MathFormulas

一元微分篇

基本求导公式

$$(C)' = 0$$

$$(x^\mu)' = \mu x^{\mu-1}$$

$$(\sin x)' = \cos x$$

$$(\cos x)' = \sin x$$

$$(\tan x)' = \sec^2 x$$

$$(\cot x)' = -\csc^2 x$$

$$(\sec x)' = \sec x \tan x$$

$$(\csc x)' = -\csc x \cot x$$

$$(a^x)' = a^x \ln a$$

$$(e^x)' = e^x$$

$$(\log_a x)' = \frac{1}{x \ln a}$$

$$(\ln x)' = \frac{1}{x}$$

$$(\arcsin x)' = \frac{1}{\sqrt{1-x^2}}$$

$$(\arccos x)' = -\frac{1}{\sqrt{1-x^2}}$$

$$(\arctan x)' = \frac{1}{1+x^2}$$

- 注:

$$\sec x = \frac{1}{\cos x}$$

$$\csc x = \frac{1}{\sin x}$$

泰勒展开

一元积分篇

不定积分的基本积分公式

$$\int k\mathrm{d}x = kx + C$$

$$\int x^{\mu}\mathrm{d}x = \frac{x^{\mu+1}}{\mu+1} + C\,(\mu \neq 1)$$

$$\int \frac{1}{x}\mathrm{d}x = \ln|x| + C$$

$$\int \frac{1}{1+x^2}\mathrm{d}x = \arctan x + C$$

$$\int \frac{1}{\sqrt{1-x^2}}\mathrm{d}x = \arcsin x + C$$

$$\int \cos x\mathrm{d}x = \sin x + C$$

$$\int \sin x\mathrm{d}x = -\cos x + C$$

$$\int \frac{1}{\cos^2 x}\mathrm{d}x = \int \sec^2 x\mathrm{d}x = \tan x + C$$

$$\int \frac{1}{\sin^2 x}\mathrm{d}x = \int \csc^2 x\mathrm{d}x = -\cot x + C$$

$$\int \sec x \tan x\mathrm{d}x = \sec x + C$$

$$\int \csc x \cot x\mathrm{d}x = -\csc x + C$$

$$\int e^x\mathrm{d}x = e^x + C$$

$$\int a^x\mathrm{d}x = \frac{a^x}{\ln a} + C$$

$$\int \mathrm{sh}x\mathrm{d}x = \mathrm{ch}x + C$$

$$\int \mathrm{ch}x\mathrm{d}x = \mathrm{sh}x + C$$

$$\int \tan x\mathrm{d}x = -\ln|\cos x| + C$$

$$\int \cot x \mathrm{d}x = \ln|\sin x| + C$$

$$\int \sec x \mathrm{d}x = \ln|\sec x + \tan x| + C$$

$$\int \csc x \mathrm{d}x = \ln|\csc x - \cot x| + C$$

$$\int \frac{1}{a^2 + x^2}\mathrm{d}x = \frac{1}{a}\arctan\frac{x}{a} + C$$

$$\int \frac{1}{x^2 - a^2}\mathrm{d}x = \frac{1}{2a}\ln\left|\frac{x-a}{x+a}\right| + C$$

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

$$\int \frac{1}{\sqrt{x^2 + a^2}}\mathrm{d}x = \ln\left(x + \sqrt{x^2 + a^2}\right) + C$$

$$\int \frac{1}{\sqrt{x^2 - a^2}}\mathrm{d}x = \ln\left(x + \sqrt{x^2 - a^2}\right) + C$$

积分中值定理

常规形式

$$\text{若函数在闭区间}[a,b]\text{上连续，则}$$

$$\exists \xi \in [a,b]$$

$$\int_a^b f(x)\mathrm{d}x = f(\xi)(b-a)$$

推广

$$\text{若}f(x)\text{、}g(x)\text{在闭区间}[a,b]\text{上可积，且}g(x)\text{在此区间上不变号，则}$$

$$\exists \xi \in [a,b]$$

$$\int_a^b f(x)g(x)\mathrm{d}x = f(\xi)\int_a^b g(x)\mathrm{d}x$$