Factsheet: List of integrals

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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}	$a \ln \lvert x \rvert + C$	
$\frac{a}{bx+c}$	$\frac{a}{b} \ln \lvert bx + c \rvert + C$	$b, c \in \mathbb{R}$
$\frac{a}{(bx+c)^n}$	$\frac{a(bx+c)^{1-n}}{b(1-n)} + C$	$b, c \in \mathbb{R}$
ae^{kx}	$\frac{a}{k} e^{kx} + C$	
$a \ln(kx)$	$ax \ln \lvert kx \rvert - ax + C$	

Antiderivatives of trigonometric functions

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

Antiderivatives of some hyperbolic functions

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

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
$-\dfrac{a}{\sqrt{1-k^2x^2}}$	$\dfrac{a}{k}\cos^{-1}(kx)+C$
$\dfrac{a}{1+k^2x^2}$	$\dfrac{a}{k}\tan^{-1}(kx)+C$
$\dfrac{a}{\sqrt{1+k^2x^2}}$	$\dfrac{a}{k}\sinh^{-1}(kx)+C$
$\dfrac{a}{\sqrt{k^2x^2-1}}$	$\dfrac{a}{k}\cosh^{-1}(kx)+C$
$\dfrac{a}{\sqrt{1-k^2x^2}}$	$\dfrac{a}{k}\tanh^{-1}(kx)+C$

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.