# Développements limités usuels en 0

$$e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \cdots + \frac{x^n}{n!} + \mathrm{O}\left(x^{n+1}\right)$$

$$\operatorname{sh} x = x + \frac{x^3}{3!} + \cdots + \frac{x^{2n+1}}{(2n+1)!} + \mathrm{O}\left(x^{2n+3}\right)$$

$$\operatorname{ch} x = 1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \cdots + \frac{x^{2n}}{(2n)!} + \mathrm{O}\left(x^{2n+2}\right)$$

$$\sin x = x - \frac{x^3}{3!} + \cdots + (-1)^n \frac{x^{2n+1}}{(2n+1)!} + \mathrm{O}\left(x^{2n+3}\right)$$

$$\cos x = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} + \cdots + (-1)^n \frac{x^{2n}}{(2n)!} + \mathrm{O}\left(x^{2n+2}\right)$$

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$$(1+x)^\alpha = 1 + \alpha x + \frac{\alpha(\alpha-1)}{2!}x^2 + \cdots + \frac{\alpha(\alpha-1)\cdots(\alpha-n+1)}{n!}x^n + \mathrm{O}\left(x^{n+1}\right)$$

$$\frac{1}{1-x} = 1 + x + x^2 + x^3 + \cdots + x^n + \mathrm{O}\left(x^{n+1}\right)$$

$$\ln(1-x) = -x - \frac{x^2}{2} - \frac{x^3}{3} - \frac{x^4}{4} - \cdots - \frac{x^n}{n} + \mathrm{O}\left(x^{n+1}\right)$$

$$\frac{1}{1+x} = 1 - x + x^2 - x^3 + \cdots + (-1)^n x^n + \mathrm{O}\left(x^{n+1}\right)$$

$$\ln(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \cdots + (-1)^{n-1}\frac{x^n}{n} + \mathrm{O}\left(x^{n+1}\right)$$

$$\sqrt{1+x} = 1 + \frac{x}{2} - \frac{x^2}{8} + \cdots + (-1)^{n-1}\frac{1 \times 3 \times \cdots \times (2n-3)}{2 \times 4 \times \cdots \times 2n}x^n + \mathrm{O}\left(x^{n+1}\right)$$

$$\frac{1}{\sqrt{1+x}} = 1 - \frac{x}{2} + \frac{3}{8}x^2 - \cdots + (-1)^n\frac{1 \times 3 \times \cdots \times (2n-1)}{2 \times 4 \times \cdots \times 2n}x^n + \mathrm{O}\left(x^{n+1}\right)$$

$$\operatorname{Arctan} x = x - \frac{x^3}{3} + \cdots + (-1)^n \frac{x^{2n+1}}{2n+1} + \mathrm{O}\left(x^{2n+3}\right)$$

$$\operatorname{Argth} x = x + \frac{x^3}{3} + \cdots + \frac{x^{2n+1}}{2n+1} + \mathrm{O}\left(x^{2n+3}\right)$$

$$\operatorname{Arcsin} x = x + \frac{1}{2}\frac{x^3}{3} + \cdots + \frac{1 \times 3 \times \cdots (2n-1)}{2 \times 4 \times \cdots \times 2n}\frac{x^{2n+1}}{2n+1} + \mathrm{O}\left(x^{2n+3}\right)$$

$$\operatorname{Argsh} x = x - \frac{1}{2}\frac{x^3}{3} + \cdots + (-1)^n\frac{1 \times 3 \times \cdots (2n-1)}{2 \times 4 \times \cdots \times 2n}\frac{x^{2n+1}}{2n+1} + \mathrm{O}\left(x^{2n+3}\right)$$

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$$\operatorname{th} x = x - \frac{x^3}{3} + \frac{2}{15}x^5 - \frac{17}{315}x^7 + \mathrm{O}\left(x^9\right)$$

$$\tan x = x + \frac{1}{3}x^3 + \frac{2}{15}x^5 + \frac{17}{315}x^7 + \mathrm{O}\left(x^9\right)$$