Common Integrals

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Trig Functions

$$\int \sin x\,dx = -\cos x + c \qquad \int \cos x\,dx = \sin x + c \qquad \int \tan x\,dx = -\ln|\cos x| + c$$

$$\int \csc x\,dx = \ln|\csc x - \cot x| + c \qquad \int \sec x\,dx = \ln|\sec x + \tan x| + c \qquad \int \cot x\,dx = \ln|\sin x| + c$$

$$\int \csc^2 x\,dx = -\cot x + c \qquad \int \sec^2 x\,dx = \tan x + c$$

Inverse trig functions

$$\int \frac{du}{\sqrt{a^2 - u^2}} = \sin^{-1}\frac{u}{a} + c \qquad \int \frac{du}{u\sqrt{u^2 - a^2}} = \frac{1}{a}\sec^{-1}\frac{|u|}{a} + c \qquad \int \frac{du}{a^2 + u^2} = \frac{1}{a}\tan^{-1}\frac{u}{a} + c$$

Exponential & Logarithmic Functions

$$\int e^x\,dx = e^x + c \qquad \int a^x\,dx = \frac{a^x}{\ln a} + c$$

$$\int \frac{1}{x}\,dx = \ln|x| + c \qquad \int \frac{1}{ax + b}\,dx = \frac{1}{a}\ln|ax + b| + c \qquad \int \ln x\,dx = x\ln x - x + c$$

Integration by Parts

If $f(x)$ can be considered the product of a function, u, and the derivative of another function, dv, then

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

Choosing *u* & *v'*

L-I-A-T-E

As a rule of thumb (there will be exceptions), choose u to be the function that comes first in this list:

- Logarithmic function
- Inverse Trig Function
- Algebraic function
- Trig function
- Exponential function

Alternatively...

- Let dv be the most complicated portion of the integrand that can be "easily" integrated.
- Let u be that part of the integrand whose derivative is a "simpler" function than u itself.