

G54FOP: Lecture 5

Operational Semantics II: Induction on Derivations

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Recap: Language Booleans (1)

$t \rightarrow$

true	<i>constant true</i>
false	<i>constant false</i>
if t then t else t	<i>conditional</i>

$v \rightarrow$

true	<i>constant true</i>
false	<i>constant false</i>

Recap: Language Booleans (2)

if true then t_2 **else** $t_3 \longrightarrow t_2$ (E-IFTRUE)

if false then t_2 **else** $t_3 \longrightarrow t_3$ (E-IFFALSE)

$$\frac{t_1 \longrightarrow t'_1}{\text{if } t_1 \text{ then } t_2 \text{ else } t_3 \longrightarrow \text{if } t'_1 \text{ then } t_2 \text{ else } t_3} \quad (\text{E-IF})$$

Note:

- Computation rules: E-IFTRUE and E-IFFALSE
- Congruence rules: E-IF
- Values cannot be evaluated further.

Extension: Small Expression Language

$t \rightarrow$ *terms:*

...

	0	<i>constant zero</i>
	succ t	<i>successor</i>
	pred t	<i>predecessor</i>
	iszero t	<i>zero test</i>

Extension: Small Expression Language

$v \rightarrow$ *values:*

...

| nv *numeric value*

$nv \rightarrow$ *numeric values:*

0 *zero value*

| **succ** nv *successor value*