Разложение по формуле Маклорена

$$e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + ... = \sum_{k=0}^{n} \frac{x^k}{k!} + o(x^n)$$

$$\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + ... = \sum_{k=0}^{n} (-1)^k \frac{x^{2k+1}}{(2k+1)!} + o(x^{2n+2})$$

$$\cos x = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + ... = \sum_{k=0}^{n} (-1)^k \frac{x^{2k}}{(2k)!} + o(x^{2n+1})$$

$$(1+x)^\alpha = 1 + \alpha x + \frac{\alpha(\alpha-1)}{2!}x^2 + ... = \sum_{k=0}^{n} C_\alpha^k x^k + o(x^n)$$ [1]

$$\ln(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + ... = \sum_{k=1}^{n} \frac{(-1)^{k-1}x^k}{k} + o(x^n)$$

$$\operatorname{sh} x = x + \frac{x^3}{3!} + \frac{x^5}{5!} + \frac{x^7}{7!} + ... = \sum_{k=0}^{n} \frac{x^{2k+1}}{(2k+1)!} + o(x^{2n+1})$$

$$\operatorname{ch} x = 1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \frac{x^6}{6!} + ... = \sum_{k=0}^{n} \frac{x^{2k}}{(2k)!} + o(x^{2n})$$

$$\arcsin x = x + \frac{x^3}{6} + \frac{3}{40}x^5 + ... = \sum_{k=0}^{n} \frac{(2k-1)!!}{(2k)!!(2k+1)} x^{2k+1} + o(x^{2n+1})$$ [2]

$$\operatorname{arctg} x = x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} + ... = \sum_{k=0}^{n} (-1)^k \frac{x^{2k+1}}{2k+1} + o(x^{2n+2})$$ [3]

$$\operatorname{tg} x = x + \frac{x^3}{3} + \frac{2}{15}x^5 + ... = \sum_{k=1}^{n} \frac{4^k(4^k-1)}{(2k)!} B_k x^{2k-1} + o(x^{2n-1})$$ [4]

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[1] $C_\alpha^k = \frac{\alpha(\alpha-1)...(\alpha-(n-1))}{n!}$
[2] $\arccos x = \frac{\pi}{2} - \arcsin x$
[3] $\operatorname{arcctg} x = \frac{\pi}{2} - \operatorname{arctg} x$
[4] B_k - числа Бернулли

$$\sec x = 1 + \frac{1}{2}x^2 + \frac{5}{24}x^4 + \frac{61}{720}x^6 + ... = \sum_{k=0}^{n} \frac{E_k}{(2k)!}x^{2k} + o(x^{2n})$$ [5]

$$\operatorname{cosec} x = \frac{1}{x} + \frac{1}{6}x + \frac{7}{360}x^3 + \frac{31}{15120}x^5 ... = \sum_{k=0}^{n} \frac{2(2^{2k-1}-1)}{(2k)!}B_k x^{2k-1} + o(x^{2n-1})$$

$$\operatorname{ctg} x = \frac{1}{x} - \left(\frac{x}{3} + \frac{x^3}{45} + \frac{2}{945}x^5 + ...\right) = \sum_{k=0}^{n} \frac{4^k B_k}{(2k)!}x^{2k-1} + o(x^{2n-1})$$

$$\operatorname{th} x = x - \frac{x^3}{3} + \frac{2}{15}x^5 + ... = \sum_{k=0}^{n} \frac{(-1)^{k+1}4^k(4^k-1)}{(2k)!}B_k x^{2k-1} + o(x^{2n-1})$$

$$\operatorname{cth} x = \frac{1}{x} + \frac{x}{3} - \frac{x^3}{45} + \frac{2}{945}x^5 + ... = \sum_{k=0}^{n} \frac{(-1)^{k+1}4^k}{(2k)!}B_k x^{2k-1} + o(x^{2n-1})$$

[5] E_k - числа Эйлера