

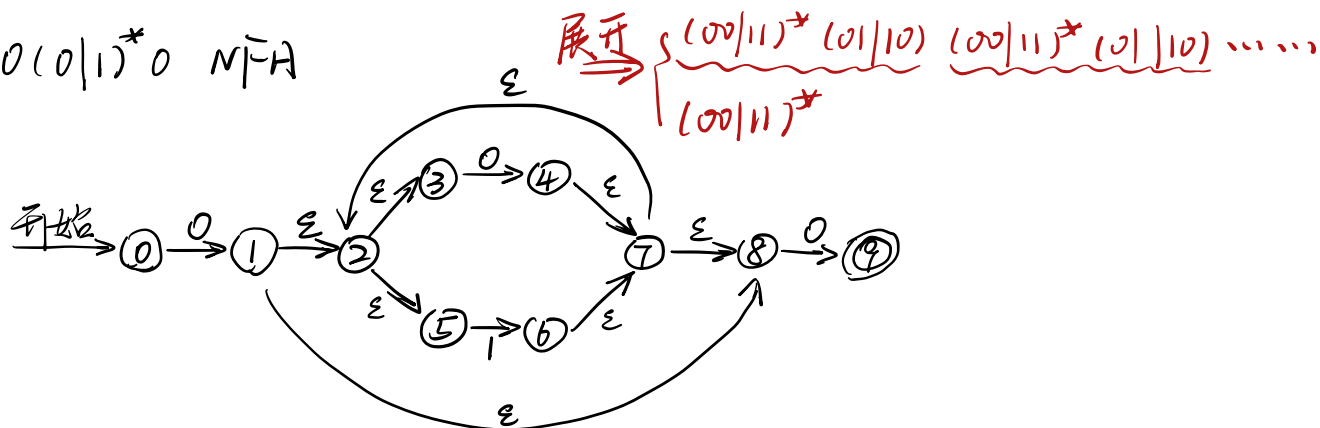
HW 2

1. (a) 字母表 $\{0,1\}$ 上以 0 开始并以 0 结尾的长度大于 1 的所有串集合.

(c) 字母表 $\{0,1\}$ 上倒数第 3 个位置为 0 的长度大于 2 的所有串集合.

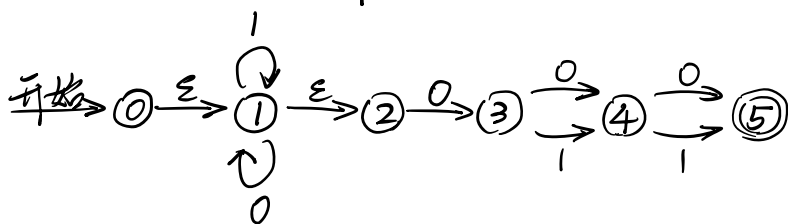
(e) 字母表 $\{0,1\}$ 上 0 的个数和 1 的个数都是偶数的所有串集合.

12) $0(0|1)^*0$ NFA

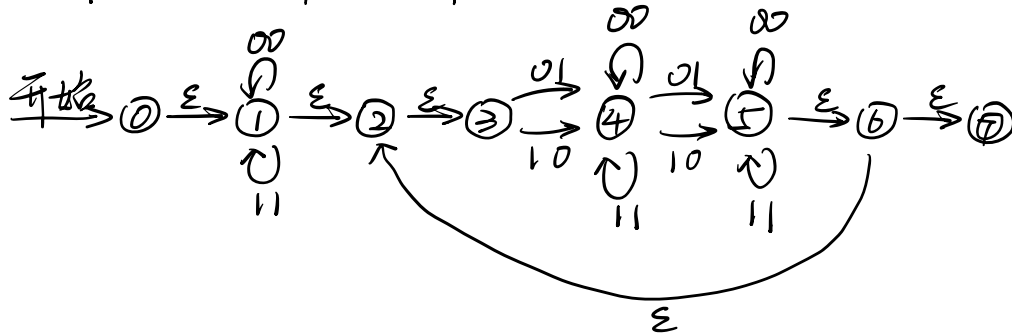


13)

(c) $(0|1)^*0(0|1)(0|1)$



(e) $(00|11)^*(01|10)(00|11)^*(01|10)(00|11)^*$



确定化和极小化.

