1．三角函数公式

$\tan x=\dfrac{\sin x}{\cos x}$，$\cot x=\dfrac{\cos x}{\sin x}$ ，$\sec x=\dfrac{1}{\cos x}$，$\csc x=\dfrac{1}{\sin x}$．（切割化弦）

$\sin^2 x+\cos^2 x=1$，$1+\tan^2 x=\sec^2 x$，$1+\cot^2 x=\csc^2 x$，

$\sin 2x=2\sin x\cos x$ ．

$\cos 2x=\cos^2 x-\sin^2 x=2\cos^2 x-1=1-2\sin^2 x$．

$\sin^2 x=\dfrac{1-\cos 2x}{2}$．$\cos^2 x=\dfrac{1+\cos 2x}{2}$．（降幂公式）

$\sin^2\dfrac{x}{2}=\dfrac{1-\cos x}{2}$．$\cos^2\dfrac{x}{2}=\dfrac{1+\cos x}{2}$．（降幂公式）

2．$\arcsin x$ 的定义域为$[-1,1]$；值域为$[-\dfrac{\pi}{2},\dfrac{\pi}{2}]$

$\arccos x$ 的定义域为$[-1,1]$；值域为$[0,\pi]$

$\arctan x$ 的定义域为$(-\infty,+\infty)$；值域为$(-\dfrac{\pi}{2},\dfrac{\pi}{2})$

$\operatorname{arccot} x$ 的定义域为$(-\infty,+\infty)$；值域为$(0,\pi)$

3．第一重要极限$\lim\limits_{x\to 0}\dfrac{\sin x}{x}=1$，推广形式$\lim\limits_{\otimes\to 0}\dfrac{\sin\otimes}{\otimes}=1$．

第二重要极限$\lim\limits_{x\to 0}(1+x)^{\frac{1}{x}}=e,\lim\limits_{x\to\infty}(1+\dfrac{1}{x})^{x}=e$，推广形式$\lim\limits_{\otimes\to 0}(1+\otimes)^{\frac{1}{\otimes}}=e$．

4.等差数列求和公式$S_n=\dfrac{(a_1+a_n)n}{2}$．

等比数列求和公式 $S_n=\dfrac{a_1(1-q^n)}{1-q},q\neq 1$．

5．当$x\to 0$时，$\sin x\sim x$，$\arcsin x\sim x$，$\tan x\sim x$ ，

$\arctan x\sim x$，$1-\cos x\sim\dfrac{x^2}{2}$，$\cos x-1\sim-\dfrac{x^2}{2}$．

$\sqrt{1+x}-1\sim\dfrac{x}{2}$ ，$\sqrt[4]{1+x}-1\sim\dfrac{x}{4}$，$1-\sqrt{1+x}\sim-\dfrac{x}{2}$，$1-\sqrt[n]{1+x}\sim-\dfrac{x}{n}$

$e^x-1\sim x$ ，$1-e^x\sim -x$，$\ln(1+x)\sim x$．

当$\varphi(x)\to 0$时，$\sin\varphi(x)\sim\varphi(x)$，$\arcsin\varphi(x)\sim\varphi(x)$，$\tan\varphi(x)\sim\varphi(x)$，

$\arctan\varphi(x)\sim\varphi(x)$，$1-\cos\varphi(x)\sim\dfrac{[\varphi(x)]^2}{2}$，$\cos\varphi(x)-1\sim-\dfrac{[\varphi(x)]^2}{2}$．

$\sqrt{1+\varphi(x)}-1\sim\frac{1}{2}\varphi(x)$ ，$\sqrt[4]{1+\varphi(x)}-1\sim\frac{1}{4}\varphi(x)$，$1-\sqrt{1+\varphi(x)}\sim-\frac{1}{2}\varphi(x)$，

$\sqrt[n]{1+\varphi(x)}-1\sim\frac{1}{n}\varphi(x)$，$e^{\varphi(x)}-1\sim\varphi(x)$ ，$1-e^{\varphi(x)}\sim-\varphi(x)$，$\ln(1+\varphi(x))\sim\varphi(x)$.

6.函数 $f(x)$ 在 $x=x_0$ 处的导数定义式为

$$f'(x_0)=\lim_{\Delta x\to 0}\frac{f(x_0+\Delta x)-f(x_0)}{\Delta x}=\lim_{h\to 0}\frac{f(x_0+h)-f(x_0)}{h}=\lim_{x\to x_0}\frac{f(x)-f(x_0)}{x-x_0}.$$

推广式 $f'(x_0)=\lim\limits_{\otimes\to 0}\frac{f(x_0+\otimes)-f(x_0)}{\otimes}$

7. $\lim\limits_{\Delta x\to 0}\frac{f(x_0+m\Delta x)-f(x_0+n\Delta x)}{k\Delta x}=\frac{(m-n)}{k}f'(x_0)$

8.求导法则：设 $u=u(x),v=v(x)$ 均在点 x 处可导，则

（1）$[u(x)\pm v(x)]'=u'(x)\pm v'(x)$.（2）$[u(x)\cdot v(x)]'=u'(x)v(x)+u(x)v'(x)$.

（3）$\left[\frac{u(x)}{v(x)}\right]'=\frac{u'(x)v(x)-u(x)v'(x)}{v^2(x)}$.（4）$[cu(x)]'=c[u(x)]'$.

9. 基本初等函数求导公式

$(C)'=0$，$(x^k)'=kx^{k-1}$ ，$(\log_a x)'=\frac{1}{x\ln a}$，$(\ln x)'=\frac{1}{x}$

$(a^x)'=a^x\ln a$，$(e^x)'=e^x$，$(\sin x)'=\cos x$，$(\cos x)'=-\sin x$，

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

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

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

10.复合函数求导链式法则

$([u(x)]^k)'=ku(x)^{k-1}\cdot u'(x)$ ，$(\log_a u(x))'=\frac{1}{u(x)\ln a}\cdot u'(x)$，$(\ln u(x))'=\frac{1}{u(x)}\cdot u'(x)$

$(a^{u(x)})'=a^{u(x)}\ln a\cdot u'(x)$，$(e^{u(x)})'=a^{u(x)}\cdot u'(x)$，$(\sin u(x))'=\cos u(x)\cdot u'(x)$，

$(\cos u(x))'=-\sin u(x)\cdot u'(x)$，$(\tan u(x))'=\sec^2 u(x)\cdot u'(x)$，

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

$(\sec u(x))' = \sec u(x) \tan u(x) \cdot u'(x)$, $(\csc u(x))' = -\csc u(x) \cot u(x) \cdot u'(x)$,

$(\arcsin u(x))' = \dfrac{1}{\sqrt{1-u^2(x)}} \cdot u'(x)$,

$(\arccos u(x))' = -\dfrac{1}{\sqrt{1-u^2(x)}} \cdot u'(x)$, $(\arctan u(x))' = \dfrac{1}{1+u^2(x)} \cdot u'(x)$,

$(\operatorname{arccot} u(x))' = -\dfrac{1}{1+u^2(x)} \cdot u'(x)$,

$(\sqrt{u(x)})' = \dfrac{1}{2\sqrt{u(x)}} \cdot u'(x)$, $\left(\dfrac{1}{u(x)}\right)' = -\dfrac{1}{u^2(x)} \cdot u'(x)$.