

### Exercise 20. Differentiating inverse trigonometric functions

In Problems 1 to 6, differentiate with respect to the variable.

1. (a)  $\sin^{-1} 4x$  (b)  $\sin^{-1} \frac{x}{2}$

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

3. (a)  $3 \tan^{-1} 2x$  (b)  $\frac{1}{2} \tan^{-1} \sqrt{x}$

4. (a)  $2 \sec^{-1} 2t$  (b)  $\sec^{-1} \frac{3}{4}x$

5. (a)  $\frac{5}{2} \operatorname{cosec}^{-1} \frac{\theta}{2}$  (b)  $\operatorname{cosec}^{-1} x^2$

6. (a)  $3 \cot^{-1} 2t$  (b)  $\cot^{-1} \sqrt{\theta^2 - 1}$

### Exercise 21. Logarithmic forms of the inverse hyperbolic functions

In Problems 1 to 3 use logarithmic equivalents of inverse hyperbolic functions to evaluate correct to 4 decimal places.

1. (a)  $\sinh^{-1} \frac{1}{2}$  (b)  $\sinh^{-1} 4$  (c)  $\sinh^{-1} 0.9$

2. (a)  $\cosh^{-1} \frac{5}{4}$  (b)  $\cosh^{-1} 3$  (c)  $\cosh^{-1} 4.3$

3. (a)  $\tanh^{-1} \frac{1}{4}$  (b)  $\tanh^{-1} \frac{5}{8}$  (c)  $\tanh^{-1} 0.7$

## Exercise 22. Differentiation of inverse hyperbolic functions

In Problems 1 to 11, differentiate with respect to the variable.

1. (a)  $\sinh^{-1} \frac{x}{3}$  (b)  $\sinh^{-1} 4x$

2. (a)  $2 \cosh^{-1} \frac{t}{3}$  (b)  $\frac{1}{2} \cosh^{-1} 2\theta$

3. (a)  $\tanh^{-1} \frac{2x}{5}$  (b)  $3 \tanh^{-1} 3x$

4. (a)  $\operatorname{sech}^{-1} \frac{3x}{4}$  (b)  $-\frac{1}{2} \operatorname{sech}^{-1} 2x$

5. (a)  $\operatorname{cosech}^{-1} \frac{x}{4}$  (b)  $\frac{1}{2} \operatorname{cosech}^{-1} 4x$

6. (a)  $\operatorname{coth}^{-1} \frac{2x}{7}$  (b)  $\frac{1}{4} \operatorname{coth}^{-1} 3t$

7. (a)  $2 \sinh^{-1} \sqrt{x^2 - 1}$   
(b)  $\frac{1}{2} \cosh^{-1} \sqrt{x^2 + 1}$

8. (a)  $\operatorname{sech}^{-1}(x - 1)$  (b)  $\tanh^{-1}(\tanh x)$

9. (a)  $\cosh^{-1} \left( \frac{t}{t-1} \right)$  (b)  $\operatorname{coth}^{-1}(\cos x)$

10. (a)  $\theta \sinh^{-1} \theta$  (b)  $\sqrt{x} \cosh^{-1} x$