**Полюга Дмитро Сергійович, ТІ-62**

**Варіант 13(10, 1, 2, 1, 2, 1)**

**Граматика мови програмування**

<program> ::= <declaration list> begin <operators list> end

<declaration list> ::= <declaration list> <declaration> ; | <declaration> ;

<declaration> ::= <type> <variables list>

<type> ::= int | float

<variables list> ::= <identifier> | <identifier> , <variables list>

<operators list> ::= <operators list> <operator> ; | <operators list> <label> : | <operator> ; | <label> :

<operator> ::= <assignment> | <input> | <output> | <loop> | <conditional statement> | goto <label>

<input> ::= cin >> <identifier> | <input> >> <identifier>

<output> ::= cout << <identifier> | <output> << <identifier>

<loop> ::= for <identifier> = <expression> by <expression> to <expression> do: <operators list> rof

<conditional statement> ::= if <ratio> then: <operators list> fi

<assignment> ::= <identifier> = <expression>

<expression> ::= <T> | <expression> + <T> | <expression> - <T> | - <T>

<T> ::= <F> | <T> \* <F> | <T> / <F>

<F> ::= <identifier> | <constant with fixed accuracy> | ( <expression> )

<identifier> ::= <identifier> <character> | <identifier> <digit> | <character>

<character> ::= A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o | p | q | r | s | t | u | v | w | x | y | z

<digit> ::= 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7| 8 | 9

<constant with fixed accuracy> ::= <number without sign> | . <number without sign> | <number without sign> . | <number without sign> . <number without sign>

<number without sign> ::= <digit> | <number without sign> <digit>

<ratio> ::= <ratio> or <LT> | <LT>

<LT> ::= <LT> and <LF> | <LF>

<LF> ::= <relation> | [ <ratio> ] | not <LF>

<relation> ::= <expression> <relation sign> <expression>

<relation sign> ::= < | > | <= | >= | == | !=

<label> ::= # <identifier>

**Полюга Дмитро Сергійович, ТІ-62**

**Варіант 13(10, 1, 2, 1, 2, 1)**

**Таблиця лексем**

|  |  |
| --- | --- |
| Id | Name |
| 1 | int |
| 2 | float |
| 3 | begin |
| 4 | end |
| 5 | goto |
| 6 | cin |
| 7 | cout |
| 8 | for |
| 9 | by |
| 10 | to |
| 11 | do |
| 12 | rof |
| 13 | if |
| 14 | then |
| 15 | fi |
| 16 | ; |
| 17 | : |
| 18 | , |
| 19 | = |
| 20 | >> |
| 21 | << |
| 22 | > |
| 23 | < |
| 24 | >= |
| 25 | <= |
| 26 | == |
| 27 | != |
| 28 | + |
| 29 | - |
| 30 | \* |
| 31 | / |
| 32 | ( |
| 33 | ) |
| 34 | or |
| 35 | and |
| 36 | not |
| 37 | [ |
| 38 | ] |
| 100 | IDN |
| 101 | CON |
| 102 | LAB |

**Таблиця ідентифікаторів**

|  |  |
| --- | --- |
| Id | Name |
| 0 | a |
| 1 | d |
| 2 | sum |
| 3 | q |

**Таблиця констант**

|  |  |  |
| --- | --- | --- |
| Id | Value | Type |
| 0 | 56 | int |
| 1 | 1.2 | float |
| 2 | 0.7 | float |
| 3 | 1 | int |
| 4 | 50 | int |
| 5 | 100 | int |

**Таблиця міток**

|  |  |
| --- | --- |
| Id | Name |
| 0 | #f |

**Полюга Дмитро Сергійович, ТІ-62**

**Варіант 13(10, 1, 2, 1, 2, 1)**

**Показовий приклад програми**

float a, d, sum;  
 int q;  
begin;  
 q = 56;  
 a = 1.2;  
 d = .7;  
 if a > 1 or q < 50 then:  
 goto #f;  
 fi;  
 sum = (q + a + d) / 100;  
 #f:  
 sum = a / d + 1.2 \* q;  
end;