计算不同输入时, 不同状态的 ϵ 闭包.

(c) $A = \{0,1,2\}$ $\epsilon\text{-closure}(\text{move}(A,0)) = \epsilon\text{-closure}(\{1,3\}) = \{1,2,3\} = B$

$\epsilon\text{-closure}(\text{move}(A,1)) = \epsilon\text{-closure}(\{1\}) = \{1,2\} = C$

$B = \{1,2,3\}$ $\epsilon\text{-closure}(\text{move}(B,0)) = \epsilon\text{-closure}(\{1,3,4\}) = \{1,2,3,4\} = D$

$\epsilon\text{-closure}(\text{move}(B,1)) = \epsilon\text{-closure}(\{1,4\}) = \{1,2,4\} = E$

$$C = \{1, 2\} \quad \varepsilon\text{-closure}(\text{move}(C, 0)) = \{1, 2, 3\} = B$$

$$\varepsilon\text{-closure}(\text{move}(C, 1)) = \{1, 2\} = C$$

$$D = \{1, 2, 3, 4\} \quad \varepsilon\text{-closure}(\text{move}(D, 0)) = \{1, 2, 3, 4, 5\} = F$$

$$\varepsilon\text{-closure}(\text{move}(D, 1)) = \{1, 2, 4, 5\} = G$$

$$E = \{1, 2, 4\} \quad \varepsilon\text{-closure}(\text{move}(E, 0)) = \{1, 2, 3, 5\} = H$$

$$\varepsilon\text{-closure}(\text{move}(E, 1)) = \{1, 2, 5\} = I$$

$$F = \{1, 2, 3, 4, 5\} \quad \varepsilon\text{-closure}(\text{move}(F, 0)) = \{1, 2, 3, 4, 5\} = F$$

$$\varepsilon\text{-closure}(\text{move}(F, 1)) = \{1, 2, 4, 5\} = G$$

$$G = \{1, 2, 4, 5\} \quad \varepsilon\text{-closure}(\text{move}(G, 0)) = \{1, 2, 3, 5\} = H$$

$$\varepsilon\text{-closure}(\text{move}(G, 1)) = \{1, 2, 5\} = I$$

$$H = \{1, 2, 3, 5\} \quad \varepsilon\text{-closure}(\text{move}(H, 0)) = \{1, 2, 3, 4\} = D$$

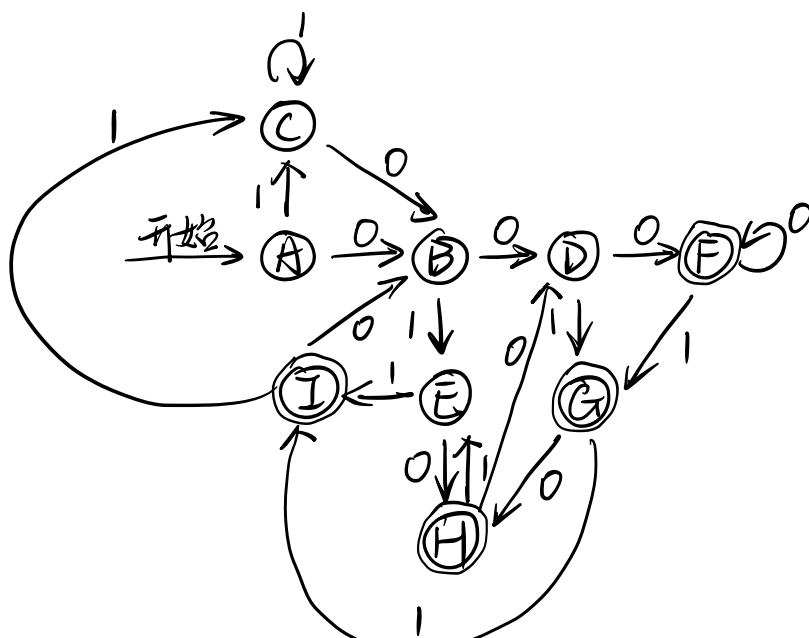
$$\varepsilon\text{-closure}(\text{move}(H, 1)) = \{1, 2, 4\} = E$$

