

Differentiation and Antidifferentiation $f(x), g(x)$ are functions and C, n, k are constants (and $k \neq 0$).

Differentiation	antidifferentiation
$\frac{dC}{dx} = 0$	$\int 0dx = C$
$\frac{d}{dx}(kf(x)) = kf'(x)$	$\int kf(x)dx = k \int f(x)dx$
$\frac{d}{dx}(f(x) \pm g(x)) = f'(x) \pm g'(x)$	$\int (f(x) \pm g(x))dx = \int f(x)dx \pm \int g(x)dx$
$\frac{dkx}{dx} = k$	$\int kdx = kx + C$
$\frac{dx^n}{dx} = nx^{n-1}$	$\int x^n dx = \frac{x^{n+1}}{n+1} + C \quad (n \neq -1)$
$\frac{d \sin x}{dx} = \cos x$	$\int \cos x dx = \sin x + C$
$\frac{d \cos x}{dx} = -\sin x$	$\int \sin x dx = -\cos x + C$
$\frac{d \tan x}{dx} = \sec^2 x$	$\int \sec^2 x dx = \tan x + C$
$\frac{d \cot x}{dx} = -\csc^2 x$	$\int \csc^2 x dx = -\cot x + C$
$\frac{d \sec x}{dx} = \sec x \tan x$	$\int \sec x \tan x dx = \sec x + C$
$\frac{d \csc x}{dx} = -\csc x \cot x$	$\int \csc x \cot x dx = -\csc x + C$

Chain rule and substitution technique

$$\frac{df(u(x))}{dx} = f'(u(x))u'(x) \iff \int f'(u(x))u'(x)dx = f(u(x)) + C.$$

Differentiation	antidifferentiation
$\frac{d(ax+b)^n}{dx} = an(ax+b)^{n-1}$	$\int (ax+b)^n dx = \frac{(ax+b)^{n+1}}{a(n+1)} + C \quad (n \neq -1, a \neq 0)$
$\frac{d[u(x)]^n}{dx} = n[u(x)]^{n-1}u'(x)$	$\int [u(x)]^n u'(x)dx = \frac{[u(x)]^{n+1}}{n+1} + C \quad (n \neq -1)$
$\frac{d \sin(u(x))}{dx} = \cos(u(x))u'(x)$	$\int \cos(u(x))u'(x)dx = \sin(u(x)) + C$
$\frac{d \cos(u(x))}{dx} = -\sin(u(x))u'(x)$	$\int \sin(u(x))u'(x)dx = -\cos(u(x)) + C$
$\frac{d \tan(u(x))}{dx} = \sec^2(u(x))u'(x)$	$\int \sec^2(u(x))u'(x)dx = \tan(u(x)) + C$
$\frac{d \cot(u(x))}{dx} = -\csc^2(u(x))u'(x)$	$\int \csc^2(u(x))u'(x)dx = -\cot(u(x)) + C$
$\frac{d \sec(u(x))}{dx} = \sec(u(x)) \tan(u(x))u'(x)$	$\int \sec(u(x)) \tan(u(x))u'(x)dx = \sec(u(x)) + C$
$\frac{d \csc(u(x))}{dx} = -\csc(u(x)) \cot(u(x))u'(x)$	$\int \csc(u(x)) \cot(u(x))u'(x)dx = -\csc(u(x)) + C$