

Differentiation Formula

1. $\frac{d}{dx}(C) = 0$
2. $\frac{d}{dx}(x^n) = nx^{n-1}$
3. $\frac{d}{dx}(\sin x) = \cos x$
4. $\frac{d}{dx}(\cos x) = -\sin x$
5. $\frac{d}{dx}(\tan x) = \sec^2 x = 1 + \tan^2 x$
6. $\frac{d}{dx}(\sec x) = \sec x \tan x$
7. $\frac{d}{dx}(\csc x) = -\csc x \cot x$
8. $\frac{d}{dx}(\cot x) = -\csc^2 x$
9. $\frac{d}{dx}(\ln x) = \frac{1}{x}$
10. $\frac{d}{dx}(e^x) = e^x$
11. $\frac{d}{dx}(a^x) = a^x \ln a$
12. $\frac{d}{dx}(\log_c x) = \frac{1}{x \ln c}$
13. $\frac{d}{dx}(\arcsin x) = \frac{1}{\sqrt{1-x^2}}$
14. $\frac{d}{dx}(\arccos x) = -\frac{1}{\sqrt{1-x^2}}$
15. $\frac{d}{dx}(\arctan x) = \frac{1}{x^2+1}$

Integration Formula

- $$\int 0 \, dx = C$$
- $$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C \quad n \neq -1$$
- $$\int \cos x \, dx = \sin x + C$$
- $$\int \sin x \, dx = -\cos x + C$$
- $$\int \sec^2 x \, dx = \tan x + C$$
- $$\int \sec x \tan x \, dx = \sec x + C$$
- $$\int \csc x \cot x \, dx = -\csc x + C$$
- $$\int \csc^2 x \, dx = -\cot x + C$$
- $$\int \frac{1}{x} \, dx = \ln|x| + C$$
- $$\int e^x \, dx = e^x + C$$
- $$\int a^x \, dx = \frac{a^x}{\ln a} + C \quad a > 0, a \neq 1$$
- $$\int \frac{1}{x \ln c} \, dx = \log_c x + C$$
- $$\int \frac{1}{\sqrt{1-x^2}} \, dx = \arcsin x + C$$
- $$\int -\frac{1}{\sqrt{1-x^2}} \, dx = \arccos x + C$$
- $$\int \frac{1}{x^2+1} \, dx = \arctan x + C$$

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