n\theta)] \cdot (n) \\ &= 2n \tan(n\theta) \sec^2(n\theta) \end{aligned}$$