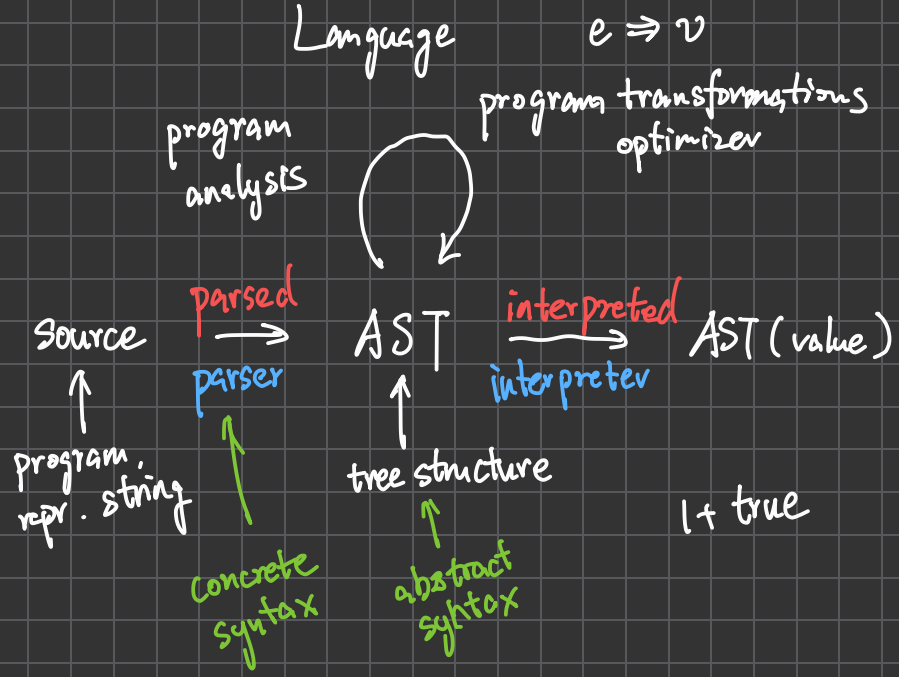
C: `int i = 0;` `f(i++, i++)` → `f(0, 1)` or `f(1, 0)`

C — gcc / clang (UB) undefined behavior



SIMP: abs $\quad v := e$

out := If in < 0 { in x (-1) }
Else { in }

program

```
If in < 0 {
    out := in x (-1)
} Else {
    out := in
}
```

Expr $\quad \langle e, \sigma \rangle \Rightarrow y \in \mathbb{Z} \cup \mathbb{B}$

Statement $\quad \langle s, \sigma \rangle \Downarrow \sigma'$

State : $\sigma = \{ \text{var} \mapsto \text{val} \}$ $\quad \mapsto$ \mapsto

$\sigma(\text{in}) =$

$$\text{(Assign)} \quad \frac{\langle e, \sigma \rangle \Rightarrow y}{\langle v := e, \sigma \rangle \Downarrow \sigma[v \mapsto y]}$$

$$\text{(If-True)} \quad \frac{\langle e, \sigma \rangle \Rightarrow \text{true} \quad \langle s_1, \sigma \rangle \Downarrow \sigma'}{\langle \text{If } e \{ s_1 \} \text{E} \{ s_2 \}, \sigma \rangle \Downarrow \sigma'}$$

$$
\text{swap} \begin{cases} \text{temp} := \text{in1}; & S_1 \\ \text{in1} := \text{in2}; & S_2 \\ \text{in2} := \text{temp} & S_3 \end{cases}
$$

$$
\dfrac{\dfrac{\langle \text{in1}, \{\text{in1} \mapsto 5, \text{in2} \mapsto 10\} \rangle \Rightarrow 5}{\langle S_1, \sigma \rangle \Downarrow \sigma'} \qquad \langle S_2 ; S_3, \sigma' \rangle \Downarrow \sigma''}{\langle S_1 ; S_2 ; S_3, \{\text{in1} \mapsto 5, \text{in2} \mapsto 10\} \rangle \Downarrow \{\text{in1} \mapsto 10, \text{in2} \mapsto 5, \text{temp} \mapsto 5\}}
$$