# Tiny Language – Final CFG (Numbered and Partially Renamed)

## 6. Function\_Call

Function\_Call → id ( ArgumentList )  
ArgumentList → Arguments | ε  
Arguments → Argument Arguments'  
Arguments' → , Argument Arguments' | ε  
Argument → id | num

## 7. Term

Term → id | num | Function\_Call

## 8. Arithmatic\_Operator

Arithmatic\_Operator → + | - | \* | /

## 9. Equation (Unambiguous)

Equation → EqTerm Equation'  
Equation' → addop EqTerm Equation' | ε  
EqTerm → Factor EqTerm'  
EqTerm' → mulop Factor EqTerm' | ε  
Factor → ( Equation ) | Term  
addop → + | -  
mulop → \* | /

## 10. Expression

Expression → String | Term | Equation

## 11. Assignment\_Statement

Assignment\_Statement → id := Expression

## 12. Datatype

Datatype → "int" | "float" | "string"

## 13. Declaration\_Statement

Declaration\_Statement → Datatype IdentifierList ;  
IdentifierList → IdentifierAssignment IdentifierList'  
IdentifierList' → , IdentifierAssignment IdentifierList' | ε  
IdentifierAssignment → id Declaration\_Init  
Declaration\_Init → := Expression | ε

## 14. Write\_Statement

Write\_Statement → "write" (Expression | "endl") ;

## 15. Read\_Statement

Read\_Statement → "read" id ;

## 16. Return\_Statement

Return\_Statement → "return" Expression ;

## 17-18. Condition and Condition\_Operator

Condition → id Condition\_Operator Term  
Condition\_Operator → < | > | = | <>

## 19-20. Condition\_Statement (Unambiguous)

Condition\_Statement → Boolean\_Or  
Boolean\_Or → Boolean\_And Boolean\_Or'  
Boolean\_Or' → || Boolean\_And Boolean\_Or' | ε  
Boolean\_And → Condition Boolean\_And'  
Boolean\_And' → && Condition Boolean\_And' | ε

## 21-22. If\_Statement (Unambiguous)

If\_Statement → "if" Condition\_Statement "then" Statements

If\_Tail  
If\_Tail → Else\_If\_List Optional\_Else "end"  
Else\_If\_List → Else\_If\_Statement Else\_If\_List | ε  
Else\_If\_Statement → "elseif" Condition\_Statement "then" Statements  
Optional\_Else → Else\_Statement | ε  
Else\_Statement → "else" Statements  
Statements → Statement Statements | ε  
Statement → Write\_Statement | Read\_Statement | Assignment\_Statement | Declaration\_Statement | Return\_Statement | If\_Statement | Repeat\_Statement | Comment\_Statement

## 24. Repeat\_Statement

Repeat\_Statement → "repeat" Statements "until" Condition\_Statement

## 25. Function\_Name

Function\_Name → id

## 26. Parameter

Parameter → Datatype id

## 27. FunctionDecl

FunctionDecl → Datatype Function\_Name ( ParameterList )  
ParameterList → Parameters | ε  
Parameters → Parameter Parameters'  
Parameters' → , Parameter Parameters' | ε

## 28. Function Body

Function\_Body → { Statements Return\_Statement }  
Statements → Statement Statements | ε  
Statement → Write\_Statement | Read\_Statement | If\_Statement | Repeat\_Statement | Declaration\_Statement

## 29. Function Statement

Function\_Statement → FunctionDecl Function\_Body

## 30. Main\_Function

Main\_Function → Datatype "main" ( ) Function\_Body

## 31. Program

Program → FunctionStatements Main\_Function  
FunctionStatements → FunctionStatements`  
FunctionStatements` → Function\_Statement FunctionStatements` | ε

# Terminals in the Tiny Language

**Numbers:** Any sequence of digits or a floating point (e.g. 123, 0.45, 78.9)

**Strings:** Text wrapped in double quotes (e.g. "Hello", "2nd + 3rd")

**Identifiers:** Start with a letter, followed by letters or digits (e.g. x, counter1, val2)

**Reserved Keywords:** int, float, string, read, write, repeat, until, if, elseif, else, then, return, endl

**Operators:** +, -, \*, /, :=, <, >, =, <>, &&, ||

**Delimiters:** (), {}, ;, ,

**Comment Start/End:** /\* ... \*/

**Function\_Call Syntax:** Function\_Name ( arguments )

Term