**Вихідна таблиця лексичного аналізатора**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Token number | Line number | Token | IDN id | CON id | LAB id | TOK id |
| 0 | 0 | float |  |  |  | 2 |
| 1 | 0 | a | 0 |  |  | 100 |
| 2 | 0 | , |  |  |  | 18 |
| 3 | 0 | d | 1 |  |  | 100 |
| 4 | 0 | , |  |  |  | 18 |
| 5 | 0 | sum | 2 |  |  | 100 |
| 6 | 0 | ; |  |  |  | 16 |
| 7 | 1 | int |  |  |  | 1 |
| 8 | 1 | q | 3 |  |  | 100 |
| 9 | 1 | ; |  |  |  | 16 |
| 10 | 2 | begin |  |  |  | 3 |
| 11 | 2 | ; |  |  |  | 16 |
| 12 | 3 | q | 3 |  |  | 100 |
| 13 | 3 | = |  |  |  | 19 |
| 14 | 3 | 56 |  | 0 |  | 101 |
| 15 | 3 | ; |  |  |  | 16 |
| 16 | 4 | a | 0 |  |  | 100 |
| 17 | 4 | = |  |  |  | 19 |
| 18 | 4 | 1.2 |  | 1 |  | 101 |
| 19 | 4 | ; |  |  |  | 16 |
| 20 | 5 | d | 1 |  |  | 100 |
| 21 | 5 | = |  |  |  | 19 |
| 22 | 5 | 0.7 |  | 2 |  | 101 |
| 23 | 5 | ; |  |  |  | 16 |
| 24 | 6 | if |  |  |  | 13 |
| 25 | 6 | a | 0 |  |  | 100 |
| 26 | 6 | > |  |  |  | 22 |
| 27 | 6 | 1 |  | 3 |  | 101 |
| 28 | 6 | or |  |  |  | 34 |
| 29 | 6 | q | 3 |  |  | 100 |
| 30 | 6 | < |  |  |  | 23 |
| 31 | 6 | 50 |  | 4 |  | 101 |
| 32 | 6 | then |  |  |  | 14 |
| 33 | 6 | : |  |  |  | 17 |
| 34 | 7 | goto |  |  |  | 5 |
| 35 | 7 | #f |  |  | 0 | 102 |
| 36 | 7 | ; |  |  |  | 16 |
| 37 | 8 | fi |  |  |  | 15 |
| 38 | 8 | ; |  |  |  | 16 |
| 39 | 9 | sum | 2 |  |  | 100 |
| 40 | 9 | = |  |  |  | 19 |
| 41 | 9 | ( |  |  |  | 32 |
| 42 | 9 | q | 3 |  |  | 100 |
| 43 | 9 | + |  |  |  | 28 |
| 44 | 9 | a | 0 |  |  | 100 |
| 45 | 9 | + |  |  |  | 28 |
| 46 | 9 | d | 1 |  |  | 100 |
| 47 | 9 | ) |  |  |  | 33 |
| 48 | 9 | / |  |  |  | 31 |
| 49 | 9 | 100 |  | 5 |  | 101 |
| 50 | 9 | ; |  |  |  | 16 |
| 51 | 10 | #f |  |  | 0 | 102 |
| 52 | 10 | : |  |  |  | 17 |
| 53 | 11 | sum | 2 |  |  | 100 |
| 54 | 11 | = |  |  |  | 19 |
| 55 | 11 | a | 0 |  |  | 100 |
| 56 | 11 | / |  |  |  | 31 |
| 57 | 11 | d | 1 |  |  | 100 |
| 58 | 11 | + |  |  |  | 28 |
| 59 | 11 | 1.2 |  | 1 |  | 101 |
| 60 | 11 | \* |  |  |  | 30 |
| 61 | 11 | q | 3 |  |  | 100 |
| 62 | 11 | ; |  |  |  | 16 |
| 63 | 12 | end |  |  |  | 4 |
| 64 | 12 | ; |  |  |  | 16 |

**Полюга Дмитро Сергійович, ТІ-62**

**Варіант 13(10, 1, 2, 1, 2, 1)**

**Спрощена граматика мови програмування**

program = declarationList "begin" operatorsList "end".

declarationList = declaration ";" {declaration ";"}.

declaration = type variablesList.

type = "int" | "float".

variablesList = "identifier" ("," variablesList | ).

operatorsList = (operator ";" | "label" ":") {operator ";" | "label" ":"}.

operator = assignment | input | output | loop | conditionalStatement | "goto" "label".

input = "cin" ">>" "identifier" {">>" "identifier"}.

output = "cout" "<<" "identifier" {"<<" "identifier"}.

loop = "for" "identifier" "=" expression "by" expression "to" expression "do" ":" operatorsList "rof".

conditionalStatement = "if" LR "then" ":" operatorsList "fi".

assignment = "identifier" "=" expression.

expression = (T | "-" T) {"+" T | "-" T}.

T = F {"\*" F | "/" F}.

F = "identifier" | "constantFixedAccuracy" | "(" expression ")".

LR = LT {"or" LT}.

LT = LF {"and" LF}.

LF = relation | "[" LR "]" | "not" LF.

relation = expression relationSign expression.

relationSign = ">" | "<" | ">=" | "<=" | "==" | "!=".