

Lec02 作业

- 1、根据 P49-P50 中 BNF 所描述的 “program” 文法，针对上述每个产生式，给出一组满足规则的语言实例，要求覆盖基本分支。既一个产生式至少给出一个满足该文法的字符串。

```
program ::= <program-heading> ';' ' ' <program-block> '.'
program-heading ::= 'program' <identifier>
                [ '(' <program-parameters> ') ' ]
program-parameters ::= <identifier-list>
identifier-list ::= <identifier> { ',' ' ' <identifier> }
program-block ::= <block>
block ::= <label-declaration-part> <constant-declaration-part>
        <type-declaration-part> <variable-declaration-part>
        <procedure-and-function-declaration-part> <statement-part> .
variable-declaration-part ::= [ 'var' <variable-declaration> ';' ' '
                             { <variable-declaration> ';' ' ' } ]
variable-declaration ::= <identifier-list> ';' ' ' <type-denoter>
statement-part ::= compound-statement.
```

```
compound-statement ::= 'begin' <statement-sequence> 'end'
statement-sequence ::= <statement> { ';' ' ' <statement> }
statement ::= [ <label> ' ': ' ' ] ( <simple-statement> | <structured-statement> )
simple-statement ::= <empty-statement> | <assignment-statement> |
                  <procedure-statement> | <goto-statement>
structured-statement ::= <compound-statement> | <conditional-statement>
                      | <repetitive-statement> | <with-statement>
```

实例：

```
program id0 (id1, id2, id3, id4);
  label-declaration-part
  constant-declaration-part
  type-declaration-part
  var id1, id2; td1; id3, id4; td2;
  paf-declaration-part
  begin
    label: empty; assignment; procedure; goto
    begin
      label: empty; assignment; procedure; goto
    end.
  end.
```

附录:

program ::= program id0 (id1, id2); label-declaration-part constant-declaration-part type-declaration-part var id1, id2; td1; id3, id4; td2; paf-declaration-part begin label: empty; assignment; procedure; goto end.

program-heading ::= program id0 (id1, id2)

program-parameters ::= id1, id2

identifier-list ::= id1, id2

program-block ::= label-declaration-part constant-declaration-part type-declaration-part var id1, id2; td1; id3, id4; td2; paf-declaration-part begin label: empty; assignment; procedure; goto end.

block ::= label-declaration-part constant-declaration-part type-declaration-part var id1, id2; td1; id3, id4; td2; paf-declaration-part begin label: empty; assignment; procedure; goto end.

variable-declaration-part ::= var id1, id2; td1; id3, id4; td2;

variable-declaration ::= id1, id2; td1

statement-part ::= begin label: empty; assignment; procedure; goto end.

