

Integration Formulas:

The Power Rule:	$\int a \, dx = ax + c$ $\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$ $\int (ax + b)^n \, dx = \frac{1}{a} * \frac{(ax + b)^{n+1}}{n+1}$
Rational Functions:	$\int \frac{1}{x} \, dx = \ln x + C$ $\int \frac{1}{ax + b} \, dx = \frac{1}{a} \ln ax + b + C$
Exponential Functions:	$\int e^x \, dx = e^x + C$ $\int e^{ax+b} \, dx = \frac{1}{a} e^{ax+b} + C$ $\int a^{bx+d} \, dx = \frac{a^{bx+d}}{b \ln a} + C$
Trig Functions:	$\int \sin x \, dx = -\cos x + C$ $\int \sin(ax + b) \, dx = -\frac{\cos(ax + b)}{a} + C$ $\int \cos x \, dx = \sin x + C$ $\int \cos(ax + b) \, dx = \frac{\sin(ax + b)}{a} + C$ $\int \csc x \cot x \, dx = -\csc x + C$ $\int \sec x \tan x \, dx = \sec x + C$ $\int \tan x \, dx = \ln \sec x + C = -\ln \cos x + C$ $\int \cot x \, dx = \ln \sin x + C = -\ln \csc x + C$ $\int \sec x \, dx = \ln \sec x + \tan x + C$ $\int \csc x \, dx = \ln \csc x - \cot x + C$
Integration By Parts:	$\int u \, dv = uv - \int v \, du$ $\int uv \, dw = uvw - \int vw \, du - \int uw \, dv$

Integration By Parts: “Related Formulas”	$\int e^{ax} \sin(bx) dx = \frac{e^{ax}}{a^2 + b^2} [a \sin bx - b \cos bx] + C$ $\int e^{ax} \cos(bx) dx = \frac{e^{ax}}{a^2 + b^2} [a \cos bx + b \sin bx] + C$ $\int x^n \ln x dx = \frac{x^{n+1}}{n+1} \ln x - \frac{x^{n+1}}{(n+1)^2} + C \quad n \neq -1$ $\int x^n e^{ax} dx = \frac{1}{a} x^n e^{ax} - \frac{n}{a} \int x^{n-1} e^{ax} dx$
Trig Substitution:	$\int \sqrt{a^2 - u^2} du = \frac{u}{2} \sqrt{a^2 - u^2} + \frac{a^2}{2} \sin^{-1} \left(\frac{u}{a} \right) + C$ Trig Sub: $u = a \sin \theta \quad du = a \cos \theta d\theta$ $\int \sqrt{a^2 + u^2} du = \frac{u}{2} \sqrt{u^2 + a^2} + \frac{a^2}{2} \ln u + \sqrt{u^2 + a^2} + C$ Trig Sub: $u = a \tan \theta \quad du = a \sec^2(\theta) d\theta$ $\int \sqrt{u^2 - a^2} du = \frac{u}{2} \sqrt{u^2 - a^2} - \frac{a^2}{2} \ln u + \sqrt{u^2 - a^2} + C$ Trig Sub: $u = a \sec \theta \quad du = a \sec \theta \tan \theta d\theta$
Reduction Formulas:	$\int \sin^2(x) dx = \frac{1}{2}x - \frac{1}{4} \sin(2x) + C = \frac{1}{2}(x - \sin x \cos x) + C$ $\int \cos^2(x) dx = \frac{1}{2}x + \frac{1}{4} \sin(2x) + C = \frac{1}{2}(x + \sin x \cos x) + C$ $\int \tan^2(x) dx = \tan x - x + C \quad \int \cot^2(x) dx = -\cot x - x + C$ $\int \sin^n(x) dx = -\frac{1}{n} \sin^{n-1}(x) \cos(x) + \frac{n-1}{n} \int \sin^{n-2}(x) dx$ $\int \cos^n(x) dx = \frac{1}{n} \cos^{n-1}(x) \sin(x) + \frac{n-1}{n} \int \cos^{n-2}(x) dx$ $\int \tan^n(x) dx = \frac{1}{n-1} \tan^{n-1}(x) - \int \tan^{n-2}(x) dx \quad n \neq 1$

