

Mathe für BioInformatiker – SS 2016

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Einige Taylorreihenentwicklungen im Punkt 0

$$\begin{aligned} e^x &= \sum_{k=0}^n \frac{x^k}{k!} + o(x^n) = 1 + x + \frac{x^2}{2!} + \dots + \frac{x^n}{n!} + o(x^n) \\ \sin(x) &= \sum_{k=0}^k (-1)^k \frac{x^{2k+1}}{(2k+1)!} + o(x^{2n+2}) = x - \frac{x^3}{3!} + \dots + \frac{(-1)^n x^{2n+1}}{(2n+1)!} + o(x^{2n+2}) \\ \cos(x) &= \sum_{k=0}^k (-1)^k \frac{x^{2k}}{(2k)!} + o(x^{2n+1}) = 1 - \frac{x^2}{2!} + \dots + \frac{(-1)^n x^{2n}}{(2n)!} + o(x^{2n+1}) \\ \frac{1}{1+x} &= \sum_{k=0}^n (-1)^k x^k + o(x^n) = 1 - x + x^2 + \dots + (-1)^n x^n + o(x^n) \\ \frac{1}{1-x} &= \sum_{k=0}^n x^k + o(x^n) = 1 + x + x^2 + \dots + x^n + o(x^n) \\ \ln(1+x) &= \sum_{k=1}^n (-1)^{k-1} \frac{x^k}{k} + o(x^n) = x - \frac{x^2}{2} + \frac{x^3}{3} + \dots + \frac{(-1)^{n-1} x^n}{n} + o(x^n) \\ \ln(1-x) &= - \sum_{k=1}^n \frac{x^k}{k} + o(x^n) = -x - \frac{x^2}{2} - \frac{x^3}{3} - \dots - \frac{x^n}{n} + o(x^n) \end{aligned}$$