# 高等数学常用公式

## xyfJASON

## 导数基本公式

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C'=0( $C$ 为常数)
$(x^\mu)'=\mu x^{\mu-1}$
$(a^x)'=a^x\ln a \ \ (a>0 \ \hbox{$oxdot{f L}$} \ a eq 1)$
$(e^x)'=e^x$
$(\log_a x)' = \frac{1}{x \ln a}  (a > 0 \perp a \neq 1)$
$(\ln x)' = rac{1}{x}$
$(\sin x)'=\cos x$
$(\cos x)' = -\sin x$
$(\tan x)' = \sec^2 x$
$(\cot x)' = -\csc^2 x$
$(\sec x)' = \sec x \tan x$
$(\csc x)' = -\csc x \cot x$
$(rcsin x)' = rac{1}{\sqrt{1-x^2}}$
$(rccos x)' = -rac{1}{\sqrt{1-x^2}}$
$(\arctan x)' = rac{1}{1+x^2}$
$(\operatorname{arccot} x)' = -rac{1}{1+x^2}$

#### 常用 n 阶导数公式

$$(x^{\mu})^{(n)} = \mu(\mu-1)\cdots(\mu-n+1)x^{\mu-n}$$

$$(e^x)^{(n)} = e^x$$

$$\left(\frac{1}{x}\right)^{(n)} = \frac{(-1)^n \cdot n!}{x^{n+1}}$$

$$(\ln x)^{(n)} = \frac{(-1)^{n-1}(n-1)!}{x^n}$$

$$(\sin x)^{(n)} = \sin(x + \frac{n\pi}{2})$$

$$(\cos x)^{(n)} = \cos(x + \frac{n\pi}{2})$$

$$[f(ax+b)]^{(n)} = a^n f^{(n)}(ax+b)$$

#### 麦克劳林公式

#### 常用麦克劳林公式

$$e^x = 1 + x + rac{x^2}{2!} + \dots + rac{x^n}{n!} + rac{e^{ heta x}}{(n+1)!} x^{n+1}$$

$$\sin x = x - rac{x^3}{3!} + rac{x^5}{5!} - \dots + (-1)^n rac{x^{2n+1}}{(2n+1)!} + (-1)^{n+1} rac{\cos heta x}{(2n+3)!} x^{2n+3}$$

$$\cos x = 1 - rac{x^2}{2!} + rac{x^4}{4!} - \dots + (-1)^n rac{x^{2n}}{(2n)!} + (-1)^{n+1} rac{\cos heta x}{(2n+2)!} x^{2n+2}$$

$$\ln(1+x) = x - rac{x^2}{2} + rac{x^3}{3} - \dots + (-1)^{n-1} rac{x^n}{n} + (-1)^n rac{x^{n+1}}{(n+1)(1+ heta x)^{n+1}}$$

$$(1+x)^{\mu}=1+\mu x+rac{\mu(\mu-1)}{2}x^2+\cdots+rac{\mu(\mu-1)\cdots(\mu-n+1)}{n!}x^n+rac{\mu(\mu-1)\cdots(\mu-n)}{(n+1)!}(1+ heta x)^{\mu-n-1}x^{n+1}$$

$$rac{1}{1-x} = 1 + x + x^2 + \dots + x^n + rac{x^{n+1}}{(1-\xi)^{n+1}}$$

斜渐近线 y = ax + b

$$a=\lim_{x o\infty}rac{f(x)}{x}=a
eq0 \ b=\lim_{x o\infty}(f(x)-ax)$$

弧微分

$$egin{aligned} ds &= \sqrt{1+(y')^2} dx \ ds &= \sqrt{(arphi'(t))^2+(\psi'(t))^2} dt \ ds &= \sqrt{(r( heta))^2+(r'( heta))^2} d heta \end{aligned}$$

曲率

$$K = \left| rac{dlpha}{ds} 
ight| = rac{|y''|}{[1 + (y')^2]^{rac{3}{2}}} \ K = rac{|arphi'(t)\psi''(t) - \psi'(t)arphi''(t)|}{[(arphi'(t))^2 + (\psi'(t))^2]^{rac{3}{2}}} \ K = rac{|(r( heta))^2 + 2(r'( heta))^2 - r( heta)r''( heta)|}{[(r( heta))^2 + (r'( heta))^2]^{rac{3}{2}}}$$

曲率半径

$$R = \frac{1}{K}$$

曲率中心

$$\left\{egin{aligned} \xi = x - rac{y'\left[1+(y')^2
ight]}{y''} \ \eta = y + rac{1+(y')^2}{y''} \end{aligned}
ight.$$

一阶线性微分方程  $\frac{dy}{dx} + P(x)y = Q(x)$  的通解为:

$$y=e^{-\int P(x)dx}\left(\int Q(x)e^{\int P(x)dx}dx+C
ight)$$

不定积分基本公式
$$\int 0 dx = C$$

$$\int 1 dx = x + C$$

$$\int x^{\alpha} dx = \frac{x^{\alpha-1}}{\rho+1} + C \quad (\mu \neq -1)$$

$$\int \frac{dx}{x} = \ln|x| + C$$

$$\int a^{x} dx = \frac{a^{x}}{\ln a} + C \quad (a > 0, a \neq 1)$$

$$\int e^{x} dx = e^{x} + C$$

$$\int \sin x dx = -\cos x + C$$

$$\int \cos x dx = \sin x + C$$

$$\int \sec^{2} x dx = \tan x + C$$

$$\int \sec^{2} x dx = \tan x + C$$

$$\int \sec^{2} x dx = \sec x + C$$

$$\int \csc x \cot x dx = -\csc x + C$$

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

$$\int \frac{dx}{1-x^{2}} = \arctan x + C = -\arccos x + C$$

$$\int \tan x dx = -\ln|\cos x| + C$$

$$\int \csc x dx = \ln|\sec x + \tan x| + C$$

$$\int \csc x dx = \ln|\csc x - \cot x| + C$$

$$\int \frac{dx}{x^{2} + a^{2}} = \frac{1}{a} \arctan \frac{x}{a} + C \quad (a > 0)$$

$$\int \frac{dx}{x^{2} - a^{2}} = \frac{1}{a} \arctan \frac{x}{a} + C \quad (a > 0)$$

$$\int rac{dx}{\sqrt{x^2 \pm a^2}} = \ln \left| x + \sqrt{x^2 \pm a^2} \right| + C \ (a > 0)$$

 $\int \frac{dx}{\sqrt{a^2 - x^2}} = \arcsin \frac{x}{a} + C \ (a > 0)$