编译原理第一次作业

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Ex. 3.3.1

以下均以 Python 3 为标准, 而非使用 Python 2.

(i)

输入字母表为 Unicode 码, 包含了

- 数字: `0123456789`
- 英文: `abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ`
- 标点符号: `!"#$%&\'()*+,-./:;<=>?@[\\]^_{|}~`
- 空格符: `\t\n\r\x0b\x0c`
- 其他语言字符, 如中文字符

等内容.

(ii)

整数词法形式:

```
integer      ::=  decinteger | bininteger | octinteger | hexinteger
decinteger   ::=  nonzerodigit (["_"] digit)* | "0"+ (["_"] "0")*
bininteger   ::=  "0" ("b" | "B") (["_"] bindigit)+
octinteger   ::=  "0" ("o" | "O") (["_"] octdigit)+
hexinteger   ::=  "0" ("x" | "X") (["_"] hexdigit)+
nonzerodigit ::=  "1"..."9"
digit        ::=  "0"..."9"
bindigit     ::=  "0" | "1"
octdigit     ::=  "0"..."7"
hexdigit     ::=  digit | "a"..."f" | "A"..."F"
```

浮点数词法形式:

```
floatnumber   ::=  pointfloat | exponentfloat
pointfloat    ::=  [digitpart] fraction | digitpart "."
exponentfloat ::=  (digitpart | pointfloat) exponent
digitpart     ::=  digit (["_"] digit)*
fraction      ::=  "." digitpart
exponent      ::=  ("e" | "E") ["+" | "-"] digitpart
```

虚数词法形式:

```
imagnumber ::=  (floatnumber | digitpart) ("j" | "J")
```

(iii)

标识符词法形式:

```
identifier   ::=  xid_start xid_continue*
id_start     ::=  <all characters in general categories Lu, Ll, Lt, Lm, Lo, Nl,
                  the underscore, and characters with the Other_ID_Start property>
id_continue  ::=  <all characters in id_start, plus characters in the categories
                  Mn, Mc, Nd, Pc and others with the Other_ID_Continue property>
xid_start    ::=  <all characters in id_start whose NFKC normalization is
                  in "id_start xid_continue*">
xid_continue ::=  <all characters in id_continue whose NFKC normalization is
                  in "id_continue*">
```

Ex. 3.3.2 - 2)

$L(((\epsilon|a)b^*)^*) = \{\epsilon, a, b, ab, abb, abab, abbab, abbabb, \cdots\}$

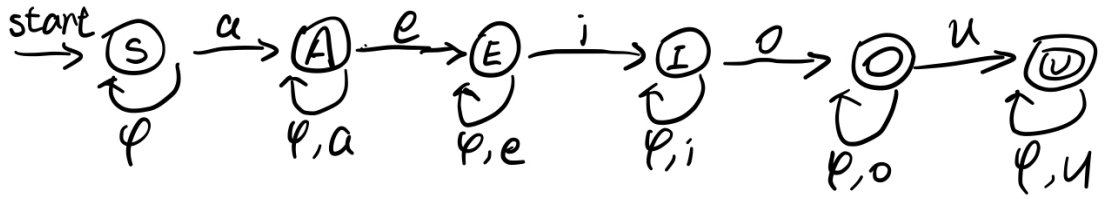
即由任意多个字母 a 和字母 b 组成的任意一个字符串.

Ex. 3.3.5 - 2)

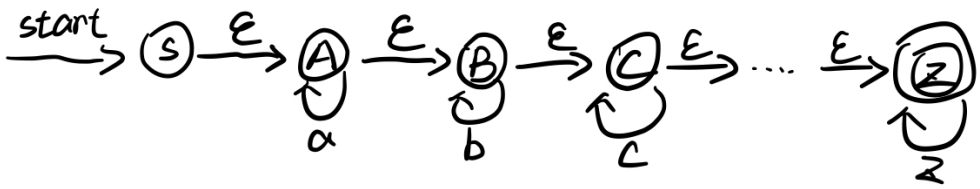
```
a*b*c*d*e*f*g*h*i*j*k*l*m*n*o*p*q*r*s*t*u*v*w*x*y*z*
```

Ex. 3.6.2

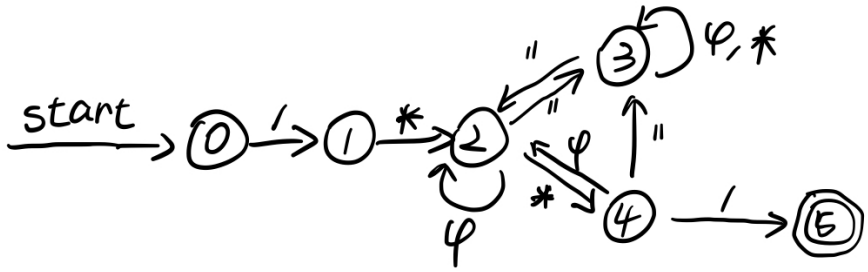
(1) 定义 φ → [b-df-hj-np-tv-z]



