DIFFERENTIATION OF INVERSE TRIGONOMETRIC FUNCTIONS

2 Differentiate the following.

(a) $y = \tan^{-1} 5x$ **(b)** $y = 3\tan^{-1}(1 - x)$ **(c)** $y = \tan^{-1} x^2$ **(d)** $y = (\tan^{-1} x)^2$

DIFFERENTIATION OF INVERSE TRIGONOMETRIC FUNCTIONS

2 Differentiate the following.

(i) $y = \sin^{-1}\left(\frac{x}{4}\right)$ **(j)** $y = 2\cos^{-1}\left(\frac{3x}{2}\right)$ **(k)** $y = \log_e(\sin^{-1} x)$ **(l)** $y = \log_e(\cos^{-1} 2x)^2$

DIFFERENTIATION OF INVERSE TRIGONOMETRIC FUNCTIONS

2 Differentiate the following.

(q) $y = \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ **(r)** $y = \cos^{-1} x + \cos^{-1}(-x)$ **(s)** $y = \tan x \tan^{-1} x$ **(t)** $y = \tan^{-1}\left(\sqrt{x^2-1}\right)$

5 If $y = \cos^{-1} x + \cos^{-1}(-x)$, find $\frac{dy}{dx}$ and show that $y = \pi$ for all x in the domain.

6 If $y = \sin^{-1} x + \sin^{-1}(-x)$, find $\frac{dy}{dx}$ and show that $y = 0$ for all x in the domain.

7 **(a)** Differentiate $x\tan^{-1}x$. **(b)** Hence find $\int \tan^{-1}x\,dx$.

(c) Use the substitution $u = \log_e x$ to evaluate $\int_1^e \frac{\tan^{-1}(\log_e x)}{x}dx$.

8 **(a)** State the domain of $f(x) = \tan^{-1} x + \tan^{-1}\left(\frac{1}{x}\right)$.

(b) Find $f'(x)$. **(c)** Find $f(1)$ and $f(-1)$. **(d)** Sketch the graph of $y = f(x)$.