一、导数基本公式表

$C' = 0$ $\qquad$ $(x^{\alpha})' = \alpha \cdot x^{\alpha-1}$

$(a^x)' = a^x \ln a \quad (a>0 且 a \neq 1) \rightarrow (e^x)' = e^x$

$(\log_a x)' = \frac{1}{x \ln a} \quad (a>0 且 a \neq 1) \rightarrow (\ln x)' = \frac{1}{x}$

$(\sin x)' = \cos x$ $\qquad$ $(\sec x)' = \sec x \cdot \tan x$

$(\cos x)' = -\sin x$ $\qquad$ $(\csc x)' = -\csc x \cdot \cot x$

$(\tan x)' = \sec^2 x = \frac{1}{\cos^2 x}$ $\qquad$ $(\cot x)' = -\csc x^2 = -\frac{1}{\sin^2 x}$

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

$(\arctan x)' = \frac{1}{1+x^2}$ $\qquad$ $(\operatorname{arccot} x)' = -\frac{1}{1+x^2}$

二、求导法则

1、导数的四则运算

$(u \pm v)' = u' + v'$

$(u \cdot v)' = u'v + uv'$

$\left(\frac{u}{v}\right)' = \frac{u'v - uv'}{v^2}$

2、反函数的导数

$$f'(x) = \frac{1}{\varphi'(y)} \quad （即\ \frac{dy}{dx} = \frac{1}{\frac{dx}{dy}}）$$

3、复合函数的求导法则)（链式法则）

$$[f(g(x))]' = f'(g(x))\cdot g'(x) \quad 即\ \frac{dy}{dx} = \frac{dy}{dv}\cdot\frac{dv}{dx}$$

4、对数求导法

5、隐函数求导　　偏导数

6、参数方程求导

$$\frac{dy}{dx} = \frac{\frac{dy}{dt}}{\frac{dx}{dt}} = \frac{\mu'(t)}{x'(t)}$$

$$\frac{d^2y}{dx^2} = \frac{\frac{d}{dt}\left(\frac{dx}{dy}\right)}{\frac{dx}{dt}}$$

二、高阶导数　$\frac{d^n y}{dx^n}$

求法：

1. 找规律（适当代数变形）

2. 记住常见的几个n阶导数

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

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

$$(x^n)^{(n+k)} = 0$$

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

$$(e^{\alpha x})^{(n)} = \alpha^n \cdot e^{\alpha x}$$

3. 莱布尼兹公式：

$$(uv)^{(n)} = \sum_{k=0}^{n} C_n^k u^{(n-k)} v^{(k)}$$