Table of Integrals

$$\int \sec(u)\,du = \ln|\sec(u) + \tan(u)| + C,$$

$$\int \csc(u)\,du = \ln|\csc(u) - \cot(u)| + C$$

$$\int \sec^n(u)\,du = \frac{1}{n-1}\tan(u)\sec^{n-2}(u) + \frac{n-2}{n-1}\int \sec^{n-2}(u)$$

$$\int \csc^n(u)\,du = \frac{-1}{n-1}\cot(u)\csc^{n-2}(u) + \frac{n-2}{n-1}\int \csc^{n-2}(u)$$

$$\int \frac{u^2}{\sqrt{u^2-a^2}}\,du = \frac{u}{2}\sqrt{u^2-a^2} + \frac{a^2}{2}\ln|u+\sqrt{u^2-a^2}| + C$$

$$\int \frac{u^2}{\sqrt{2au-u^2}}\,du = -\frac{u+3a}{2}\sqrt{2au-u^2} + \frac{3a^2}{2}\cos^{-1}\left(\frac{a-u}{a}\right) + C$$

$$\int \frac{u^2}{\sqrt{a^2-u^2}}\,du = -\frac{u}{2}\sqrt{a^2-u^2} + \frac{a^2}{2}\sin^{-1}\left(\frac{u}{a}\right) + C$$

$$\int \frac{u^2}{\sqrt{a+bu}}\,du = \frac{2}{15b^3}(8a^2+3b^2u^2-4abu)\sqrt{a+bu} + C$$

$$\int \frac{1}{\sqrt{a^2+u^2}}\,du = \ln|u+\sqrt{u^2+a^2}| + C$$

$$\int \frac{du}{u(a+bu)} = \frac{1}{a}\ln\left|\frac{u}{a+bu}\right| + C$$

$$\int \frac{du}{u^2(a+bu)} = -\frac{1}{au} + \frac{b}{a^2}\ln\left|\frac{a+bu}{u}\right| + C$$

$$\int \frac{u}{(a+bu)^2}\,du = \frac{a}{b^2(a+bu)} + \frac{1}{b^2}\ln|a+bu| + C$$

$$\int \frac{du}{u(a+bu)^2} = \frac{1}{a(a+bu)} - \frac{1}{a^2}\ln\left|\frac{a+bu}{u}\right| + C$$

$$\int \frac{1}{a^2+u^2}\,du = \frac{1}{a}\arctan\left(\frac{u}{a}\right) + C$$

Simpson's Rule: $\int_a^b f(x)\,dx \approx \frac{h}{3}(y_0 + 4y_1 + 2y_2 + 4y_3 + \cdots + 4y_{n-1} + y_n)$ with error of magnitude at most $\frac{K(b-a)^5}{180n^4} = K(b-a)h^4$, where $|f^{(4)}(x)| \le K$ for $a \le x \le b$.