

$$2. a. \cos^{-1}(3x) \Rightarrow \frac{-3}{\sqrt{1-9x^2}}$$

$$b. \frac{2}{3} \cos^{-1}\left(\frac{x}{3}\right) \Rightarrow \frac{-\frac{1}{3}}{\sqrt{1-\frac{x^2}{9}}} \times \frac{2}{3} = \frac{-2}{3\sqrt{9-x^2}}$$

$$4. (a) \sec^{-1} 2t \Rightarrow \frac{2}{2t\sqrt{4t^2-1}}$$

$$b. \sec^{-1}\left(\frac{3x}{4}\right) \Rightarrow \frac{3}{4} \times \frac{1}{\frac{3}{4}\sqrt{\frac{9x^2}{16}-1}} \times \frac{4}{4}$$

$$= \frac{4}{x\sqrt{9x^2-16}} *$$

$$6. (a) 3\cot^{-1}(2t) \Rightarrow \frac{-6}{1+4t^2}$$

$$(b) \cot^{-1}(\sqrt{\theta^2-1}) \Rightarrow \frac{\sqrt{\theta^2-1}}{\sqrt{\theta^2-1}} \Rightarrow \frac{2\theta}{2\sqrt{\theta^2-1}} = \frac{\theta}{\sqrt{\theta^2-1}}$$

$$\Rightarrow \frac{-\theta}{\sqrt{\theta^2-1}} \Rightarrow \frac{-\theta}{\sqrt{\theta^2-1}} \times \frac{1}{\theta^2}$$

$$\Rightarrow \frac{-1}{\theta\sqrt{\theta^2-1}} *$$

$$8. (a) 2x \sin^{-1} 3x \Rightarrow 2\sin^{-1} 3x + 2x \cdot \frac{3}{\sqrt{1-9x^2}}$$

$$\Rightarrow 2\sin^{-1} 3x + \frac{6x}{\sqrt{1-9x^2}}$$

$$(b) t^2 \sec^{-1} 2t \Rightarrow 2t \sec^{-1} 2t + t^2 \cdot \frac{2}{2t\sqrt{4t^2-1}}$$

$$\Rightarrow \frac{t}{\sqrt{4t^2-1}} + 2t \sec^{-1} 2t$$

$$10. 2\sqrt{t} \cot^{-1} t \Rightarrow \frac{1}{\sqrt{t}} \cot^{-1} t + 2\sqrt{t} \cdot \frac{-1}{1+t^2}$$

$$\Rightarrow \frac{\cot^{-1} t}{\sqrt{t}} - \frac{2\sqrt{t}}{1+t^2}$$

## Exercise 2

$$2. (a) 2 \cosh^{-1}\left(\frac{t}{3}\right) \Rightarrow 2 \cdot \frac{-\frac{1}{3}}{\sqrt{\frac{t^2}{9}-1}} \Rightarrow \frac{-2}{3\sqrt{\frac{t^2}{9}-1}} = \frac{-2}{\sqrt{t^2-9}}$$

$$(b) \frac{\cosh^{-1} 20}{2} \Rightarrow \frac{-1}{2} \cdot \frac{2}{\sqrt{400-1}} = \frac{-1}{\sqrt{400-1}}$$

$$4. (a) \operatorname{sech}^{-1} \frac{3x}{4} \Rightarrow \frac{3}{4} \cdot \frac{-4}{3x\sqrt{16-9x^2}} \Rightarrow \frac{-4}{x\sqrt{16-9x^2}}$$

$$\Rightarrow \frac{-4}{x\sqrt{16-9x^2}}$$

$$(b) \frac{-\operatorname{sech}^{-1} 2x}{2} \Rightarrow \frac{-1}{2} \cdot \frac{-2}{2x\sqrt{1-4x^2}} \Rightarrow \frac{1}{2x\sqrt{1-4x^2}}$$

$$6. (a) \coth^{-1}\left(\frac{2x}{7}\right) \Rightarrow \frac{2}{7} \cdot \frac{-\frac{2}{7}}{\frac{4}{49}x^2+1} \Rightarrow \frac{-4}{49} \cdot \frac{1}{\frac{4}{49}x^2+1}$$

$$\Rightarrow \frac{-14}{4x^2+49}$$

$$(b) \frac{1}{4} \coth^{-1} 3t \Rightarrow \frac{3}{4} \cdot \frac{1}{1-9t^2} \Rightarrow \frac{3}{4(1-9t^2)}$$

$$8. (a) \operatorname{sech}^{-1}(x-1) \Rightarrow \frac{-1}{(x-1)\sqrt{1-(x-1)^2}}$$

$$(b) \tanh^{-1}(\tanh(x)) \Rightarrow \operatorname{sech}^2 x \cdot \frac{1}{1-\tanh^2(x)}$$

$$\tanh^{-1}(\tanh(x)) = x \Rightarrow 1$$



10. (a)  $\theta \sinh^{-1} \theta \Rightarrow \sinh^{-1} \theta + \theta \frac{1}{\sqrt{\theta^2 + 1}}$

(b)  $\sqrt{x} \cosh^{-1} x \Rightarrow \frac{\cosh^{-1} x}{2\sqrt{x}} + \frac{\sqrt{x}}{\sqrt{x^2 - 1}}$

12.  $\frac{d}{dx} [\cosh^{-1}(\cosh(x))] = 2x$

$x \cosh^{-1}(\cosh(x)) = x \cdot x = x^2$

$\frac{d}{dx} [x^2] = 2x \neq$