Exercise 31

Calculate y'.

$$y = x \tan^{-1}(4x)$$

Solution

Calculate y' by using the chain and product rules.

$$\begin{aligned} y' &= \frac{d}{dx}(x \tan^{-1} 4x) \\ &= \left[\frac{d}{dx}(x)\right] \tan^{-1} 4x + x \left[\frac{d}{dx}(\tan^{-1} 4x)\right] \\ &= (1) \tan^{-1} 4x + x \left[\frac{1}{1+(4x)^2} \cdot \frac{d}{dx}(4x)\right] \\ &= \tan^{-1} 4x + x \left[\frac{1}{1+16x^2} \cdot (4)\right] \\ &= \tan^{-1} 4x + \frac{4x}{1+16x^2} \end{aligned}$$