Differentiation Formulas

$$\frac{d}{dx}k = 0 \tag{1}$$

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

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

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

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

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

$$\frac{d}{dx}x^n = nx^{n-1} \tag{7}$$

$$\frac{d}{dx}\sin x = \cos x \tag{8}$$

$$\frac{d}{dx}\cos x = -\sin x \tag{9}$$

$$\frac{d}{dx}\tan x = \sec^2 x \tag{10}$$

$$\frac{d}{dx}\cot x = -\csc^2 x \tag{11}$$

$$\frac{d}{dx}\sec x = \sec x \tan x \tag{12}$$

$$\frac{d}{dx}\csc x = -\csc x \cot x \tag{13}$$

$$\frac{d}{dx}e^x = e^x \tag{14}$$

$$\frac{d}{dx}a^x = a^x \ln a \tag{15}$$

$$\frac{d}{dx}\ln|x| = \frac{1}{x} \tag{16}$$

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

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

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

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

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

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

Integration Formulas

$$\int dx = x + C \tag{1}$$

$$\int x^n\,dx = \frac{x^{n+1}}{n+1} + C \tag{2}$$

$$\int \frac{dx}{x} = \ln|x| + C \tag{3}$$

$$\int e^x\,dx = e^x + C \tag{4}$$

$$\int a^x\,dx = \frac{1}{\ln a}a^x + C \tag{5}$$

$$\int \ln x\,dx = x\ln x - x + C \tag{6}$$

$$\int \sin x\,dx = -\cos x + C \tag{7}$$

$$\int \cos x\,dx = \sin x + C \tag{8}$$

$$\int \tan x\,dx = -\ln|\cos x| + C \tag{9}$$

$$\int \cot x\,dx = \ln|\sin x| + C \tag{10}$$

$$\int \sec x\,dx = \ln|\sec x + \tan x| + C \tag{11}$$

$$\int \csc x\,dx = -\ln|\csc x + \cot x| + C \tag{12}$$

$$\int \sec^2 x\,dx = \tan x + C \tag{13}$$

$$\int \csc^2 x\,dx = -\cot x + C \tag{14}$$

$$\int \sec x\tan x\,dx = \sec x + C \tag{15}$$

$$\int \csc x\cot x\,dx = -\csc x + C \tag{16}$$

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

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

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