

1.1.1(b) Fakultät $n!$

$$n! = 1 \cdot 2 \cdot 3 \cdot \dots \cdot n$$

$$\text{für } n \in \{1, 2, 3, 4, \dots\} = \mathbb{N}^*$$

$$\text{d.h. } n \geq 1$$

rekursiv: $1! = 1$ Start

$$(n+1)! = n! \cdot (n+1) \quad \text{Rekursionsformel}$$

Zusätzlich definiert man: $0! = 1$

n	0	1	2	3	4	5	6
$n!$	1	1	2	6	24	120	...

(c) Fibonacci-Zahlen

$$a_0 = a_1 = 1$$

$$a_{n+1} = a_n + a_{n-1}$$

n	0	1	2	3	4	5	6	7	...
a_n	1	1	2	3	5	8	13	21	...

$$\begin{array}{c} \curvearrowright \quad \quad \quad \curvearrowright \\ a_2 = a_1 + a_0 \quad a_3 = a_2 + a_1 \end{array}$$

$$1.2.1(d) \quad \sum_{k=4}^7 \frac{1}{k+1} = \frac{1}{5} + \frac{1}{6} + \frac{1}{7} + \frac{1}{8}$$

Gauß-Trick $\sum_{k=1}^n k = 1 + 2 + \dots + n = ?$

$$\begin{aligned} 2 \cdot \sum_{k=1}^n k &= \underbrace{1}_{\text{1}} + \underbrace{2}_{\text{2}} + \underbrace{3}_{\text{3}} + \dots + n-1 + n \\ &\quad + n + n-1 + n-2 + \dots + 2 + 1 \\ &= n+1 + n+1 + n+1 + \dots + n+1 + n+1 \\ &= n(n+1) \end{aligned}$$

$$\Rightarrow \sum_{k=1}^n k = \frac{n(n+1)}{2}$$