$$I = \{1, 2, 5\} \quad \varepsilon\text{-closure}(\text{move}(I, 0)) = \{1, 2, 3\} = B$$

$$\varepsilon\text{-closure}(\text{move}(I, 1)) = \{1, 2\} = C$$

状态	输入符号	
	0	1
A	B	C
B	D	E
C	B	C
D	F	G
E	H	I
F	F	G

得到 DFA 如下:



G	H	I
H	D	E
I	B	C

下进行简化得到

① 分组得到 $\{A, B, C, D, E\}$, $\{F\}$, $\{G\}$, $\{H\}$, $\{I\}$

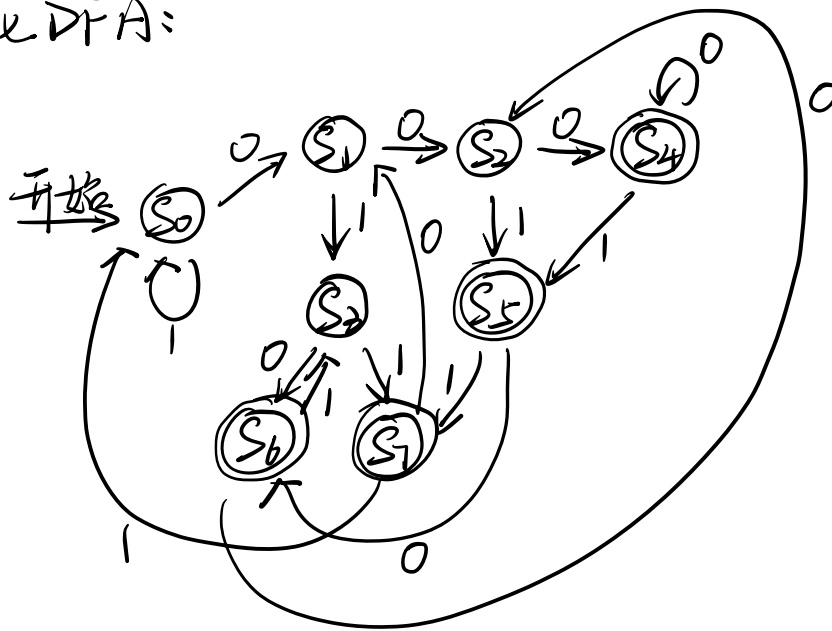
② 易知 A 和 C 行为相同, 继续分组 $\{A, C\}$, $\{B\}$, $\{D\}$, $\{E\}$,

$\{F\}$, $\{G\}$, $\{H\}$, $\{I\}$

③ 取 $S_0 = \{A, C\}$, $S_1 = \{B\}$, $S_2 = \{D\}$, $S_3 = \{E\}$, $S_4 = \{F\}$, $S_5 = \{G\}$

$S_6 = \{H\}$, $S_7 = \{I\}$

得到极小化 DFA:



1e) 下以 ε 代替 ε -closure, m 代替 move

$$A = \{0, 1, 2, 3\} \quad \varepsilon(m(A, 00)) = \varepsilon(\{1\}) = \{1, 2, 3\} = B$$

