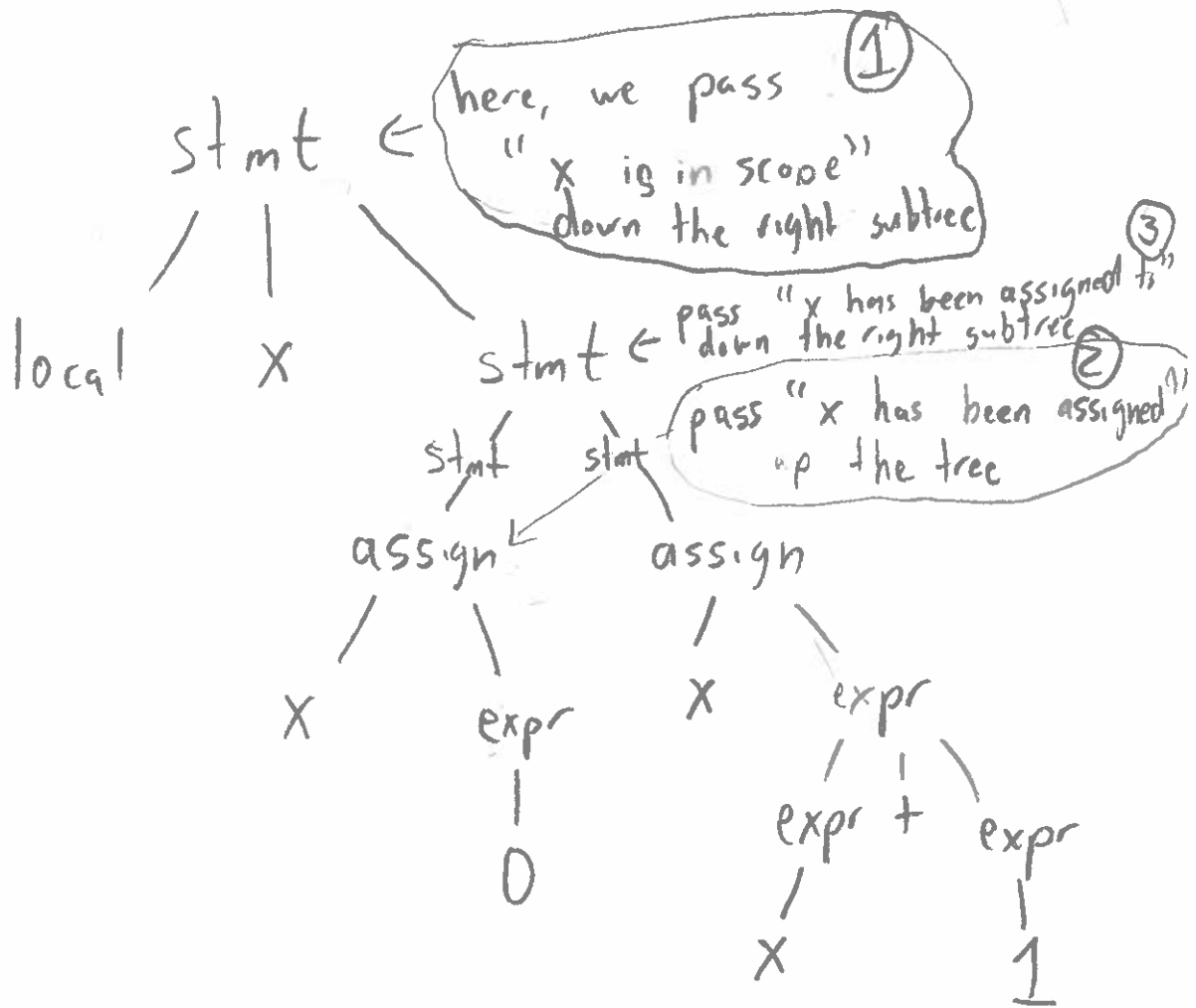


local x in (x := 0 ; x := x + 1)



x needs
goals: to be in scope,
have type integer,
and be initialized

$\langle \text{stmt} \rangle ::= \text{skip}$
 $\quad | \text{var} := \langle \text{expr} \rangle$
 $\quad | \langle \text{stmt} \rangle \langle \text{stmt} \rangle$
 $\quad | \text{local var in } \langle \text{stmt} \rangle$

"Local statements make a variable in scope in the subtree"
 Production: $\langle \text{stmt} \rangle_1 ::= \text{local var in } \langle \text{stmt} \rangle_2$

Rule: $\langle \text{stmt} \rangle_2 \cdot \text{scope} := \langle \text{stmt} \rangle_1 \cdot \text{scope} \cup \{\text{var}\}$

"Scope is passed down the subtree"

Production: $\langle \text{stmt} \rangle_1 ::= \langle \text{stmt} \rangle_2 \langle \text{stmt} \rangle_3$

Rules: $\langle \text{stmt} \rangle_2 \cdot \text{scope} := \langle \text{stmt} \rangle_1 \cdot \text{scope}$

$\langle \text{stmt} \rangle_3 \cdot \text{scope} := \langle \text{stmt} \rangle_1 \cdot \text{scope}$
 (continued below)

Production: $\langle \text{stmt} \rangle ::= \text{var} := \langle \text{expr} \rangle$

Rules: $\langle \text{stmt} \rangle \cdot \text{assigned} := \{\text{var}\}$

$\langle \text{stmt} \rangle \cdot \text{types} := \{(\text{var}, \text{expr} \cdot \text{type})\}$

$\langle \text{expr} \rangle \cdot \text{scope} := \langle \text{stmt} \rangle \cdot \text{scope}$

$\langle \text{expr} \rangle \cdot \text{assigned} := \langle \text{stmt} \rangle \cdot \text{assigned}$

$\langle \text{expr} \rangle \cdot \text{types} := \langle \text{stmt} \rangle \cdot \text{types}$

Production: $\langle \text{stmt} \rangle_1 ::= \langle \text{stmt} \rangle_2 \langle \text{stmt} \rangle_3$

Rules: $\langle \text{stmt} \rangle_3 \cdot \text{initialised} := \langle \text{stmt} \rangle_1 \cdot \text{initialised}$
 $\vee \langle \text{stmt} \rangle_2 \cdot \text{initialised}$

~~$\langle \text{stmt} \rangle_3 \cdot \text{types} := \langle \text{stmt} \rangle_2 \cdot \text{types}$~~