

# IMP: Syntax

*AExp* :  $a ::= n \mid X \mid a_0 + a_1 \mid a_0 - a_1 \mid a_0 * a_1$

*BExp* :  $b ::= \text{true} \mid \text{false} \mid a_0 = a_1 \mid a_0 \leq a_1$

*Com* :  $c ::= \text{skip} \mid X := a \mid c_0; c_1 \mid \text{if } b \text{ then } c_0 \text{ else } c_1$   
| while  $b$  do  $c$

# IMP: Denotationale Semantik

Umgebung = Abb.  $\eta : Loc \rightarrow \mathbb{Z}$

$\Sigma$  = Menge der Umgebungen

$$\llbracket a \rrbracket : \Sigma \rightarrow \mathbb{Z}$$

$$\llbracket b \rrbracket : \Sigma \rightarrow \mathbb{T}$$

$$\llbracket c \rrbracket : \Sigma \rightarrow \Sigma$$

z.B.

$$n(b, c, \eta) = \min\{k \mid \llbracket b \rrbracket \llbracket c \rrbracket^k \eta = \text{false}\} \in \mathbb{N} \cup \{\infty\}$$

$$\llbracket \text{while } b \text{ do } c \rrbracket \eta = \llbracket c \rrbracket^{n(b,c,\eta)} \eta$$