Basic Trigonometric Identities

Pythagorean Identities

$$\cos^2 x + \sin^2 x = 1$$
$$\tan^2 x + 1 = \sec^2 x$$
$$\cot^2 x + 1 = \csc^2 x$$

Double Angle Formulas

$$\sin 2x = 2 \sin x \cos x$$
$$\cos 2x = \begin{cases} \cos^2 x - \sin^2 x \\ 2\cos^2 x - 1 \\ 1 - 2\sin^2 x \end{cases}$$

Reduction Formulas

$$\cos^2 x = \frac{1 + \cos 2x}{2}$$
$$\sin^2 x = \frac{1 - \cos 2x}{2}$$
$$\sin x \cos x = \frac{1}{2} \sin 2x$$

Supplementary Integrals

Cosecant

$$\int \csc x \, dx = \ln \left| \csc x - \cot x \right| + C$$
$$\int \csc^2 x \, dx = -\cot x + C$$

Cotangent

$$\int \cot x \, dx = \ln \left| \sin x \right| + C$$