

$\{P\} A \{Q\}$ (P, Q) $Q, A \longrightarrow W_P :$ 1) $\{W_P\} A \{Q\}$ 2) $P \supset W_P$ Rules: $\{Q\} \text{ skip } \{Q\}$

empty program

 $\{P\} A_1 \{R\}$ $\{R\} A_2 \{Q\}$ $\{P\} A_1; A_2 \{Q\}$

composition

 $\{Q \mid x \leftarrow e\} x := e \{Q\}$

assignment

 $\{W_{P_1}\} A_1 \{Q\}$ $\{W_{P_2}\} A_2 \{Q\}$ $\{t \wedge W_{P_1} \vee \neg t \wedge W_{P_2}\} \text{if } (t) A_1; \text{else } A_2; \{Q\}$ R - loop invariant $P \supset R \quad \neg t \wedge R \supset Q \quad \{t \wedge R\} A \{R\}$

+ halting

 $\{P\} \text{while } (t) A; \{Q\}$

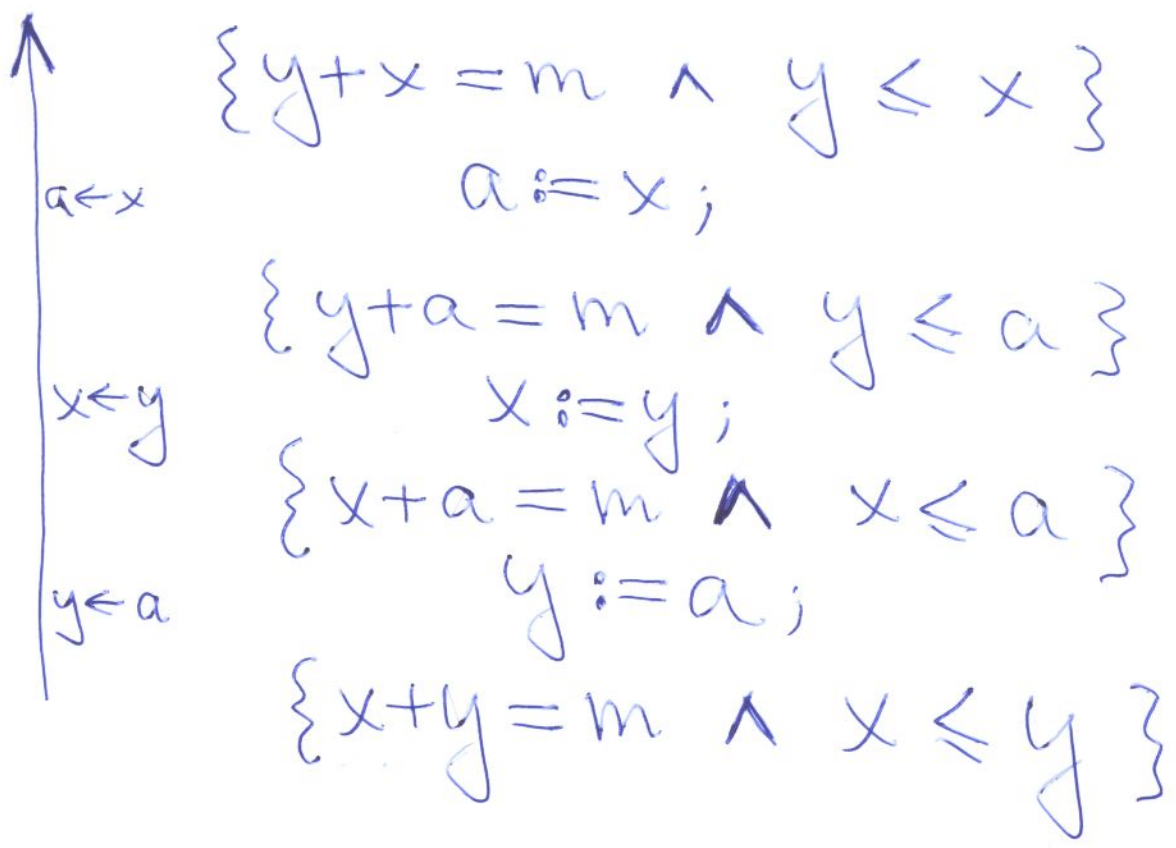
Example.

Precondition: $x + y = m$

Program: $\text{if } (x > y)$
 $a := x;$
 $x := y;$
 $y := a;$
 else skip;

Postcondition: $x + y = m \wedge x \leq y$

Wp for if-clause:



Wp₂ for skip-clause:

$$x + y = m \wedge x \leq y$$

$$t: x > y$$

$$t \wedge Wp_1: x > y \wedge x + y = m$$

$$\neg t \wedge Wp_2: x \leq y \wedge x + y = m$$

$$t \wedge Wp_1 \vee \neg t \wedge Wp_2: x + y = m$$

q.e.d.