

# Factsheet: List of integrals

Tom Coleman

## Summary

A list of common (and some uncommon) integrals of functions.

Throughout,  $a, k$  are real numbers and  $C$  is the constant of integration.

## Antiderivatives of polynomial, rational, exponential, logarithmic functions

function	antiderivative w.r.t $x$	notes
$a$	$ax + C$	
$ax^n$	$\frac{ax^{n+1}}{n+1} + C$	$n \in \mathbb{R}, n \neq -1$
$ax^{-1}$	$a \ln x  + C$	
$\frac{a}{bx+c}$	$\frac{a}{b} \ln bx+c  + C$	$b, c \in \mathbb{R}$
$\frac{a}{(bx+c)^n}$	$\frac{a(bx+c)^{1-n}}{b(1-n)} + C$	$b, c \in \mathbb{R}$
$ae^{kx}$	$\frac{a}{k}e^{kx} + C$	
$a \ln(kx)$	$ax \ln kx  - ax + C$	

## Antiderivatives of trigonometric functions

function	antiderivative w.r.t $x$
$a \sin(kx)$	$-\frac{a}{k} \cos(kx) + C$
$a \cos(kx)$	$\frac{a}{k} \sin(kx) + C$
$a \tan(kx)$	$\frac{a}{k} \ln  \sec(kx)  + C$
$a \cot(kx)$	$\frac{a}{k} \ln  \sin(kx)  + C$
$a \sec(kx)$	$\frac{a}{k} \ln  \tan(kx) + \sec(kx)  + C$
$a \csc(kx)$	$\frac{a}{k} (\ln  \sin(\frac{kx}{2})  - \ln  \cos(\frac{kx}{2}) ) + C$

### Antiderivatives of some hyperbolic functions

function	antiderivative w.r.t $x$
$a \sinh(kx)$	$\frac{a}{k} \cosh(kx) + C$
$a \cosh(kx)$	$\frac{a}{k} \sinh(kx) + C$
$a \tanh(kx)$	$\frac{a}{k} \ln  \cosh(kx)  + C$
$a \coth(kx)$	$\frac{a}{k} \ln  \sinh(kx)  + C$

### Standard forms that integrate to inverse trigonometric/hyperbolic functions

function	antiderivative w.r.t $x$
$\frac{a}{\sqrt{1-k^2x^2}}$	$\frac{a}{k} \sin^{-1}(kx) + C$

function	antiderivative w.r.t $x$
$-\frac{a}{\sqrt{1-k^2x^2}}$	$\frac{a}{k} \cos^{-1}(kx) + C$
$\frac{a}{1+k^2x^2}$	$\frac{a}{k} \tan^{-1}(kx) + C$
$\frac{a}{\sqrt{1+k^2x^2}}$	$\frac{a}{k} \sinh^{-1}(kx) + C$
$\frac{a}{\sqrt{k^2x^2-1}}$	$\frac{a}{k} \cosh^{-1}(kx) + C$
$\frac{a}{\sqrt{1-k^2x^2}}$	$\frac{a}{k} \tanh^{-1}(kx) + C$


## Further reading

For more about where these came from, please see [Guide: Introduction to integration](#) and [Proof sheet: Antiderivatives of other common functions].

## Version history

v1.0: created in 08/25 by tdhc.

[This work is licensed under CC BY-NC-SA 4.0.](#)