//------------------------------------Z:, X:= Q:[ T:] R:{ P:}

PROGRAM -> DECLLIST

DECLLIST -> DECL DECLLIST1

DECLLIST1 -> DECL DECLLIST1 | **eps**

DECL -> VARDECL | FUNCDECL

VARDECL -> TYPE VARDECLLIST **;**

VARDECLLIST -> VARVAL VARDECLLIST1

VARDECLLIST1 -> **,** VARVAL VARDECLLIST1 | **eps**

VARVAL -> VARID VARVALLIST

VARVALLIST -> **=** SIMPLEEXP | **eps**

VARID -> **id** VARIDEXTRA

VARIDEXTRA -> **[** **numconst** **]** | **eps**

TYPE -> **int** | **bool** | **char**

FUNDECL -> TYPE **idfunc** **(**PARAMS**)** STMT

PARAMS -> PARAMSLIST | **eps**

PARAMSLIST -> PARAMTYPE PARAMSLIST1

PARAMSLIST1 -> **,** PARAMTYPE PARAMSLIST1 | **eps**

PARAMTYPE -> TYPE PARAMID

PARAMID -> **id** EXTRA

EXTRA -> **[** **]** | **eps**

STMT -> EXPSTMT | SCOPESTMT | CONDSTMT | ITERSTMT | RETURNSTMT | BREAKSTMT | READSTMT | WRITESTMT

EXPSTMT -> EXP **;** | **;**

SCOPESTMT -> **{** LOCALDECLS STMTLIST **}**

LOCALDECLS -> LOCALDECLS1

LOCALDECLS1 -> SCOPEDVARDECL LOCALDECLS1 | **eps** // hadi fchkel makayna f ta regle wash terminal ?

STMTLIST -> STMTLIST1

STMTLIST1 -> STMT STMTLIST1 | **eps**

CONDSTMT -> **if** FIF

FIF -> SIMPLEEXP FSIMPLEEXP1

FSIMPLEEXP1 -> **let** STMT | **then** STMT **else** STMT

ITERSTMT -> **while** SIMPLEEXP **do** STMT | **for** **id** = ITERRANGE **do** STMT

ITERRANGE -> SIMPLEEXP FSIMPLEEXP

FSIMPLEEXP -> **to** FTO

FTO -> SIMPLEEXP FSIMPLEEXP1

FSIMPLEEXP1 -> | **by** SIMPLEEXP

RETURNSTMT -> **return** EXPSTMT

BREAKSTMT -> **break** **;**

READSTMT -> **cin** **(** LISTID **)** **;**

WRITESTMT -> **cout** ( EXP **)** **;**

LISTID -> **id** LISTID1

LISTID1 -> **, id** LISTID1 | **eps**

EXP -> **:** MUTABLE **=** EXP | SIMPLEEXP

SIMPLEEXP -> ANDEXP SIMPLEEXP1

SIMPLEEXP1 -> **or** ANDEXP SIMPLEEXP1 | **eps**

ANDEXP -> NOTEXP ANDEXP1

ANDEXP1 -> **and** NOTEXP ANDEXP1 | **eps**

NOTEXP -> **!** NOTEXP | COMPAREXP

COMPAREXP -> SUMEXP COMPAREXTRA

COMPAREXTRA -> COMPAROP SUMEXP | **eps**

COMPAROP -> **==** | **>** | **<** | **<=** | **>=** | **!=**

SUMEXP -> MULEXP SUMEXP1

SUMEXP1 -> SUMOP MULEXP SUMEXP1 | eps

SUMOP -> **+** | **-**

MULEXP -> FACTOR MULEXP1

MULEXP1 -> MULOP FACTOR MULEXP1 | **eps**

MULOP -> **\*** | **/** | **%**

FACTOR -> IMMUTABLE | MUTABLE

MUTABLE -> **id** MUTABLEEXTRA

MUTABLEEXTRA -> | **[** EXP **]**

IMMUTABLE -> **(** EXP **)** | CALL | CONSTANT

CALL -> **idfunc** **(** ARGS **)**

ARGS -> ARGLIST | **eps**

ARGLIST -> EXP ARGLIST1

ARGLIST1 -> **,** EXP ARGLIST1 | **eps**

CONSTANT -> **numconstant** | **charconstant** | **stringconstant** | **true** | **false**