

Exercise 5

Calculate y' .

$$y = x^2 \sin \pi x$$

Solution

Calculate y' by using the product rule.

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