

## MS2

### Task 1:

## Tiny Language CFG

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i. Terminals:

1. number
2. stringLine
3. reserved\_words
4. comment\_statement
5. identifier
6. booleanOp
7. conditionOp
8. assignOp
9. semicolon
10. dot
11. comma
12. leftParanthesis
13. rightParanthesis
14. leftPracket
15. rightPracket
16. equalOp
17. assignmentOp
18. lessThanOp
19. greaterThanOp
20. notEqualOp
21. andOp
22. orOp
23. plusOp
24. minusOp
25. multiplyOp
26. divideOp

## ii. Production Rules:

NUMBER	RULE
1	$Datatype \rightarrow \text{int} \mid \text{float} \mid \text{string}$
2	$Statement \rightarrow Write\_statement \mid Read\_statement \mid$ $Assignment\_statement \mid Declaration\_statement \mid If\_statement \mid$ $Repeat\_statement \mid Function\_call$
3	$Statements \rightarrow Statements Statement \mid Statement$ $Statements \rightarrow Statement Statements'$ $Statements' \rightarrow Statement Statements' \mid \varepsilon$
4	$Function\_call \rightarrow \text{identifier} (Identifier\_list \mid \varepsilon)$
5	$Term \rightarrow \text{number} \mid \text{identifier} \mid Function\_call$
6	$Equ \rightarrow Equ AddOp Equation \mid (Equ AddOp Equation) \mid Equation$ $Equ \rightarrow (Equ AddOp Equation) Equ' \mid Equation Equ'$ $Equ' \rightarrow AddOp Equation Equ' \mid \varepsilon$
7	$Equation \rightarrow Equation MultOp Term \mid (Equation MultOp Term) \mid Term$ $Equation \rightarrow (Equation MultOp Term) Equation' \mid Term Equation'$ $Equation' \rightarrow MultOp Term Equation' \mid \varepsilon$
8	$Expression \rightarrow \text{stringLine} \mid Term \mid Equation$
9	$Assignment\_statement \rightarrow \text{identifier assignmentOp Expression} ;$
10	$Declaration\_statement \rightarrow Datatype Identifier\_list ;$
11	$Identifier\_list \rightarrow Identifier\_list , Id \mid Id$

	$Identifier\_list \rightarrow Id\ Identifier\_list'$ $Identifier\_list' \rightarrow , Id\ Identifier\_list' \mid \varepsilon$
12	$Id \rightarrow \text{identifier} \mid \text{identifier assignmentOp Expression}$ $Id \rightarrow \text{identifier } Id'$ $Id' \rightarrow \varepsilon \mid \text{assignmentOp Expression}$
13	$Write\_statement \rightarrow \text{write Expression} ; \mid \text{write endl} ;$ $Write\_statement \rightarrow \text{write Write\_statement}'$ $Write\_statement' \rightarrow Expression ; \mid \text{endl} ;$
14	$Read\_statement \rightarrow \text{read identifier} ;$
15	$Return\_statement \rightarrow \text{return Expression} ;$
16	$Ret\_statement \rightarrow Return\_statement \mid \varepsilon$
17	$ConditionOp \rightarrow \text{notEqualOp} \mid \text{equalOp} \mid \text{lessThanOp} \mid$ $\text{greaterThanOp}$
18	$BooleanOp \rightarrow \text{andOp} \mid \text{orOp}$
19	$AddOp \rightarrow \text{plusOp} \mid \text{minusOp}$
20	$MultOp \rightarrow \text{multiplyOp} \mid \text{devideOp}$
21	$Condition \rightarrow \text{identifier ConditionOp Term}$
22	$Condition\_statement \rightarrow Condition\_statement BooleanOp Condition \mid$ $Condition$ $Condition\_statement \rightarrow Condition Condition\_statement'$ $Condition\_statement' \rightarrow BooleanOp Condition Condition\_statement' \mid$ $\varepsilon$

23	$if\_statement \rightarrow \text{if } Condition\_statement \text{ then Statements Ret\_statement Else\_if\_statement Else\_statement end}$
24	$Else\_if\_statement \rightarrow \text{elseif } Condition\_statement \text{ then Statements Ret\_statement Else\_statement end} \mid \varepsilon$
25	$Else\_statement \rightarrow \text{else Statements end} \mid \varepsilon$
26	$Repeat\_statement \rightarrow \text{repeat Statements until } Condition\_statement$
27	$Parameter \rightarrow Datatype \text{ identifier} \mid \varepsilon$
28	$Parameters \rightarrow Parameters, Parameter \mid Parameter$ $Parameters \rightarrow Parameter Parameters'$ $Parameters' \rightarrow , Parameter Parameters' \mid \varepsilon$
29	$Function\_declaration \rightarrow Datatype \text{ identifier } (Parameters)$
30	$Function\_body \rightarrow \{ Statements Return\_statement \}$
31	$Function\_statement \rightarrow Function\_declaration Function\_body \mid \varepsilon$
32	$Function\_statements \rightarrow Function\_statements Function\_statement \mid Function\_statement$ $Function\_statements \rightarrow Function\_statement Function\_statements'$ $Function\_statements' \rightarrow Function\_statement Function\_statements' \mid \varepsilon$
33	$Main\_function \rightarrow Datatype \text{ main}() Function\_body$
34	$Program \rightarrow Function\_statements Main\_function$