Contents

| Expression for integration of hyperbolic function sinhx | 2 |
|--|---|
| Derivation for expression for integration of hyperbolic function sinhx | 2 |
| Expression for integration of hyperbolic function coshx | 2 |
| Derivation for expression for integration of hyperbolic function coshx | 2 |
| Expression for integration of hyperbolic function tanhx | 2 |
| Derivation for expression for integration of hyperbolic function tanhx | 3 |
| Expression for integration of hyperbolic function cothx | 3 |
| Derivation for expression for integration of hyperbolic function cothx | 3 |
| Expression for integration of hyperbolic function cosechx | 3 |
| Derivation for expression for integration of hyperbolic function cosechx | 3 |
| Expression for integration of hyperbolic function sechx | 4 |
| Derivation for expression for integration of hyperbolic function sechx | 4 |
| Expression for integration of hyperbolic function square of sechx | 5 |
| Expression for integration of hyperbolic function square of cosechx | 5 |
| Expression for integration of hyperbolic function sechx times tanhx | 5 |
| Expression for integration of hyperbolic function cosechy times cothy | 5 |

Expression for integration of hyperbolic function sinhx

•

$$\int sinhxdx = coshx + C$$

Derivation for expression for integration of hyperbolic function sinhx

•

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

•

$$\int sinhx dx = coshx + C$$

Expression for integration of hyperbolic function coshx

•

$$\int coshxdx = sinhx + C$$

Derivation for expression for integration of hyperbolic function coshx

•

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

 $\int coshxdx = sinhx + C$

Expression for integration of hyperbolic function tanhx

•

$$\log(\cosh x) + C$$

Derivation for expression for integration of hyperbolic function tanhx

•

$$\int tanhxdx = \int \frac{sinhx}{coshx}dx$$

•

$$z = coshx$$

•

$$\int \frac{dz}{z}$$

•

$$\log(z) + C$$

•

$$\log(\cosh x) + C$$

Expression for integration of hyperbolic function cothx

•

$$\int cothx = \log(sinhx) + C$$

Derivation for expression for integration of hyperbolic function cothx

•

$$\int cothx = \int \frac{coshx}{sinhx} dx$$

•

$$\int cothx = \log(sinhx) + C$$

Expression for integration of hyperbolic function cosechx

•

$$\int cosechx dx = \log(tanh(\frac{x}{2})) + C$$

Derivation for expression for integration of hyperbolic function cosechx

•

$$\int cosechx dx = \int \frac{1}{sinhx} dx$$

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

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

$$y = e^x$$

$$2\int \frac{1}{y^2 - 1} dy$$

$$= \log(\frac{y-1}{y+1}) + C$$

$$= \log(\frac{e^x - 1}{e^x + 1}) + C$$

$$\int cosechxdx = \log(tanh(\frac{x}{2})) + C$$

Expression for integration of hyperbolic function sechx

$$\int sechxdx = 2\tan^{-1}(\tanh(\frac{x}{2})) + C$$

$\label{lem:continuous} \textbf{Derivation for expression for integration of hyperbolic function sechx}$

$$\int sechxdx = \int \frac{1}{\cosh x}dx$$

$$= \frac{dx}{\cosh^2(\frac{x}{2}) + \sinh^2(\frac{x}{2})}$$

$$= \int \frac{sech^2 \frac{x}{2}}{1 + tanh^2 \frac{x}{2}} dx$$

$$z = tanh\frac{x}{2}$$

$$=2\int \frac{dz}{1+z^2}$$

•

$$= 2tan^{-1}z + C$$

•

$$\int sechxdx = 2\tan^{-1}(\tanh(\frac{x}{2})) + C$$

Expression for integration of hyperbolic function square of sechx

$$\int sech^x dx = tanhx$$

Expression for integration of hyperbolic function square of cosechx

$$\int cosech^x dx = -cothx$$

Expression for integration of hyperbolic function sechx times tanhx

$$\int sechxtanhxdx = -sechx$$

Expression for integration of hyperbolic function cosechx times cothx

$$\int cosechx cothx = -cosechx$$