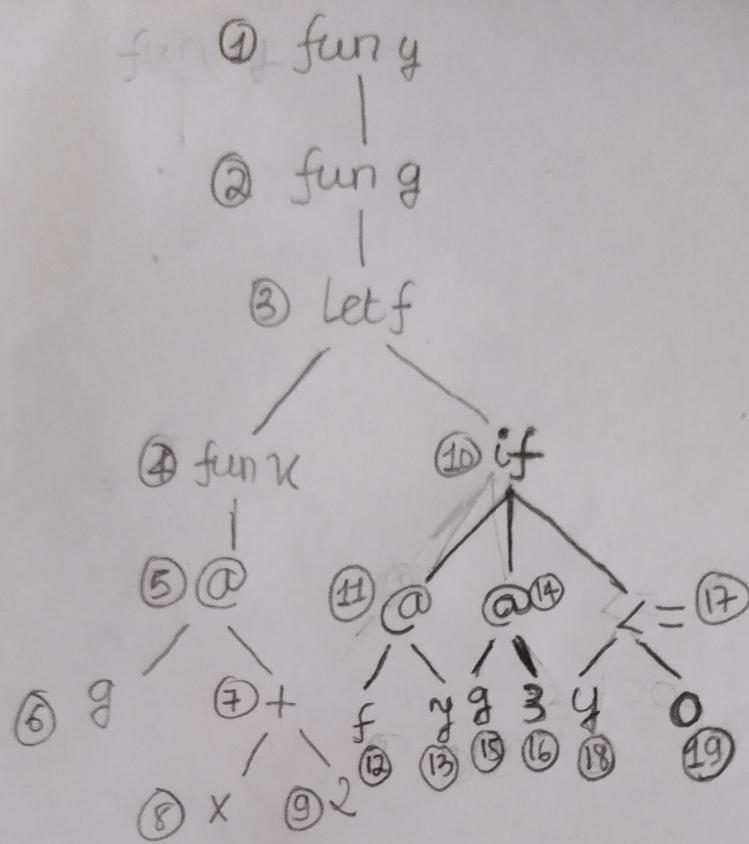


\* The AST



\* the general constraints

Node #	Rule	constraint
1	fun	$t_1 = t_y \rightarrow t_2$
2	fun	$t_2 = t_g \rightarrow t_3$
3	Let	$t_4 = t_f \& t_3 = t_{10}$
4	fun	$t_4 = t_x \rightarrow t_5$
5	APP	$t_6 = t_7 \rightarrow t_5$
6	Var	$t_6 = t_g$
7	ADD	$t_7 = t_8 = t_g = \text{int}$
8	Var	$t_8 = t_x$
9	Int	$t_g = \text{int}$
10	If	$t_{11} = \text{Bool}$ $t_{10} = t_{14} = t_{17}$

Node #	Rule	constraint
11	APP	$t_{12} = t_y \rightarrow t_{11}$
12	Var	$t_{12} = t_f$
13	Var	$t_{13} = t_y$
14	APP	$t_{15} = t_{16} \rightarrow t_{14}$
15	Var	$t_{15} = t_g$
16	Int	$t_{16} = \text{int}$
17	Leq	$t_{17} = \text{Bool} \& t_{18} = t_{19} = \text{Int}$
18	Var	$t_{18} = T_y$
19	Int	$t_{19} = \text{int}$

\*Solving By inspection

$$(5) \leftarrow (6), (7) \Leftrightarrow t_6 = t_g = \text{Int} \rightarrow t_5 \quad (a)$$

$$(18) \leftarrow (17) \Leftrightarrow t_{18} = t_y = \text{Init} \quad (b)$$

$$(11) \leftarrow (10), (12), (6) \Leftrightarrow t_{12} = t_f = \text{Int} \rightarrow \text{BOOL} \quad (c)$$

$$(10) \leftarrow (17) \Leftrightarrow t_{10} = t_{14} = t_{17} = \text{BOOL} \quad (d)$$

$$(14) \leftarrow (15), (16), (d) \Leftrightarrow t_{15} = t_g = \text{Int} \rightarrow \text{BOOL} \quad (e)$$

$$(a) \& (e) \Leftrightarrow \text{Int} \rightarrow t_5 = \text{Int} \rightarrow \text{Bool} \Rightarrow t_5 = \text{Bool} \quad (f)$$

$$(7) \leftarrow (8) \Leftrightarrow t_8 = t_x = \text{Int} \quad (g)$$

$$(4) \leftarrow (f), (i) \Leftrightarrow t_4 = \text{Int} \rightarrow \text{BOOL} \quad (h)$$

$$(3) \leftarrow (j) \Leftrightarrow t_4 = t_f = \text{Int} \rightarrow \text{BOOL} \quad (k)$$

$$(3) \leftarrow (d) \Leftrightarrow t_3 = t_{10} = \text{BOOL} \quad (l)$$

$$(2) \leftarrow (e), (g) \Leftrightarrow t_2 = (\text{Int} \rightarrow \text{BOOL}) \rightarrow \text{BOOL} \quad (m)$$

$$(1) \leftarrow (b), (m) \Leftrightarrow t_1 = \text{Int} \rightarrow [(\text{Int} \rightarrow \text{BOOL}) \rightarrow \text{BOOL}] \quad (n)$$

### Summary

$$* t_1 = \text{Int} \rightarrow [(\text{Int} \rightarrow \text{BOOL}) \rightarrow \text{BOOL}] \quad (\text{Step n})$$

$$* t_x = \text{Int} \quad (\text{Step i})$$

$$* t_y = \text{Init} \quad (\text{Step b})$$

$$* t_g = \text{Int} \rightarrow \text{Bool} \quad (\text{Step e})$$

$$* t_f = \text{Int} \rightarrow \text{Bool} \quad (\text{Step k})$$