RECOGNIZING TYPE ERRORS

- function

    let f g = g 2

    val f : $(int \rightarrow t_4) \rightarrow t_4$ = ⟨fun⟩

- incorrect use

    let not x = if x then true else false

    val not : $bool \rightarrow bool$ = ⟨fun⟩

    f not

    > Error : operator and operand don't agree

        operator domain : int → a

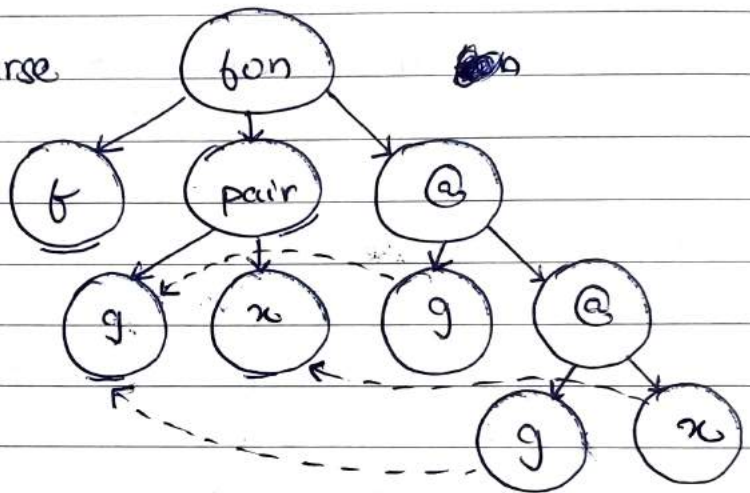   operand :   bool → bool.

- type error

    Cannot unify $bool \rightarrow bool$
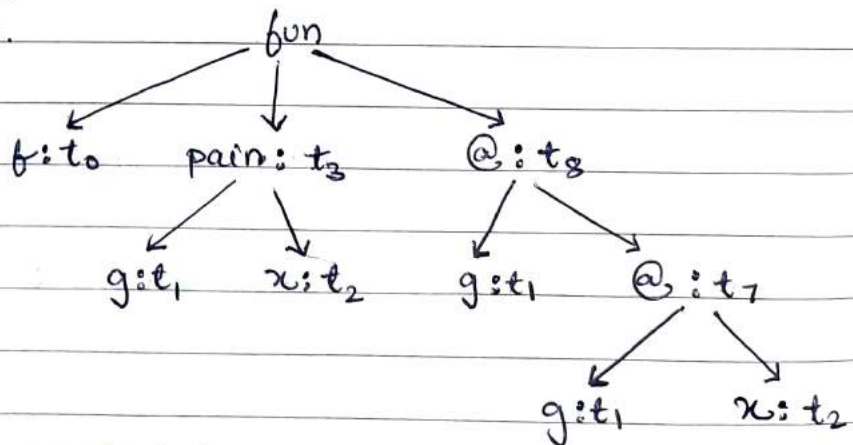   and $int \rightarrow t$

ANOTHER EXAMPLE

let $f(g, x) = g(g\ x)$

val $f: ((t_8 \to t_8) * t_8) \to t_8$

① build parse
tree

② assign type
variables.

③ generate constraints

$t_1 = t_2 \to t_7$ $\qquad\qquad$ $t_0 = t_3 \to t_8$

$t_1 = t_7 \to t_8$

$t_3 = (t_1, t_2)$

④ solve constraints

$$
\begin{cases}
t_1 = t_2 \to t_7 & \Rightarrow \quad t_2 \to t_7 = t_7 \to t_8 \\[4pt]
t_1 = t_7 \to t_8 & \Rightarrow \quad t_7 = t_8, \quad t_2 = t_7 = t_8
\end{cases}
$$

$$t_3 = (t_1, t_2) \quad \Rightarrow \quad t_1 = t_8 \to t_8$$

$$t_0 = t_3 \to t_8 \quad \Rightarrow \quad t_3 = (t_8 \to t_8, t_8)$$

$$\Rightarrow \quad t_0 = (t_8 \to t_8, t_8) \to t_8$$

⑤ determine type of b.

$$t_0 = (t_8 \to t_8, t_8) \to t_8$$

$$= (t_8 \to t_8 * t_8) \to t_8$$