INTEGRATION FORMULAS:

$\int f(x)\,dx = F(x) + C, \text{where } F'(x) = f(x)$

$\frac{d}{dx}\int_a^x f(t)\,dt = f(x)$ [First Fundamental Theorem]

Remember the Chain Rule!!!: $\frac{d}{dx}\int_a^u f(t)\,dt = f(u)\cdot D_u$

$\int_a^b f(x)\,dx = F(b) - F(a), \text{where } F'(x) = f(x)$ [Second Fundamental Theorem]

$\int u^n\,du = \frac{u^{n+1}}{n+1} + C,\ n \neq -1$

$\int \frac{du}{u} = \ln|u| + C$

$\int e^u\,du = e^u + C$

$\int a^u\,du = \frac{a^u}{\ln a} + C,\ (a > 0,\ a \neq 1)$

$\int \sin u\,du = -\cos u + C$

$\int \cos u\,du = \sin u + C$

$\int \sec^2 u\,du = \tan u + C$

$\int \csc^2 u\,du = -\cot u + C$

$\int \sec u \bullet \tan u\,du = \sec u + C$

$\int \csc u \bullet \cot u\,du = -\csc u + C$

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

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

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

$\int \cot u\,du = \ln|\sin u| + C$

$\int \sin^2 \mathrm{u}\,\mathrm{du} = \frac{1}{2}\mathrm{u} - \frac{1}{4}\sin\ 2\mathrm{u} + \mathrm{C}$

$\int \cos^2 \mathrm{u}\,\mathrm{du} = \frac{1}{2}\mathrm{u} + \frac{1}{4}\sin\ 2\mathrm{u} + \mathrm{C}$

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

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

$\int \frac{du}{u\sqrt{u^2 - a^2}} = \frac{1}{a} \bullet \sec^{-1}\left|\frac{u}{a}\right| + C$

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

$\int u\,dv = uv - \int v\,du$