

# APPENDIX B | TABLE OF DERIVATIVES

## General Formulas

1.  $\frac{d}{dx}(c) = 0$
2.  $\frac{d}{dx}(f(x) + g(x)) = f'(x) + g'(x)$
3.  $\frac{d}{dx}(f(x)g(x)) = f'(x)g(x) + f(x)g'(x)$
4.  $\frac{d}{dx}(x^n) = nx^{n-1}$ , for real numbers  $n$
5.  $\frac{d}{dx}(cf(x)) = cf'(x)$
6.  $\frac{d}{dx}(f(x) - g(x)) = f'(x) - g'(x)$
7.  $\frac{d}{dx}\left(\frac{f(x)}{g(x)}\right) = \frac{g(x)f'(x) - f(x)g'(x)}{(g(x))^2}$
8.  $\frac{d}{dx}[f(g(x))] = f'(g(x)) \cdot g'(x)$

## Trigonometric Functions

9.  $\frac{d}{dx}(\sin x) = \cos x$
10.  $\frac{d}{dx}(\tan x) = \sec^2 x$
11.  $\frac{d}{dx}(\sec x) = \sec x \tan x$
12.  $\frac{d}{dx}(\cos x) = -\sin x$
13.  $\frac{d}{dx}(\cot x) = -\csc^2 x$
14.  $\frac{d}{dx}(\csc x) = -\csc x \cot x$

## Inverse Trigonometric Functions

15.  $\frac{d}{dx}(\sin^{-1} x) = \frac{1}{\sqrt{1-x^2}}$
16.  $\frac{d}{dx}(\tan^{-1} x) = \frac{1}{1+x^2}$
17.  $\frac{d}{dx}(\sec^{-1} x) = \frac{1}{|x|\sqrt{x^2-1}}$

$$18. \frac{d}{dx}(\cos^{-1} x) = -\frac{1}{\sqrt{1-x^2}}$$

$$19. \frac{d}{dx}(\cot^{-1} x) = -\frac{1}{1+x^2}$$

$$20. \frac{d}{dx}(\csc^{-1} x) = -\frac{1}{|x|\sqrt{x^2-1}}$$

## Exponential and Logarithmic Functions

$$21. \frac{d}{dx}(e^x) = e^x$$

$$22. \frac{d}{dx}(\ln|x|) = \frac{1}{x}$$

$$23. \frac{d}{dx}(b^x) = b^x \ln b$$

$$24. \frac{d}{dx}(\log_b x) = \frac{1}{x \ln b}$$

## Hyperbolic Functions

$$25. \frac{d}{dx}(\sinh x) = \cosh x$$

$$26. \frac{d}{dx}(\tanh x) = \operatorname{sech}^2 x$$

$$27. \frac{d}{dx}(\operatorname{sech} x) = -\operatorname{sech} x \tanh x$$

$$28. \frac{d}{dx}(\cosh x) = \sinh x$$

$$29. \frac{d}{dx}(\coth x) = -\operatorname{csch}^2 x$$

$$30. \frac{d}{dx}(\operatorname{csch} x) = -\operatorname{csch} x \coth x$$

## Inverse Hyperbolic Functions

$$31. \frac{d}{dx}(\sinh^{-1} x) = \frac{1}{\sqrt{x^2+1}}$$

$$32. \frac{d}{dx}(\tanh^{-1} x) = \frac{1}{1-x^2} (|x| < 1)$$

$$33. \frac{d}{dx}(\operatorname{sech}^{-1} x) = -\frac{1}{x\sqrt{1-x^2}} \quad (0 < x < 1)$$

$$34. \frac{d}{dx}(\cosh^{-1} x) = \frac{1}{\sqrt{x^2-1}} \quad (x > 1)$$

$$35. \frac{d}{dx}(\coth^{-1} x) = \frac{1}{1-x^2} \quad (|x| > 1)$$

$$36. \frac{d}{dx}(\operatorname{csch}^{-1} x) = -\frac{1}{|x|\sqrt{1+x^2}} \quad (x \neq 0)$$