Contents

Expression for standard integral as integration of sum of square of a and square of x in denominator

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

Derivation for standard integral as integration of of sum of square of a and square of x in denominator

- $$x=a\tan\theta$$
- $$dx=a\sec^2\theta d\theta$$
- $$a^2+x^2=a^2+a^2\tan^2\theta=a^2(1+\tan^2\theta)$$
- $$=a^2\sec^2\theta$$
- $$\int\frac{1}{a^2+x^2}=\frac{1}{a^2\sec^2\theta}.a\sec^2\theta d\theta$$
- $$=\frac{1}{a}\int d\theta$$
- $$\frac{1}{a}\theta+C$$
- $$\frac{1}{a}\tan^{-1}\frac{x}{a}+C$$

Expression for standard integral as integration of difference of square of a and square of x in denominator

- $$\int\frac{1}{a^2-x^2}dx=\frac{1}{2a}\log(\frac{a+x}{a-x})+C$$

Derivation for standard integral as integration of difference of square of a and square of x in denominator

- $$\int \frac{1}{a^2 - x^2} dx = \int \frac{1}{(a+x)(a-x)} dx$$
- $$= \frac{1}{2a} \int (\frac{1}{a+x} + \frac{1}{a-x}) dx$$
- $$= \frac{1}{2a} [\log(a+x) - \log(a-x)] + C$$
- $$\int \frac{1}{a^2 - x^2} dx = \frac{1}{2a} \log(\frac{a+x}{a-x}) + C$$

Expression for standard integral as integration of difference of square of x and square of a in denominator

- $$\int \frac{1}{x^2 - a^2} \frac{1}{2a} \log(\frac{x-a}{x+a}) + C$$

Derivation for standard integral as integration of difference of square of x and square of a in denominator

- $$\int \frac{1}{x^2 - a^2} = \int \frac{1}{(x+a)(x-a)} dx$$
- $$\frac{1}{2a} \int (\frac{1}{x-a} - \frac{1}{x+a}) dx$$
- $$\frac{1}{2a} (\log(x-a) - \log(x+a)) + C$$
- $$\int \frac{1}{x^2 - a^2} \frac{1}{2a} \log(\frac{x-a}{x+a}) + C$$

Expression for standard integral as integration of square root of difference of square of a and square of x in denominator

- $$\int \frac{dx}{\sqrt{a^2 - x^2}} = \sin^{-1}\frac{x}{a} + C$$

Derivation for standard integral as integration of square root of difference of square of a and square of x in denominator

- $$x = a\sin\theta$$
- $$dx = a\cos\theta d\theta$$
- $$\sqrt{a^2 - x^2} = \sqrt{a^2 - a^2\sin^2\theta} = a\cos\theta$$
- $$\int \frac{dx}{\sqrt{a^2 - x^2}} = \int \frac{a\cos\theta}{a\cos\theta} d\theta$$
- $$= \int d\theta$$
- $$= \theta + C$$
- $$\int \frac{dx}{\sqrt{a^2 - x^2}} = \sin^{-1}\frac{x}{a} + C$$

Expression for standard integral as integration of square root of sum of square of x and square of a in denominator

- $$\int \frac{dx}{\sqrt{x^2 + a^2}} = \log(x + \sqrt{a^2 + x^2}) + C$$

Derivation for standard integral as integration of square root of sum of square of x and square of a in denominator

- $$x = a\tan\theta$$
- $$dx = a\sec^2\theta d\theta$$
- $$\sqrt{x^2+a^2} = \sqrt{a^2\tan^2\theta + a^2} = a\sec\theta$$
- $$\int \frac{dx}{x^2+a^2} = \int \frac{a\sec^2\theta}{a\sec\theta} d\theta$$
- $$\int \sec\theta d\theta$$
- $$\log(\sec\theta + \tan\theta) + C$$
- $$\log(\sqrt{1+\frac{x^2}{a^2}} + \frac{x}{a}) + C$$
- $$\log(\frac{x+\sqrt{a^2+x^2}}{a}) + C$$
- $$\log(x+\sqrt{a^2+x^2}) - \log(a) + C$$
- $$\int \frac{dx}{\sqrt{x^2+a^2}} = \log(x+\sqrt{a^2+x^2}) + C$$