Reduction Formulas:	$\int \cot^n(x) dx = -\frac{1}{n-1} \cot^{n-1}(x) - \int \cot^{n-2}(x) dx \quad n \neq 1$ $\int \sec^n(x) dx = \frac{1}{n-1} \sec^{n-2}(x) \tan(x) + \frac{n-2}{n-1} \int \sec^{n-2}(x) dx \quad n \neq 1$ $\int \csc^n(x) dx = -\frac{1}{n-1} \csc^{n-2}(x) \cot(x) + \frac{n-2}{n-1} \int \csc^{n-2}(x) dx \quad n \neq 1$
Integration of Logs:	$\int \log_d(ax+b) dx = \frac{ax+b}{a} \log_d \left \frac{ax+b}{e} \right + C$
Inverse Trig: "Related Formulas"	$\int \frac{1}{a^2 + u^2} du = \frac{1}{a} \tan^{-1} \left(\frac{u}{a} \right) + C = -\frac{1}{a} \cot^{-1} \left(\frac{u}{a} \right) + C$ $\int \frac{1}{\sqrt{a^2 - u^2}} du = \sin^{-1} \left(\frac{u}{a} \right) + C = -\cos^{-1} \left(\frac{u}{a} \right) + C$ $\int \frac{1}{u\sqrt{u^2 - a^2}} du = \frac{1}{a} \sec^{-1} \left(\frac{u}{a} \right) + C = -\frac{1}{a} \csc^{-1} \left(\frac{u}{a} \right) + C$
Inverse Trig Formulas:	$\int \sin^{-1}(u) du = u \sin^{-1}(u) + \sqrt{1-u^2} + C$ $\int \cos^{-1}(u) du = u \cos^{-1}(u) - \sqrt{1-u^2} + C$ $\int \tan^{-1}(u) du = u \tan^{-1}(u) - \ln \sqrt{1+u^2} + C$ $\int \cot^{-1}(u) du = u \cot^{-1}(u) + \ln \sqrt{1+u^2} + C$ $\int \sec^{-1}(u) du = u \sec^{-1}(u) - \ln \left u + \sqrt{u^2 - 1} \right + C$ $\int \csc^{-1}(u) du = u \csc^{-1}(u) + \ln \left u + \sqrt{u^2 - 1} \right + C$

Table of Integrals:

Form: $u^2 \pm a^2$	$\int \frac{1}{u^2 - a^2} du = \frac{1}{2a} \ln \left \frac{u-a}{u+a} \right + C \quad \text{Note: } u-a = a-u $ $\int \frac{1}{a^2 - u^2} du = \frac{1}{2a} \ln \left \frac{u+a}{u-a} \right + C = \frac{1}{2a} \ln \left \frac{a+u}{a-u} \right + C$ $\int \frac{1}{\sqrt{u^2 \pm a^2}} du = \ln \left u + \sqrt{u^2 \pm a^2} \right + C$ $\int \frac{\sqrt{u^2 \pm a^2}}{u^2} du = -\frac{\sqrt{u^2 \pm a^2}}{u} + \ln \left u + \sqrt{u^2 \pm a^2} \right + C$ $\int \frac{u^2}{\sqrt{u^2 \pm a^2}} du = \frac{1}{2} \left[u\sqrt{u^2 \pm a^2} \mp a^2 \ln \left u + \sqrt{u^2 \pm a^2} \right \right] + C$ $\int \frac{1}{u^2 \sqrt{u^2 \pm a^2}} du = \mp \frac{\sqrt{u^2 \pm a^2}}{a^2 u} + C$ $\int \frac{1}{(u^2 \pm a^2)^{3/2}} du = \frac{\pm u}{a^2 \sqrt{u^2 \pm a^2}} + C$ $\int \frac{u^2}{\sqrt{a^2 - u^2}} du = -\frac{u}{2} \sqrt{a^2 - u^2} + \frac{a^2}{2} \sin^{-1} \left(\frac{u}{a} \right) + C$ $\int \frac{1}{u^2 \sqrt{a^2 - u^2}} du = -\frac{\sqrt{a^2 - u^2}}{a^2 u} + C$ $\int \frac{\sqrt{a^2 - u^2}}{u^2} du = -\frac{\sqrt{a^2 - u^2}}{u} - \sin^{-1} \left(\frac{u}{a} \right) + C$
Form: $\sqrt{a + bu}$	$\int \frac{u}{\sqrt{a + bu}} du = \frac{2bu - 4a}{3b^2} \sqrt{a + bu} + C$ $\int \frac{1}{u\sqrt{a + bu}} du = \frac{1}{\sqrt{a}} \ln \left \frac{\sqrt{a + bu} - \sqrt{a}}{\sqrt{a + bu} + \sqrt{a}} \right + C \quad a > 0$ $\int \frac{\sqrt{a + bu}}{u} du = 2\sqrt{a + bu} + a \int \frac{1}{u\sqrt{a + bu}} du$

Form: $1/(a + bu)$	$\int \frac{u}{a + bu} du = \frac{u}{b} - \frac{a}{b^2} \ln a + bu + C$ $\int \frac{1}{u(a + bu)} du = \frac{1}{a} \ln \left \frac{u}{a + bu} \right + C$ $\int \frac{1}{u^2(a + bu)} du = \frac{b}{a^2} \ln \left \frac{a + bu}{u} \right - \frac{1}{au}$ $\int \frac{u^2}{a + bu} du = \frac{1}{2b} u^2 - \frac{a}{b^2} u + \frac{a^2}{b^3} \ln a + bu + C$ $\int \frac{u^2}{(a + bu)^2} du = \frac{1}{b^3} \left[bu - \frac{a^2}{a + bu} - 2a \ln a + bu \right] + C$
Form: $1/(a + bu + cu^2)$	$\int \frac{1}{a + bu + cu^2} du = \frac{2}{\sqrt{4ac - b^2}} \tan^{-1} \left(\frac{2cu + b}{\sqrt{4ac - b^2}} \right) + C \quad \text{if } b^2 < 4ac$ $\int \frac{1}{a + bu + cu^2} du = \frac{1}{\sqrt{b^2 - 4ac}} \ln \left \frac{2cu + b - \sqrt{b^2 - 4ac}}{2cu + b + \sqrt{b^2 - 4ac}} \right + C \quad \text{if } b^2 > 4ac$