

Complete Grammar (Natural Form)

1. **<mainFunction>** ==> MAIN SQO SQC <stmtsAndFunctionDefs> END
2. <stmtsAndFunctionDefs>==> <stmtOrFunctionDef><stmtAndFunctionDefs>|<stmtOrFunctionDef>
3. <stmtOrFunctionDef>==> <stmt> | <functionDef>
4. <stmt>==> <declarationStmt> | <assignmentStmt_type1> | **<assignmentStmt_type2>** |<ifStmt>|<ioStmt>| <funCallStmt>
SEMICOLON
5. <functionDef>==>FUNCTION SQO <parameter_list> **SQC** ASSIGNOP FUNID SQO <parameter_list> SQC
<stmtsAndFunctionDefs> END **SEMICOLON**
6. <parameter_list>==><type> ID <remainingList>
7. <type>==> INT | REAL | STRING | MATRIX
8. <remainingList>==>COMMA <parameter_list> | ∈
9. <declarationStmt>==> <type> <var_list> SEMICOLON
10. <var_list>==> ID <more_ids>
11. <more_ids>==> COMMA <var_list> | ∈
12. <assignmentStmt_type1>==> <leftHandSide_singleVar> ASSIGNOP <rightHandSide_type1> SEMICOLON
13. **<assignmentStmt_type2>**==> <leftHandSide_listVar> ASSIGNOP **<rightHandSide_type2>** SEMICOLON
14. <leftHandSide_singleVar> ==> ID
15. **<leftHandSide_listVar>** ==> SQO <var_list> SQC
16. <rightHandSide_type1> ==> <arithmeticExpression> | **<sizeExpression>** |<funCallStmt>
17. **<rightHandSide_type2>** ==> **<sizeExpression>** |<funCallStmt>
18. **<sizeExpression>** ==> **SIZE ID**

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- (1)Changes and updates in Red color
 - (2)Added Missing Semicolons (Rules 5 and 20)
 - (3)Opertor Precedence imposed

19. $\langle \text{ifStmt} \rangle \Rightarrow \text{IF OP } \langle \text{booleanExpression} \rangle \text{ CL } \langle \text{stmt} \rangle \langle \text{otherStmts} \rangle \text{ ELSE } \langle \text{stmt} \rangle \langle \text{otherStmts} \rangle \text{ ENDIF SEMICOLON}$
20. $\langle \text{ifStmt} \rangle \Rightarrow \text{IF OP } \langle \text{booleanExpression} \rangle \text{ CL } \langle \text{stmt} \rangle \langle \text{otherStmts} \rangle \text{ ENDIF SEMICOLON}$
21. $\langle \text{otherStmts} \rangle \Rightarrow \langle \text{stmt} \rangle \langle \text{otherStmts} \rangle \mid \epsilon$
22. $\langle \text{ioStmt} \rangle \Rightarrow \text{READ OP ID CL SEMICOLON} \mid \text{PRINT OP ID CL SEMICOLON}$
23. $\langle \text{funCallStmt} \rangle \Rightarrow \text{FUNID OP } \langle \text{inputParameterList} \rangle \text{ CL}$
24. $\langle \text{inputParameterList} \rangle \Rightarrow \langle \text{var} \rangle \langle \text{listVar} \rangle \mid \epsilon$
25. $\langle \text{listVar} \rangle \Rightarrow \text{COMMA } \langle \text{inputParameterList} \rangle \mid \epsilon$
26. $\langle \text{arithmeticExpression} \rangle \Rightarrow \langle \text{arithmeticTerm} \rangle \langle \text{operator_lowPrecedence} \rangle \langle \text{arithmeticExpression} \rangle \mid \langle \text{arithmeticTerm} \rangle$
27. $\langle \text{arithmeticTerm} \rangle \Rightarrow \langle \text{factor} \rangle \langle \text{operator_highPrecedence} \rangle \langle \text{arithmeticTerm} \rangle \mid \langle \text{factor} \rangle$
28. $\langle \text{factor} \rangle \Rightarrow \text{OP } \langle \text{arithmeticExpression} \rangle \text{ CL} \mid \langle \text{var} \rangle$
 ~~$\langle \text{arithmeticExpression} \rangle \Rightarrow \text{OP } \langle \text{arithmeticExpression} \rangle \text{ CL} \mid \langle \text{var} \rangle$~~
29. $\langle \text{operator_lowPrecedence} \rangle \Rightarrow \text{PLUS} \mid \text{MINUS}$
30. $\langle \text{operator_highPrecedence} \rangle \Rightarrow \text{MUL} \mid \text{DIV}$
31. $\langle \text{booleanExpression} \rangle \Rightarrow \text{OP } \langle \text{booleanExpression} \rangle \text{ CL } \langle \text{logicalOp} \rangle \text{ OP } \langle \text{booleanExpression} \rangle \text{ CL}$
32. $\langle \text{booleanExpression} \rangle \Rightarrow \langle \text{constrainedVars} \rangle \langle \text{relationalOp} \rangle \langle \text{constrainedVars} \rangle$
33. $\langle \text{constrainedVars} \rangle \Rightarrow \text{ID} \mid \text{NUM} \mid \text{RNUM}$
34. $\langle \text{var} \rangle \Rightarrow \text{ID} \mid \text{NUM} \mid \text{RNUM} \mid \langle \text{matrixElement} \rangle \mid \text{STR} \mid \langle \text{matrix} \rangle$
35. $\langle \text{matrix} \rangle \Rightarrow \text{SQO } \langle \text{rows} \rangle \text{ SQC}$
36. $\langle \text{rows} \rangle \Rightarrow \langle \text{row} \rangle \text{ SEMICOLON } \langle \text{rows} \rangle \mid \langle \text{row} \rangle$
37. $\langle \text{row} \rangle \Rightarrow \text{NUM } \langle \text{remainingColElements} \rangle \mid \text{NUM}$
38. $\langle \text{remainingColElements} \rangle \Rightarrow \text{COMMA NUM } \langle \text{remainingColElements} \rangle \mid \epsilon$

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39. $\langle \text{matrixElement} \rangle \implies \text{ID S Q O NUM COMMA NUM S Q C}$

40. $\langle \text{logicalOp} \rangle \implies \text{AND} \mid \text{OR}$

41. $\langle \text{booleanExpression} \rangle \implies \text{NOT OP} \langle \text{booleanExpression} \rangle \text{CL}$

42. $\langle \text{relationalOp} \rangle \implies \text{LT} \mid \text{LE} \mid \text{EQ} \mid \text{GT} \mid \text{GE} \mid \text{NE}$
