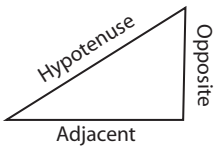
Basic Derivatives and Integrals

$\frac{d}{dx}[\cos x] = -\sin x$	$\int[\sin x]\,dx = -\cos x + C$
$\frac{d}{dx}[\sin x] = \cos x$	$\int[\cos x]\,dx = \sin x + C$
$\frac{d}{dx}[\tan x] = \sec^2 x$	$\int[\sec^2 x]\,dx = \tan x + C$
$\frac{d}{dx}[\cot x] = \csc^2 x$	$\int[\csc^2]\,dx = \cot x + C$
$\frac{d}{dx}[\sec x] = \sec x \tan x$	$\int[\sec x \tan x]\,dx = \sec x + C$
$\frac{d}{dx}[\csc x] = \csc x \cot x$	$\int[\csc x \cot x]\,dx = \csc x + C$
$\frac{d}{dx}[e^x] = e^x$	$\int[e^x]\,dx = e^x + C$
$\frac{d}{dx}[\ln\lvert x\rvert] = \frac{1}{x}$	$\int[\frac{1}{x}]\,dx = \ln\lvert x\rvert + C$
$\frac{d}{dx}[\tan^{-1}x] = \frac{1}{1+x^2}$	$\int[\frac{1}{1+x^2}]\,dx = \tan^{-1}x + C$
$\frac{d}{dx}[\sin^{-1}x] = \frac{1}{\sqrt{1-x^2}}$	$\int[\frac{1}{\sqrt{1-x^2}}]\,dx = \sin^{-1}x + C$
$\frac{d}{dx}[\sec^{-1}x] = \frac{1}{x\sqrt{x^2-1}}$	$\int[\frac{1}{x\sqrt{x^2-1}}]\,dx = \sec^{-1}x + C$

Basic Trigonometry Review



SOH-CAH-TOA

$\sin x = \frac{\text{Opposite}}{\text{Hypotenuse}}$ $\cos x = \frac{\text{Adjacent}}{\text{Hypotenuse}}$ $\tan x = \frac{\text{Opposite}}{\text{Adjacent}}$

Basic Relationships

$\tan x = \frac{\sin x}{\cos x}$ $\cot x = \frac{\cos x}{\sin x}$ $\sec x = \frac{1}{\cos x}$ $\csc x = \frac{1}{\sin x}$

Trigonometric Identities

$\sin^2 x + \cos^2 x = 1$

$\tan^2 x + 1 = \sec^2 x$

$\cot^2 x + 1 = \csc^2 x$

$\sin 2x = 2 \sin x \cos x$

$\cos 2x = \cos^2 x - \sin^2 x$

$\cos 2x = 2\cos^2 x - 1$

$\cos 2x = 1 - 2\sin^2 x$

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

$\cos^2 x = \frac{1}{2}(1 + \cos 2x)$

Addition Formulas

$\sin(a + b) = \sin a \cos b + \cos a \sin b$

$\sin(a - b) = \sin a \cos b - \cos a \sin b$

$\cos(a + b) = \cos a \cos b - \sin a \sin b$

$\cos(a - b) = \cos a \cos b + \sin a \sin b$

Mathematical Reference

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Formulas and Constants

Product Rule

$f(x)g(x) = f'(x)g(x) + f(x)g'(x)$

Quotient Rule

$\frac{f(x)}{g(x)} = \frac{f'(x)g(x) - f(x)g'(x)}{[g(x)]^2}$

Chain Rule

$(f(x))^n = n(f(x))^{n-1}(f'(x))$

Integration by Parts

$uv - \int v\,du$

Electron mass: 9.109×10^{-31} kg

Electron Charge: 1.6×10^{-19} C

Proton mass: 1.672×10^{-27} kg

Permitivity Constant: 8.85×10^{12} C^2/Nm^2

ElectronVolt: 1.6×10^{-19} J

Speed of Light: 3×10^8 m/s

Gas Constant: 8.314 $J(K\text{-mole})^{-1}$

Avogrados Number: 6.022×10^{23}

Grav Constant: 6.66×10^{-11} Nm^2/Kg^2

Gravity: 9.8 m/s^2

Speed of Sound: 344 m/s

SAP: 1.013×10^5 Pascals

More Integrals and Hyperbolics

$\int[\sin^2 x]\,dx = \frac{1}{2}x - \frac{1}{4}\sin 2x + C$

$\int[\sin^3 x]\,dx = \frac{1}{3}\cos^3 x - \cos x + C$

$\int[\cos^2 x]\,dx = \frac{1}{2}x + \frac{1}{4}\sin 2x + C$

$\int[\cos^3 x]\,dx = \sin x - \frac{1}{3}\sin^3 x + C$

$\int[\tan x]\,dx = \ln\lvert\sec x\rvert + C$

$\int[\sec x]\,dx = \ln\lvert\sec x + \tan x\rvert + C$

$\int[\tan^2 x]\,dx = \tan x - x + C$

$\int[\sec^2 x]\,dx = \tan x + C$

$\int[\ln\lvert x\rvert]\,dx = x\ln\lvert x\rvert - x + C$

$\sinh x = \frac{e^x - e^{-x}}{2}$

$\cosh x = \frac{e^x + e^{-x}}{2}$

$\tanh x = \frac{e^x - e^{-x}}{e^x + e^{-x}}$