

## Differentiation Formulas

$$\frac{d}{dx} k = 0 \quad (1)$$

$$\frac{d}{dx} [f(x) \pm g(x)] = f'(x) \pm g'(x) \quad (2)$$

$$\frac{d}{dx} [k \cdot f(x)] = k \cdot f'(x) \quad (3)$$

$$\frac{d}{dx} [f(x)g(x)] = f(x)g'(x) + g(x)f'(x) \quad (4)$$

$$\frac{d}{dx} \left( \frac{f(x)}{g(x)} \right) = \frac{g(x)f'(x) - f(x)g'(x)}{[g(x)]^2} \quad (5)$$

$$\frac{d}{dx} f(g(x)) = f'(g(x)) \cdot g'(x) \quad (6)$$

$$\frac{d}{dx} x^n = nx^{n-1} \quad (7)$$

$$\frac{d}{dx} \sin x = \cos x \quad (8)$$

$$\frac{d}{dx} \cos x = -\sin x \quad (9)$$

$$\frac{d}{dx} \tan x = \sec^2 x \quad (10)$$

$$\frac{d}{dx} \cot x = -\csc^2 x \quad (11)$$

$$\frac{d}{dx} \sec x = \sec x \tan x \quad (12)$$

$$\frac{d}{dx} \csc x = -\csc x \cot x \quad (13)$$

$$\frac{d}{dx} e^x = e^x \quad (14)$$

$$\frac{d}{dx} a^x = a^x \ln a \quad (15)$$

$$\frac{d}{dx} \ln |x| = \frac{1}{x} \quad (16)$$

$$\frac{d}{dx} \sin^{-1} x = \frac{1}{\sqrt{1-x^2}} \quad (17)$$

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

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

$$\frac{d}{dx} \cot^{-1} x = \frac{-1}{x^2+1} \quad (20)$$

$$\frac{d}{dx} \sec^{-1} x = \frac{1}{|x|\sqrt{x^2-1}} \quad (21)$$

$$\frac{d}{dx} \csc^{-1} x = \frac{-1}{|x|\sqrt{x^2-1}} \quad (22)$$

## Integration Formulas

$$\int dx = x + C \quad (1)$$

$$\int x^n dx = \frac{x^{n+1}}{n+1} + C \quad (2)$$

$$\int \frac{dx}{x} = \ln |x| + C \quad (3)$$

$$\int e^x dx = e^x + C \quad (4)$$

$$\int a^x dx = \frac{1}{\ln a} a^x + C \quad (5)$$

$$\int \ln x dx = x \ln x - x + C \quad (6)$$

$$\int \sin x dx = -\cos x + C \quad (7)$$

$$\int \cos x dx = \sin x + C \quad (8)$$

$$\int \tan x dx = -\ln |\cos x| + C \quad (9)$$

$$\int \cot x dx = \ln |\sin x| + C \quad (10)$$

$$\int \sec x dx = \ln |\sec x + \tan x| + C \quad (11)$$

$$\int \csc x dx = -\ln |\csc x + \cot x| + C \quad (12)$$

$$\int \sec^2 x dx = \tan x + C \quad (13)$$

$$\int \csc^2 x dx = -\cot x + C \quad (14)$$

$$\int \sec x \tan x dx = \sec x + C \quad (15)$$

$$\int \csc x \cot x dx = -\csc x + C \quad (16)$$

$$\int \frac{dx}{\sqrt{a^2 - x^2}} = \sin^{-1} \frac{x}{a} + C \quad (17)$$

$$\int \frac{dx}{a^2 + x^2} = \frac{1}{a} \tan^{-1} \frac{x}{a} + C \quad (18)$$

$$\int \frac{dx}{x\sqrt{x^2 - a^2}} = \frac{1}{a} \sec^{-1} \frac{|x|}{a} + C \quad (19)$$