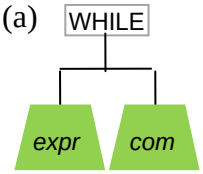
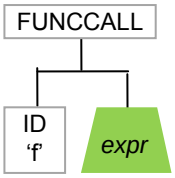
Exercises 7 (Contextual analysis) – Solutions

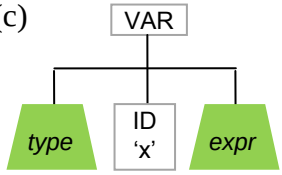
7A. *(Type checking)*

(a) 

check *expr*, and check that its type is BOOL;
walk *com*.

(b) 

lookup 'f' and retrieve its type, which must be of the form $T \rightarrow T'$;
check *expr*, and check that its type is T;
infer that the type of the whole expression is T'.

(c) 

let the type be T;
check *expr*, and check that its type is T;
enter 'x' in the type table with type T.

7B. *(Symbol tables)*

(a) Early version of Cobol: The symbol table could be just a hash-table.

(b) Early version of Fortran: The symbol table could be a pair of hash-tables, one for globals and one for locals. An identifier would be looked up first in the local hash-table.

(c) C: The symbol table could be a stack of hash-tables, with the globals at the bottom and the locals at the top. An identifier is looked up in the hash-tables starting at the top. When the contextual analyser encounters a block, it first pushes a new hash-table, then walks the block performing scope/type checking, then pops the topmost hash-table.