Expression for standard integral as integration of square root of sum of square of x and square of a in denominator in terms of hyperbolic function

- $$\int \frac{1}{\sqrt{x^2+a^2}} = sinh^{-1}\frac{x}{a} + C$$

Derivation for standard integral as integration of square root of sum of square of x and square of a in denominator in terms of hyperbolic function

- $$x = asinhy$$
- $$dx = acoshydy$$
- $$\int \frac{1}{\sqrt{x^2 + a^2}} = \int \frac{acoshydy}{\sqrt{a^2sinh^2y + a^2}}$$
- $$= \int \frac{acoshy}{acoshy} dy$$
- $$= \int dy$$
- $$= y + C$$
- $$\int \frac{1}{\sqrt{x^2 + a^2}} = sinh^{-1}\frac{x}{a} + C$$

Expression for standard integral as integration square root of difference of square of x and square of a in denominator

- $$\int \frac{dx}{\sqrt{x^2 - a^2}} dx = \log(x + \sqrt{x^2 - a^2}) + C$$

Derivation for standard integral as integration of square root of difference of square of x and square of a in denominator

- $$x = a\sec\theta$$
- $$dx = a\sec\theta\tan\theta d\theta$$
- $$\sqrt{x^2 - a^2} = \sqrt{a^2\sec^2\theta - a^2} = a\tan\theta$$

- $$\int \frac{dx}{x^2 - a^2} = \int \frac{a \sec\theta \tan\theta d\theta}{a \tan\theta}$$
- $$\int \sec\theta d\theta$$
- $$= \log(\sec\theta + \tan\theta) + C$$
- $$= \log(\frac{x}{a} + \sqrt{\frac{x^2}{a^2} - 1}) + C$$
- $$= \log(\frac{x + \sqrt{x^2 - a^2}}{a}) + C$$
- $$= \log(x + \sqrt{x^2 - a^2}) - \log(a) + C$$
- $$\int \frac{dx}{\sqrt{x^2 - a^2}} dx = \log(x + \sqrt{x^2 - a^2}) + C$$

Expression for standard integral as integration of square root of difference of square of x and square of a in denominator in terms of hyperbolic function

- $$\int \frac{1}{\sqrt{x^2 - a^2}} = cosh^{-1}(\frac{x}{a}) + C$$

Derivation for standard integral as integration of square root of difference of square of x and square of a in denominator in terms of hyperbolic function

- $$x = acoshy$$
- $$dx = asinhydy$$
- $$\int \frac{dx}{\sqrt{x^2 - a^2}} = \int \frac{asinhydy}{\sqrt{a^2cosh^2y - a^2}}$$
- $$= \int \frac{asinhy}{asinhy} dy$$

- $$= \int dy$$
- $$= y + C$$
- $$\int \frac{1}{\sqrt{x^2 - a^2}} = cosh^{-1}(\frac{x}{a}) + C$$

Expression for resolution of integration of mx + e at numerator and quadratic equation at denominator in terms of p and q

$$\int \frac{mx + e}{ax^2 + bx + c} = p \int \frac{2ax + b}{ax^2 + bx + c} dx + q \int \frac{1}{ax^2 + bx + c} dx$$

Expression for resolution of integration of mx + e at numerator and square root of quadratic equation at denominator in terms of p and q

$$\int \frac{mx + e}{\sqrt{ax^2 + bx + c}} dx = p \int \frac{2ax + b}{\sqrt{ax^2 + bx + c}} dx + q \int \frac{1}{\sqrt{ax^2 + bx + c}}$$