

$$1 - \sqrt{1+x} = 1 + \frac{x}{2} - \frac{x^2}{8} + \frac{x^3}{16} + \dots + (-1)^{n-1} \frac{1 \times 3 \times 5 \times \dots \times (2n-3)}{2 \times 4 \times 6 \times \dots \times (2n)} x^n + o(x^n)$$

$$2 - \frac{1}{\sqrt{1+x}} = 1 - \frac{x}{2} + \frac{3}{8}x^2 + \dots + (-1)^n \frac{1 \times 3 \times \dots \times (2n-1)}{2 \times 4 \times \dots \times (2n)} x^n + o(x^n)$$

$$\begin{aligned} 3 - \sqrt{1-x} &= 1 - \frac{x}{2} - \frac{x^2}{8} - \frac{x^3}{16} - \dots + (-1)^{n-1} \frac{1 \times 3 \times 5 \times \dots \times (2n-3)}{2 \times 4 \times 6 \times \dots \times (2n)} (-x)^n + o(x^n) \\ &= 1 - \frac{x}{2} - \frac{x^2}{8} - \dots + (-1)^{2n-1} \frac{1 \times 3 \times 5 \times \dots \times (2n-3)}{2 \times 4 \times 6 \times \dots \times (2n)} x^n + o(x^n) \\ &= 1 - \frac{x}{2} - \frac{x^2}{8} - \dots - \frac{1 \times 3 \times 5 \times \dots \times (2n-3)}{2 \times 4 \times 6 \times \dots \times (2n)} x^n + o(x^n) \end{aligned}$$

$$\begin{aligned} 4 - \frac{1}{\sqrt{1+x}} &= 1 + \frac{x}{2} + \frac{3}{8}x^2 + \dots + (-1)^n \frac{1 \times 3 \times \dots \times (2n-1)}{2 \times 4 \times \dots \times (2n)} (-x)^n + o(x^n) \\ &= 1 + \frac{x}{2} + \frac{3}{8}x^2 + \dots + (-1)^n (-1)^n \frac{1 \times 3 \times \dots \times (2n-1)}{2 \times 4 \times \dots \times (2n)} x^n + o(x^n) \\ &= 1 + \frac{x}{2} + \frac{3}{8}x^2 + \dots + \frac{1 \times 3 \times \dots \times (2n-1)}{2 \times 4 \times \dots \times (2n)} x^n + o(x^n) \end{aligned}$$

$$\begin{aligned} 5 - \cos x \sin x &= \left(1 - \frac{x^2}{2} + o(x^3)\right) \left(x - \frac{x^3}{6} + o(x^3)\right) = x - \frac{x^3}{6} - \frac{x^3}{2} + o(x^3) \\ &= x - x^3 \left(\frac{1}{6} + \frac{1}{2}\right) + o(x^3) \end{aligned}$$

$$6 - \csc x = 1 + \frac{x^2}{2} + \frac{x^4}{24} + \dots + \frac{x^{2n}}{(2n)!} + o(x^{2n+1}) = x - \frac{2}{3}x^3 + o(x^3)$$

$$7 - \sec x = x + \frac{x^3}{6} + \frac{x^5}{120} + \dots + \frac{x^{2n+1}}{(2n+1)!} + o(x^{2n+2})$$

$$8 - \frac{1}{x^2+x-2} = -\frac{1}{2} - \frac{x}{4} - \frac{3x^2}{8} - \frac{5x^3}{16} + o(x^3)$$

$$9 - \frac{1}{1+e^x} = \frac{1}{2} - \frac{1}{4}x + \frac{1}{48}x^3 + o(x^3)$$

$$10 - \tan x = x + \frac{1}{3}x^3 + \frac{2}{15}x^5 + o(x^5)$$

$$11 - \tanh x = x - \frac{x^3}{3} + \frac{2}{15}x^5 + o(x^5)$$

$$12 - \ln(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} + \dots + (-1)^{n-1} \frac{x^n}{n} + o(x^n)$$

$$13 - \ln(1-x) = -x - \frac{x^2}{2} - \frac{x^3}{3} + \dots - \frac{x^n}{n} + o(x^n)$$

$$14 - e^{\sin x} = 1 + x + \frac{1}{2}x^2 + o(x^3).$$