

Standard Integrals

Integral

Trig Value (+k)

Log Value (+k)

$$\int \frac{1}{x^2 + a^2} dx$$

$$\frac{1}{a} \tan^{-1} \frac{x}{a}$$

$$\frac{i}{2a} \ln \frac{ai + x}{ai - x}$$

$$\int \frac{a}{x^2 + a^2} dx$$

$$\tan^{-1} \frac{x}{a}$$

$$\frac{i}{2} \ln \frac{ai + x}{ai - x}$$

$$\int \frac{1}{a^2 - x^2} dx$$

$$\frac{1}{a} \tanh^{-1} \frac{x}{a}$$

$$\frac{1}{2a} \ln \frac{a+x}{a-x} \quad x^2 < a^2$$

$$\int \frac{a}{a^2 - x^2} dx$$

$$\tanh^{-1} \frac{x}{a}$$

$$\frac{1}{2} \ln \frac{a+x}{a-x} \quad x^2 < a^2$$

$$\int \frac{1}{x^2 - a^2} dx$$

$$-\frac{1}{a} \coth^{-1} \frac{x}{a}$$

$$\frac{1}{2a} \ln \frac{x-a}{x+a} \quad x^2 > a^2$$

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$$\frac{1}{2} \ln \frac{x-a}{x+a} \quad x^2 > a^2$$

$$\tanh^{-1} \frac{a}{x}$$

$$\int \frac{1}{\sqrt{x^2 + a^2}} dx$$

$$\sinh^{-1} \frac{x}{a}$$

$$\ln \left\{ \left(x + \sqrt{x^2 + a^2} \right) / a \right\} \textcircled{1}$$

$$\int \frac{1}{\sqrt{x^2 - a^2}} dx$$

$$\cosh^{-1} \frac{x}{a}$$

$$\ln \left\{ \left(x \pm \sqrt{x^2 - a^2} \right) / a \right\} \textcircled{1}$$

\cosh^{-1} is two-valued

$$\int \frac{1}{\sqrt{a^2 - x^2}} dx$$

$$\frac{1}{a} \sin^{-1} \frac{x}{a}$$

$$-i \ln \left\{ ix + \sqrt{1 - x^2} \right\}$$

$$-\cos^{-1} \frac{x}{a}$$

$$-i \ln \left\{ x + \sqrt{x^2 - 1} \right\}$$

$$\text{as } \sin^{-1} x + \cos^{-1} x = \frac{1}{2}\pi$$

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

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