

5) Faktlogik

x	y	\bar{x}	\bar{y}	$\bar{y} \wedge x$	$\bar{x} \vee y$	$(\bar{y} \wedge x) \vee (\bar{x} \vee y)$
0	0	1	1	0	1	1
0	1	1	0	0	1	1
1	0	0	1	1	0	1
1	1	0	0	0	1	1

1) Mathematische Induktion

$$\sum_{i=1}^n i^2 = \frac{n(n+1)(2n+1)}{6}$$

a) $1 + 4 + 9 + \dots + n^2 = \frac{n(n+1)(2n+1)}{6} \quad | \quad V(n)$

b) $V(n+1)$

$$1 + 4 + 9 + \dots + n^2 + (n+1)^2 = \frac{(n+1) \cdot (n+2) \cdot (2n+3)}{6}$$

c) Induktion

$$\sum_{i=1}^n i^2 = \frac{n(n+1)(2n+1)}{6} + (n+1)^2 \Rightarrow \text{gemeinsamer Nenner}$$

$$\sum_{i=1}^n i^2 = \frac{n(n+1)(2n+1) + 6(n+1)^2}{6} \Rightarrow \text{Nenner mal } (n+1)$$

$$\sum_{i=1}^n i^2 = \frac{(n+1)(n(2n+1) + 6(n+1))}{6}$$

$$\sum_{i=1}^n i^2 = \frac{(n+1)(2n^2 + n + 6n + 6)}{6} = \frac{(n+1)(2n^2 + 7n + 6)}{6}$$

Nullstellen

$$x_{1,2} = \frac{-7 \pm \sqrt{49 - 4 \cdot 6}}{4} = \frac{-7 \pm 5}{4} \Rightarrow \left. \begin{aligned} x_1 &= \frac{-7+5}{4} = \frac{-2}{4} = -\frac{1}{2} \\ x_2 &= \frac{-7-5}{4} = \frac{-12}{4} = -3 \end{aligned} \right\} Q \cdot (x - x_1)(x - x_2) \Rightarrow$$

$$\Rightarrow 2 \cdot \left(x + \frac{1}{2}\right)(x + 3) = (2x + 1)(x + 3) \Rightarrow \sum_{i=1}^n i^2 = \frac{(n+1)(2n+3)(n+2)}{6}$$