Integrals and Trig Identities

Basic Integrals

$$\int x^n \, dx = \frac{x^{n+1}}{n+1} \quad (n \neq -1)$$

$$\int \frac{1}{x} \, dx = \ln |x|$$

$$\int e^x \, dx = e^x$$

$$\int a^x \, dx = \frac{a^x}{\ln a}$$

$$\int \sin x \, dx = -\cos x$$

$$\int \cos x \, dx = \sin x$$

$$\int \sec^2 x \, dx = \tan x$$

$$\int \csc^2 x \, dx = -\cot x$$

$$\int \sec x \tan x \, dx = \sec x$$

$$\int \csc x \cot x \, dx = -\csc x$$

$$\int \sec x \, dx = \ln |\sec x + \tan x|$$

$$\int \csc x \, dx = \ln |\csc x - \cot x|$$

$$\int \tan x \, dx = \ln |\sec x|$$

$$\int \cot x \, dx = \ln |\sin x|$$

$$\int \frac{1}{x^2 + a^2} \, dx = \frac{1}{a} \tan^{-1}\left(\frac{x}{a}\right)$$

$$\int \frac{1}{\sqrt{a^2 - x^2}} \, dx = \sin^{-1}\left(\frac{x}{a}\right)$$

Constants of integration have been ommitted.

Trig Identities

$$\sin^2 \theta + \cos^2 \theta = 1 \qquad \tan^2 \theta + 1 = \sec^2 \theta$$

$$\cos^2 x = \tfrac{1}{2}(1 + \cos 2x) \qquad \sin^2 x = \tfrac{1}{2}(1 - \cos 2x)$$

$$\sin 2x = 2 \sin x \cos x \qquad \cos 2x = \cos^2 x - \sin^2 x$$

Completing the square

$$ax^2 + bx + c = a(x + d)^2 + e, \text{ where } d = \frac{b}{2a} \text{ and } e = c - \frac{b^2}{4a}$$