Exercise 3.1

- Give the recognized tokens of the following program in Pascal.

```
function max(i, j: integer): integer;
{return the maximum of integers i and j}
begin
  if i > j then max := i else max := j
end;
```

答:

function： <Reserved words, function>

max： <Identifiers, max>

(： <Punctuation, (>

i： <Identifiers, i>

, ： <Punctuation, , >

j： <Identifiers, j>

: ： <Punctuation, : >

integer： <Reserved words, integer>

) ： <Punctuation,)>

: ： <Punctuation, : >

integer： <Reserved words, integer>

; ： <Punctuation, ;>

{ ： <Punctuation, { >

"return the maximum of integers i and j" : <Constants, "return the maximum of integers i and j">

} : <Punctuation, } >

begin : <Reserved words,begin>

if : <Reserved words, if>

i : <Identifiers, i>

> : <Operators, > >

j : <Identifiers, j>

then : <Reserved words,then>

max : <Identifiers, max>

:= : <Operators, := >

i : <Identifiers, i>

else : <Reserved words, else>

max : <Identifiers,max>

:= : <Operators, := >

j : <Identifiers, j>

end : <Reserved words, end>

; : <Punctuation, ;>

Exercise 3.2

- (DBv2, Ch.3, pp.125, ex.3.3.2) Describe the languages denoted by the following regular expressions:
  - a (a | b)* a
  - a* b a* b a* b a*

答：

a (a | b)* a：该字符串仅包含 a，b，同时该字符串以 a 开头和结尾

a*b a*b a*b a*：该字符串仅包含 a，b，同时该字符串只包含 3 个 b

Exercise 3.3

- (DBv2, Ch.3, pp.125, ex.3.3.4) Most Languages are case sensitive, so keywords can be written only one way, and the regular expressions describing their lexemes are very simple.
- However, some languages, like Pascal and SQL, are case insensitive. For example, the SQL keyword **SELECT** can also be written **select**, **Select**, or **sELEcT**.
- Show how to write a regular expression for a keyword in a case insensitive language. Illustrate your idea by writing the expression for **SELECT** in SQL.

答：select —> [Ss][Ee][Ll][Cc][Ee][Tt]

Exercise 3.4

- Given the following regular expression

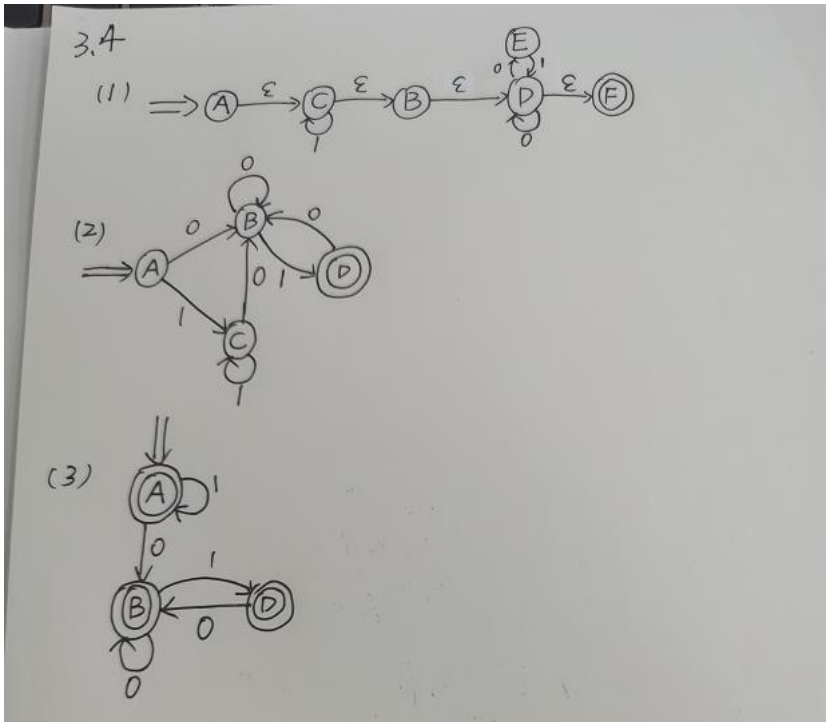
$$1^*(0 \mid 01)^*$$

(1) Transform it to an equivalent finite automaton.

(2) Construct an equivalent DFA for the result of exercise (1).

(3) Reduce the result of (2) and get a reduced DFA.

答：



Exercise 3.5**

- Given the alphabet Σ = { z, o, / }, a comment in a program over Σ begins with "/o" and ends with "o/". Embedded comments are not permitted.
  (1) Draw a DFA that recognizes nothing but all the comments in the source programs.
  (2) Write a single regular expression that exactly describes all the comments in the source programs.

答：