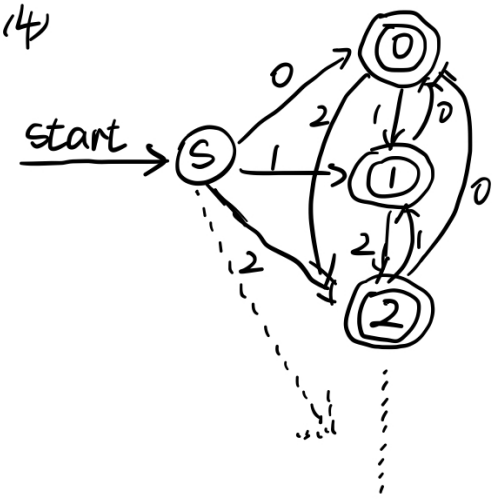
(2)



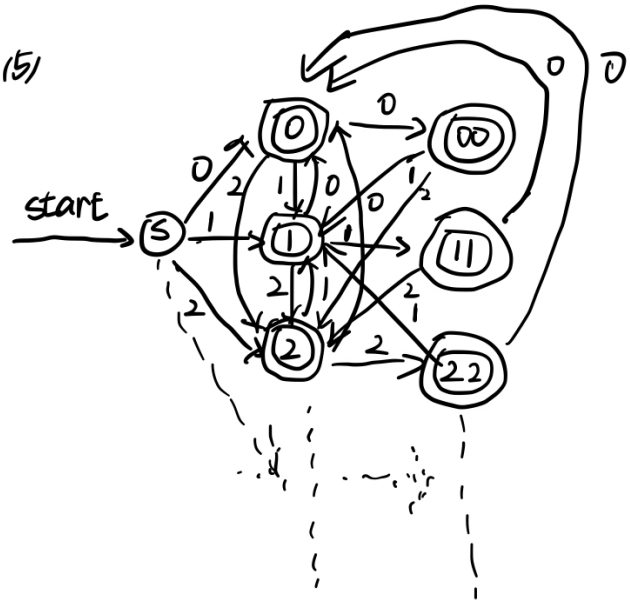
(3) 定义 φ → 除 * 和 " 外的字母



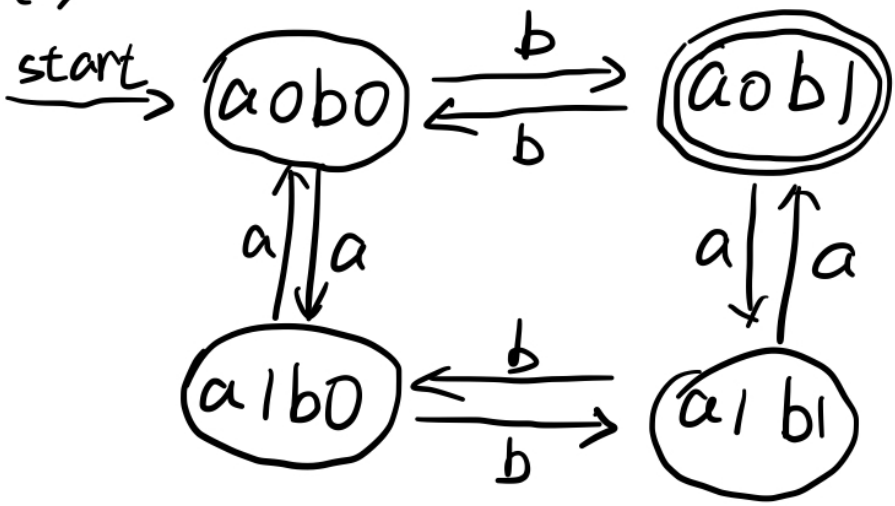
(4)



(5)

