Standard Integrals

Integral	*Trig Value (+k)*	*Log Value (+k)*
$\int 1/(x^2+a^2)\,dx$	$1/a \tan^{-1} x/a$	$i/2a \ln (ai+x)/(ai-x)$
$\int a/(x^2+a^2)\,dx$	$\tan^{-1} x/a$	$i/2 \ln (ai+x)/(ai-x)$
$\int 1/(a^2-x^2)\,dx$	$1/a \tanh^{-1} x/a$	$1/2a \ln (a+x)/(a-x)$ $x^2<a^2$
$\int a/(a^2-x^2)\,dx$	$\tanh^{-1} x/a$	$1/2 \ln (a+x)/(a-x)$ $x^2<a^2$
$\int 1/(x^2-a^2)\,dx$	$-1/a \coth^{-1} x/a$	$1/2a \ln (x-a)/(x+a)$ $x^2>a^2$
	$-1/a \tanh^{-1} a/x$	
$\int a/(x^2-a^2)\,dx$	$\coth^{-1} x/a$	$1/2 \ln (x-a)/(x+a)$ $x^2>a^2$
	$\tanh^{-1} a/x$	
$\int 1/\sqrt{(x^2+a^2)}\,dx$	$\sinh^{-1} x/a$	$\ln\{(x+\sqrt{(x^2+a^2)})/a\}$①
$\int 1/\sqrt{(x^2-a^2)}\,dx$	$\cosh^{-1} x/a$	$\ln\{(x\pm\sqrt{(x^2-a^2)})/a\}$①
		$\cosh^{-1}$ is two-valued
$\int 1/\sqrt{(a^2-x^2)}\,dx$	$1/a \sin^{-1} x/a$	$-i \ln\{ix+\sqrt{(1-x^2)}\}$
	$-\cos^{-1} x/a$	$-i \ln\{x+\sqrt{(x^2-1)}\}$
	as $\sin^{-1}x+\cos^{-1}x = 1/2\pi$	

① In practice the denominator **a** can be absorbed into the constant.

Standard Integrals

Integral	*Trig Value (+k)*	*Log Value (+k)*
$\int 1 / x^2 + a^2 \, dx$	$1/a \tan^{-1} x/a$	$i/2a \ln \frac{ai + x}{ai - x}$
$\int a / x^2 + a^2 \, dx$	$\tan^{-1} x/a$	$i/2 \ln \frac{ai + x}{ai - x}$
$\int 1 / a^2 - x^2 \, dx$	$1/a \tanh^{-1} x/a$	$1/2a \ln \frac{a+x}{a-x}$ $x^2<a^2$
$\int a / a^2 - x^2 \, dx$	$\tanh^{-1} x/a$	$1/2 \ln \frac{a+x}{a-x}$ $x^2<a^2$
$\int 1 / x^2 - a^2 \, dx$	$-1/a \coth^{-1} x/a$	$1/2a \ln \frac{x-a}{x+a}$ $x^2>a^2$
	$-1/a \tanh^{-1} a/x$	
$\int a / x^2 - a^2 \, dx$	$\coth^{-1} x/a$	$1/2 \ln \frac{x-a}{x+a}$ $x^2>a^2$
	$\tanh^{-1} a/x$	
$\int 1 / \sqrt{(x^2 + a^2)} \, dx$	$\sinh^{-1} x/a$	$\ln\{(x + \sqrt{(x^2+a^2)}/a\}$①
$\int 1 / \sqrt{(x^2 - a^2)} \, dx$	$\cosh^{-1} x/a$	$\ln\{(x \pm \sqrt{(x^2-a^2)}/a\}$①
		$\cosh^{-1}$ is two-valued
$\int 1 / \sqrt{(a^2 - x^2)} \, dx$	$1/a \sin^{-1} x/a$	$-i \ln \{ix + \sqrt{(1- x^2)}\}$
	$-\cos^{-1} x/a$	$-i \ln \{x + \sqrt{(x^2 - 1)}$
	as $\sin^{-1}x+\cos^{-1}x = 1/2\pi$	

① In practice the denominator **a** can be absorbed into the constant.