

# Taylor expansions

- $\frac{1}{1-x} = 1 + x + x^2 + x^3 + \dots = \sum_0^{\infty} x^n, |x| < 1$
- $\frac{1}{1+x} = 1 - x + x^2 - x^3 + \dots = \sum_0^{\infty} (-x)^n, |x| < 1$
- $e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots = \sum_0^{\infty} \frac{x^n}{n!}, x \in \mathbb{R}$
- $\sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} + \dots = \sum_0^{\infty} (-1)^n \frac{x^{2n+1}}{(2n+1)!}, x \in \mathbb{R}$
- $\cos(x) = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} + \dots = \sum_0^{\infty} (-1)^n \frac{x^{2n}}{(2n)!}, x \in \mathbb{R}$
- $\log(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} + \dots = \sum_1^{\infty} (-1)^{n+1} \frac{x^n}{n}, -1 < x \leq 1$
- $\arctan(x) = x - \frac{x^3}{3} + \frac{x^5}{5} + \dots = \sum_0^{\infty} (-1)^n \frac{x^{2n+1}}{2n+1}, |x| \leq 1$   
 $\int \frac{1}{1+x^2}$