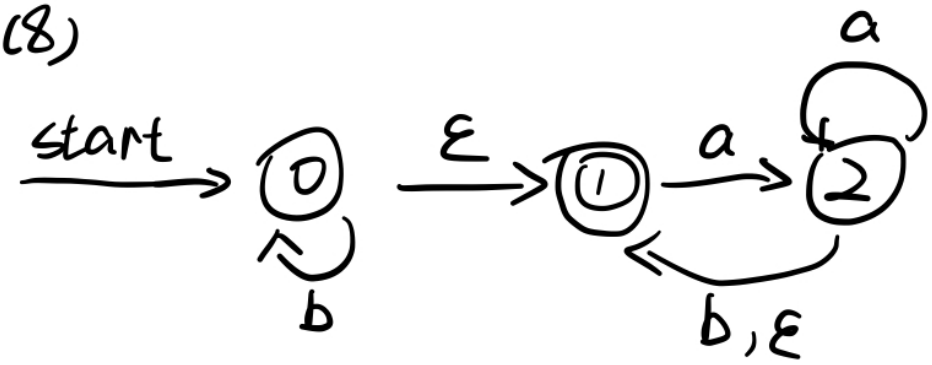


(6)

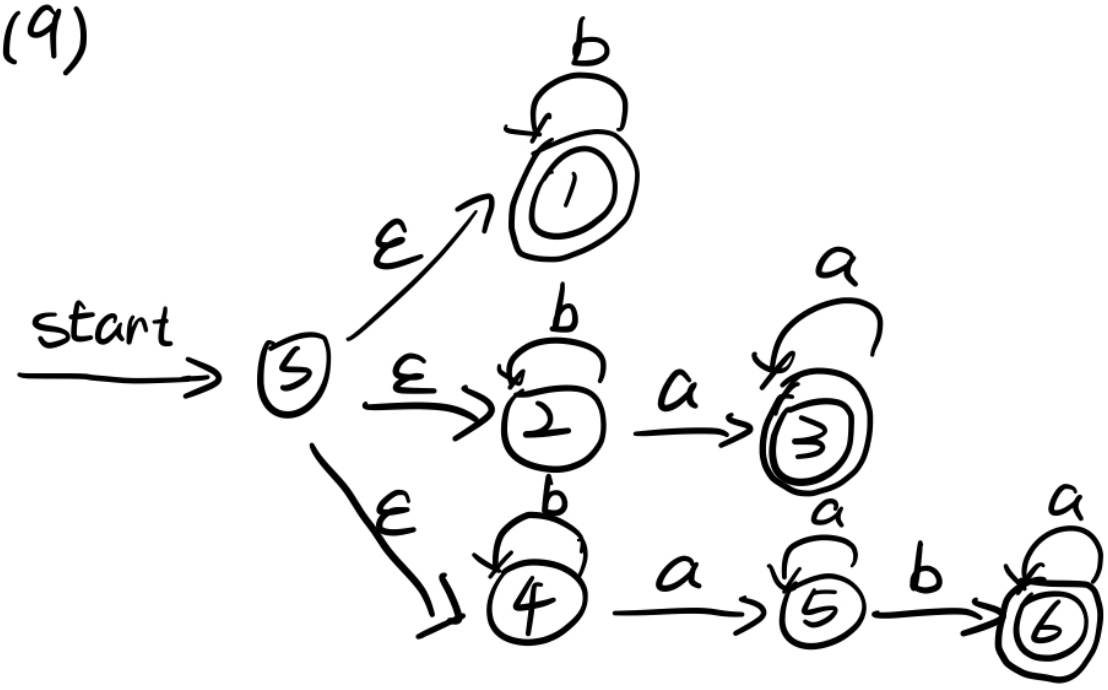

start
a0b0
a0b1
a1b0
a1b1
a
b

(7)

(8)


start
0
1
2
a
b
ε
b, ε

(9)


start
5
1
2
3
4
5
6
a
b
ε

Ex. 3.6.3

- (0) =a=> (0) =a=> (0) =b=> (0) =b=> (0)
- (0) =a=> (0) =a=> (1) =b=> (1) =b=> (1)
- (0) =a=> (1) =a=> (1) =b=> (1) =b=> (1)
- (0) =a=> (1) =a=> (2) =b=> (2) =b=> (2)
- (0) =a=> (1) =a=> (2) =b=> (2) =b=> (3)
- (0) =a=> (1) =a=> (2) =ϵ=> (0) =b=> (0) =b=> (0)
- (0) =a=> (1) =a=> (2) =b=> (2) =ϵ=> (0) =b=> (0)

这个 NFA 接受 aabb.

Ex. 3.6.5 - 1)

状态	a	b	ε
0	{0,1}	{0}	∅
1	{1,2}	{1}	∅
2	{2}	{2,3}	{0}
3	∅	∅	∅

Ex. 3.7.1 - 3)

使用子集构造法可知, ε-closure(0) = { 0, 1, 2, 3 }, 因此 U = ε-closure(move(T, a)) = { 0, 1, 2, 3 }, 列表可知

NFA 状态	DFA 状态	a	b
{ 0, 1, 2, 3}	A	A	A

因此有 DFA: