Basic Differentiation Formulae

In the following, $u = f(x)$ and $v = g(x)$ are functions, while *a*, *b*, *c* and *n* are real constants.

Additive constant rule:	$\frac{d}{dx}[c] = 0$	Power rule:	$\frac{d}{dx}[x^n] = nx^{n-1}$
Multiplicative constant rule:	$\frac{d}{dx}[cu] = cu'$	Product rule:	$\frac{d}{dx}[uv] = u'v + uv'$
Linear rule:	$\frac{d}{dx}[ax + b] = a$	Quotient rule:	$\frac{d}{dx}\left[\frac{u}{v}\right] = \frac{u'v - uv'}{v^2}$
Addition rule:	$\frac{d}{dx}[u \pm v] = u' \pm v'$	Chain rule:	$\frac{d}{dx}[f(g(x))] = f'(g(x))g'(x)$

$$\frac{d}{dx}[\sin x] = \cos x$$
$$\frac{d}{dx}[\cos x] = -\sin x$$
$$\frac{d}{dx}[\tan x] = \sec^2 x$$
$$\frac{d}{dx}[\sec x] = \sec x \tan x$$
$$\frac{d}{dx}[\csc x] = -\csc x \cot x$$
$$\frac{d}{dx}[\cot x] = -\csc^2 x$$

$$\frac{d}{dx}[\arcsin x] = \frac{1}{\sqrt{1-x^2}}$$
$$\frac{d}{dx}[\arccos x] = \frac{-1}{\sqrt{1-x^2}}$$
$$\frac{d}{dx}[\arctan x] = \frac{1}{1+x^2}$$
$$\frac{d}{dx}[\operatorname{arccot} x] = \frac{-1}{1+x^2}$$

$$\frac{d}{dx}[e^x] = e^x$$
$$\frac{d}{dx}[a^x] = a^x \ln a$$
$$\frac{d}{dx}[\ln x] = \frac{1}{x}$$
$$\frac{d}{dx}[\log_a x] = \frac{1}{x \ln a}$$

Basic Integration Formulae

$$\int af(x)dx = a\int f(x)dx$$
$$\int [f(x) \pm g(x)]dx = \int f(x)dx \pm \int g(x)dx$$
$$\int dx = x + c$$
$$\int x^n dx = \frac{x^{n+1}}{n+1} + c \qquad n \neq -1$$
$$\int x^{-1}dx = \int \frac{1}{x}dx = \ln|x| + c$$
$$\int e^x dx = e^x + c$$
$$\int a^x dx = \frac{a^x}{\ln a} + c$$

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

$$\int \sec^2 x\, dx = \tan x + c$$
$$\int \csc^2 x\, dx = -\cot x + c$$
$$\int \frac{1}{x^2 + a^2}\, dx = \frac{1}{a}\arctan\frac{x}{a} + c$$
$$\int \frac{1}{\sqrt{a^2 - x^2}}\, dx = \arcsin\frac{x}{a} + c$$