

Exercise 2.7

1. Differentiate each of the following with respect to x :

- (i) $\sin^{-1} 6x$ (ii) $\tan^{-1} 3x$ (iii) $\sin^{-1}(2x + 1)$ (iv) $\tan^{-1}(x^2)$

$$f(x) = \sin^{-1}\left(\frac{x}{a}\right) \Rightarrow f'(x) = \frac{1}{\sqrt{a^2 - x^2}}$$

$$f(x) = \tan^{-1}\left(\frac{x}{a}\right) \Rightarrow f'(x) = \frac{a}{a^2 + x^2}$$

$$6x = \frac{x}{?} = \frac{x}{\left(\frac{1}{6}\right)}$$

$$\Rightarrow a = \frac{1}{6}$$

$$f(x) = \sin^{-1} 6x = \sin^{-1} \left(\frac{x}{\left(\frac{1}{6}\right)}\right)$$

$$f'(x) = \frac{1}{\sqrt{\left(\frac{1}{6}\right)^2 - x^2}}$$

$$= \frac{1}{\sqrt{\frac{1}{36} - x^2}}$$