

Calculus

Differentiation

$y = f(x)$	$\frac{dy}{dx} = f'(x)$
$\ln x$	$\frac{1}{x}$
e^{ax}	ae^{ax}
$\sin x$	$\cos x$
$\cos x$	$-\sin x$
$\tan x$	$\sec^2 x$

Product rule

$$\text{If } y = uv \text{ then } \frac{dy}{dx} = u \frac{dv}{dx} + v \frac{du}{dx}$$

Quotient rule

$$\text{If } y = \frac{u}{v} \text{ then } \frac{dy}{dx} = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}$$

Chain (or function of a function rule)

$$\text{If } y = f(u) \text{ and } u = g(x) \text{ then } \frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx}$$

$f(x)$	$\int f(x) dx$
x^n	$\frac{x^{n+1}}{n+1} + c$
$\frac{1}{x}$	$\ln x + c$
$\cos x dx$	$\sin x + c$
$\sin x dx$	$-\cos x + c$
$\sec^2 x dx$	$\tan x + c$

By parts

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

Substitution

$$\int f(g(x))g'(x)dx = \int f(u)du$$