

$$(u+v)^{(n)} = u^{(n)} + v^{(n)} \quad (uv)^{(n)} = C_n^0 u^{(n)} + C_n^1 u^{(n-1)} v' + \cdots + C_n^n u v^{(n)} \quad (\sin x)^{(n)} = \sin(x + \frac{n\pi}{2}) \quad (\cos x)^{(n)} = \cos(x + \frac{n\pi}{2})$$

$$\frac{1}{(ax+b)^{(n)}} = \frac{(-1)^n n! a^n}{(ax+b)^{(n+1)}}$$

设 $y=f(x)$ 可导且 $f'(x) \neq 0, x = \varphi(y)$ 为反函数, 则 $x = \varphi(y)$ 可导, 且 $\varphi'(y) = \frac{1}{f'(x)}$

设 $y=f(x)$ 二阶可导且 $f'(x) \neq 0, x = \varphi(y)$ 为反函数, 则 $x = \varphi(y)$ 二阶可导, 且 $\varphi''(y) = -\frac{f''(x)}{f'^3(x)}$

$x \rightarrow 0$ 常用的等价无穷小 $x \sim \sin x \sim \tan x \sim \arcsin x \sim \arctan x \sim \ln(1+x) \sim e^x - 1, \quad 1 - \cos x \sim \frac{x^2}{2}, 1 - \cos^a x \sim \frac{a}{2} x^2$

$(1+x)^a - 1 \sim ax, \quad a^x - 1 \sim x \ln a$

$x \rightarrow 0$ 常用的麦克劳林公式 $e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots + \frac{x^n}{n!} + o(x^n) \quad \sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \cdots + \frac{(-1)^n}{(2n+1)!} x^{2n+1} + o(x^{2n+1})$

$\cos x = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \cdots + \frac{(-1)^n}{(2n)!} x^{2n} + o(x^{2n}) \quad \frac{1}{1-x} = 1 + x + x^2 + x^3 + x^4 + \cdots + x^n + o(x^n)$

$\frac{1}{1+x} = 1 - x + x^2 - x^3 + x^4 + \cdots + \frac{(-1)^{n-1}}{n} x^n + o(x^n)$

$\ln(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \cdots + \frac{(-1)^{n-1}}{n} x^n + o(x^n) \quad (1+x)^a = 1 + ax + \frac{a(a-1)}{2!} x^2 + \frac{a(a-1)(a-2)}{3!} x^3 + \cdots + \frac{a(a-1)\cdots(a+1-n)}{n!} x^n$