compound-statement ::= begin empty; assignment; procedure; goto end

statement-sequence ::= empty; assignment; procedure; goto

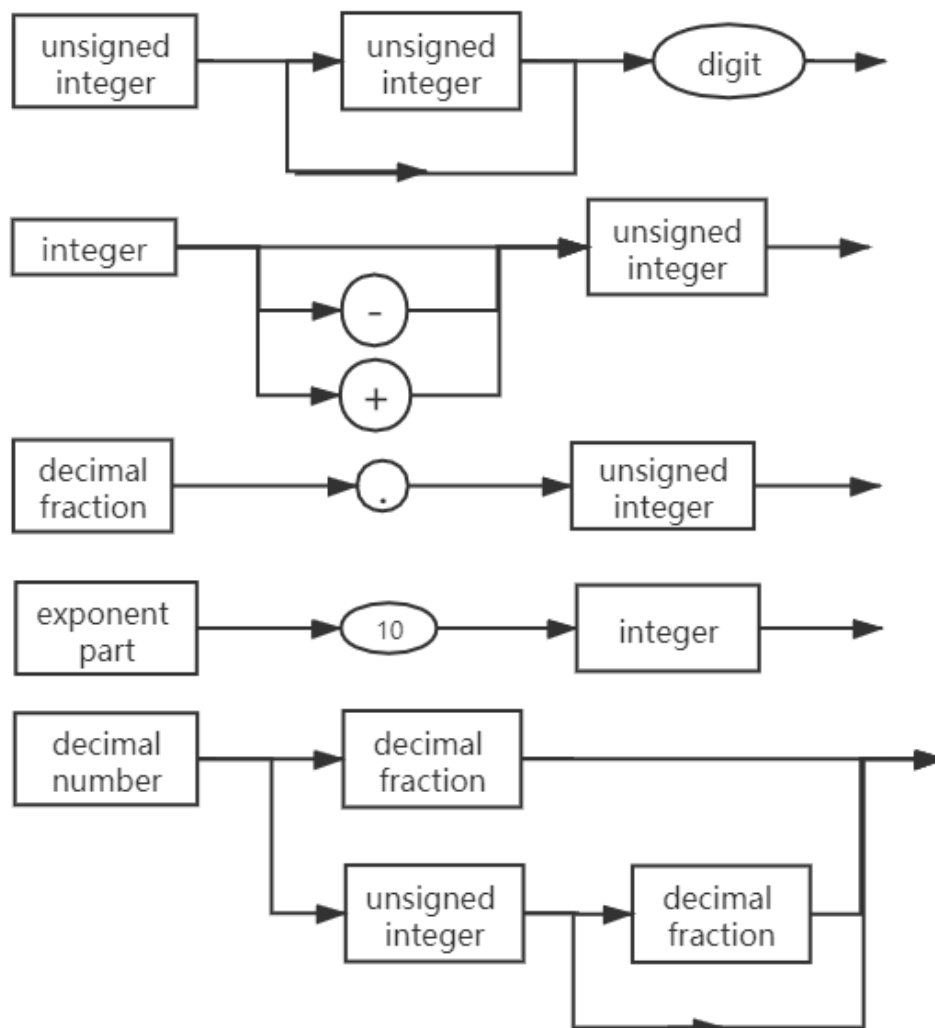
statement ::= label: empty

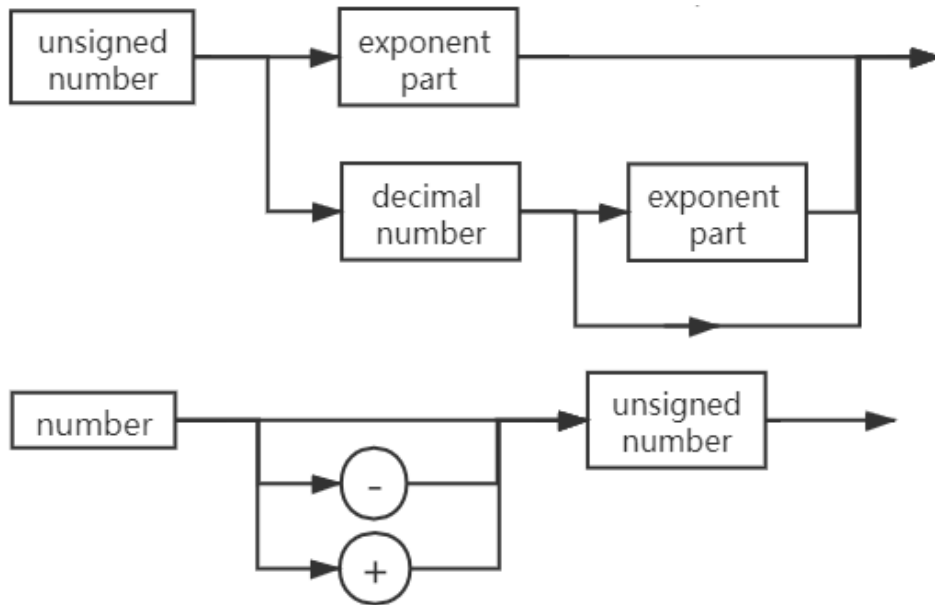
simple-statement ::= goto

structured-statement ::= begin label: empty; assignment; procedure; goto end

2、将以下 BNF 表示的 Algol60 部分产生式画成语法图

$\langle \text{unsigned integer} \rangle :: = \langle \text{digit} \rangle$
 $\quad \quad \quad | \langle \text{unsigned integer} \rangle \langle \text{digit} \rangle$
 $\langle \text{integer} \rangle :: = +\langle \text{unsigned integer} \rangle$
 $\quad \quad \quad | -\langle \text{unsigned integer} \rangle$
 $\quad \quad \quad | \langle \text{unsigned integer} \rangle$
 $\langle \text{decimal fraction} \rangle :: = . \langle \text{unsigned integer} \rangle$
 $\langle \text{exponent part} \rangle :: = 10 \langle \text{integer} \rangle \quad //10 \text{ 为下标}$
 $\langle \text{decimal number} \rangle :: = \langle \text{unsigned integer} \rangle$
 $\quad \quad \quad | \langle \text{decimal fraction} \rangle$
 $\quad \quad \quad | \langle \text{unsigned integer} \rangle \langle \text{decimal fraction} \rangle$
 $\langle \text{unsigned number} \rangle :: = \langle \text{decimal number} \rangle$
 $\quad \quad \quad | \langle \text{exponent part} \rangle$
 $\quad \quad \quad | \langle \text{decimal number} \rangle \langle \text{exponent part} \rangle$
 $\langle \text{number} \rangle :: = +\langle \text{unsigned number} \rangle$
 $\quad \quad \quad | -\langle \text{unsigned number} \rangle$
 $\quad \quad \quad | \langle \text{unsigned number} \rangle$





3、将下面的 EBNF 转换为 BNF:

$S \rightarrow A \{ b A \}$

$A \rightarrow a [b] A$

解: $\langle S \rangle ::= \langle A \rangle \{ 'b' \langle A \rangle \}$ 或 $\langle S \rangle ::= \langle A \rangle | \langle S \rangle 'b' \langle A \rangle$
 $\langle A \rangle ::= 'a' ['b'] \langle A \rangle$ 或 $\langle A \rangle ::= 'a' \langle A \rangle | 'a' ['b'] \langle A \rangle$

4、考虑下列文法:

$\langle S \rangle \rightarrow \langle A \rangle a \langle B \rangle b$

$\langle A \rangle \rightarrow \langle A \rangle b \mid b$

$\langle B \rangle \rightarrow a \langle B \rangle \mid a$

下面的哪些句子属于这些文法所产生的语言?

baab

bbbab

bbaaaaa

bbaab

解: $A \rightarrow \{ b \}$

$B \rightarrow \{ a \}$

$S \rightarrow \{ b \} a \{ a \} b$

\therefore baab、bbaab 是该文法所产生的语言