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Some Important Integrals

For BSc or BS Level

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- $\int c\,dx = cx$, where c is constant
- $\int x^n dx = \frac{x^{n+1}}{n+1}, \quad n \neq -1,$
- $\int e^x dx = e^x$
- $\int a^x dx = \frac{a^x}{\ln a}$
- $\int \frac{dx}{x} = \ln|x|$
- $\int \sin x\,dx = -\cos x$
- $\int \sec^2 x\,dx = \tan x$
- $\int \sec x \tan x\,dx = \sec x$
- $\int \cos x\,dx = \sin x$
- $\int \csc^2 x\,dx = -\cot x$
- $\int \csc x \cot x\,dx = -\csc x$
- $\int \tan x\,dx = \ln|\sec x| = -\ln|\cos x|$
- $\int \sec x\,dx = \ln|\sec x + \tan x|$
- $\int \cot x\,dx = \ln|\sin x| = -\ln|\csc x|$
- $\int \csc x\,dx = \ln|\csc x - \cot x| = -\ln|\csc x + \cot x|$
- $\int \frac{dx}{\sqrt{a^2 - x^2}} = \sin^{-1}\frac{x}{a}$ or $-\cos^{-1}\frac{x}{a}$
- $\int \frac{dx}{a^2 + x^2} = \frac{1}{a}\tan^{-1}\frac{x}{a}$ or $-\frac{1}{a}\cot^{-1}\frac{x}{a}$
- $\int \frac{dx}{x\sqrt{x^2 - a^2}} = \frac{1}{a}\sec^{-1}\frac{x}{a}$ or $-\frac{1}{a}\csc^{-1}\frac{x}{a}$
- $\int \frac{dx}{\sqrt{a^2 + x^2}} = \sinh^{-1}\frac{x}{a} = \ln(x + \sqrt{x^2 + a^2})$
- $\int \frac{dx}{\sqrt{x^2 - a^2}} = \cosh^{-1}\frac{x}{a} = \ln(x + \sqrt{x^2 - a^2})$
- $\int \frac{dx}{x\sqrt{a^2 - x^2}} = -\frac{1}{a}\operatorname{sech}^{-1}\frac{x}{a} = -\frac{1}{a}\ln\left|\frac{a + \sqrt{a^2 - x^2}}{x}\right|$
- $\int \frac{dx}{x\sqrt{a^2 + x^2}} = -\frac{1}{a}\operatorname{csch}^{-1}\frac{x}{a} = -\frac{1}{a}\ln\left|\frac{a + \sqrt{a^2 + x^2}}{x}\right|$
- $\int \frac{dx}{a^2 - x^2} = \frac{1}{2a}\ln\left|\frac{a + x}{a - x}\right| = \frac{1}{a}\tanh^{-1}\frac{x}{a} \quad if \quad x^2 < a^2$
- $\int \frac{dx}{x^2 - a^2} = \frac{1}{2a}\ln\left|\frac{x - a}{x + a}\right| = -\frac{1}{a}\coth^{-1}\frac{x}{a} \quad if \quad x^2 > a^2$
- $\int \sqrt{a^2 - x^2}\,dx = \frac{x\sqrt{a^2 - x^2}}{2} + \frac{a^2}{2}\sin^{-1}\left(\frac{x}{a}\right)$
- $\int \sqrt{x^2 + a^2}\,dx = \frac{x\sqrt{x^2 + a^2}}{2} + \frac{a^2}{2}\ln\left|\frac{x + \sqrt{x^2 + a^2}}{a}\right|$
- $\int \sqrt{x^2 - a^2}\,dx = \frac{x\sqrt{x^2 - a^2}}{2} - \frac{a^2}{2}\ln\left|\frac{x + \sqrt{x^2 - a^2}}{a}\right|$

- $\int \sinh x\,dx = \cosh x$
- $\int \cosh x\,dx = \sinh x$
- $\int \operatorname{sech}^2 x\,dx = \tanh x$
- $\int \operatorname{csch}^2 x\,dx = -\coth x$
- $\int \operatorname{sech} x \tanh x\,dx = -\operatorname{sech} x$
- $\int \operatorname{csch} x \coth x\,dx = -\coth x$
- $\int \tanh x\,dx = \ln|\cosh x|$
- $\int \coth x\,dx = \ln|\sinh x|$

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