$$\varepsilon(m(A, 01)) = \varepsilon(\{4\}) = \{4\} = C$$

$$\varepsilon(m(A, 10)) = \varepsilon(\{4\}) = C$$

$$\varepsilon(m(A, 11)) = \varepsilon(\{1\}) = B$$

$$B = \{1, 2, 3\}$$

$$\varepsilon(m(B, 00)) = \varepsilon(\{1\}) = B$$

$$\varepsilon(m(B, 01)) = \varepsilon(\{4\}) = C$$

$$\varepsilon(m(B, 10)) = \varepsilon(\{4\}) = C$$

$$\varepsilon(m(B, 11)) = \varepsilon(\{1\}) = B$$

$$C = \{4\}$$

$$\varepsilon(m(C, 00)) = \varepsilon(\{4\}) = C$$

$$\varepsilon(m(C, 01)) = \varepsilon(\{5\}) = \{2, 3, 5, 6, 7\} = D$$

$$\varepsilon(m(C, 10)) = \varepsilon(\{5\}) = D$$

$$\varepsilon(m(C, 11)) = \varepsilon(\{4\}) = C$$

$$D = \{2, 3, 5, 6, 7\}$$

$$\varepsilon(m(D, 00)) = \varepsilon(\{5\}) = D$$

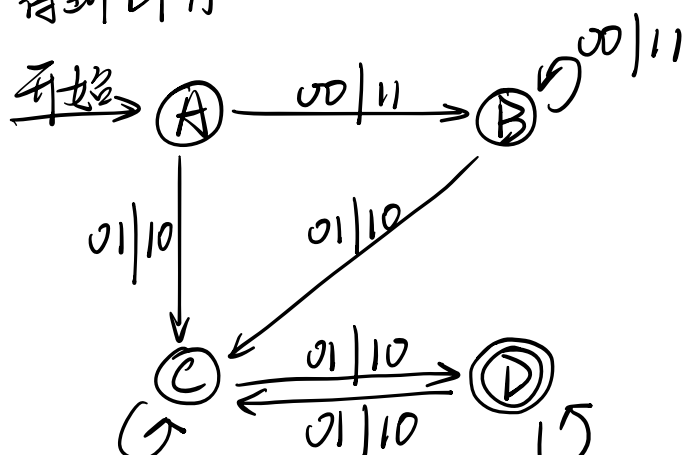
$$\varepsilon(m(D, 01)) = \varepsilon(\{4\}) = C$$

$$\varepsilon(m(D, 10)) = \varepsilon(\{4\}) = C$$

$$\varepsilon(m(D, 11)) = \varepsilon(\{5\}) = D$$

状态,	输入状态,			
	00	01	10	11
A	B	C	C	B
B	B	C	C	B
C	C	D	D	C

\Rightarrow 得到 DFA



D | D C C D

00|11

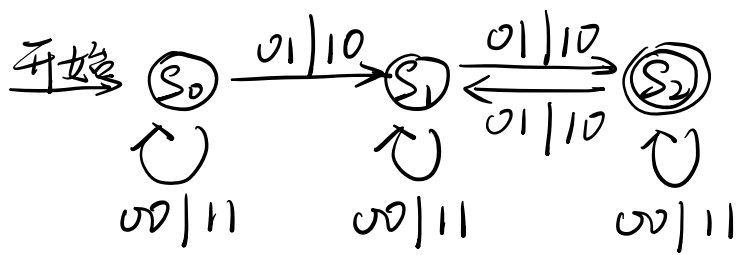
00|11

下简化

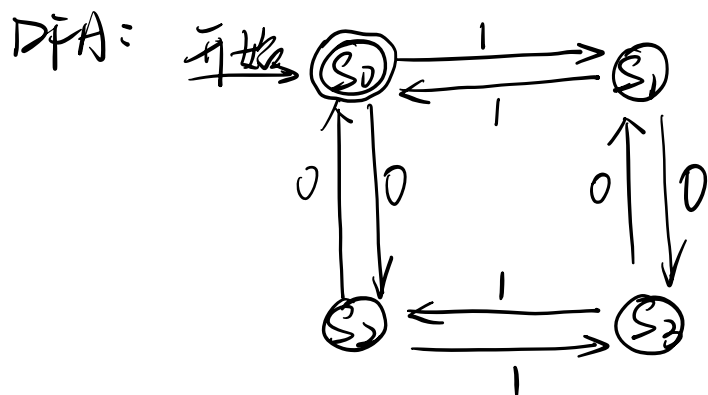
① $\{A, B, C\} \{D\}$

② $\{A, B\}, \{C\}, \{D\}$

③ $S_0 = \{A, B\}, S_1 = \{C\}, S_2 = \{D\}$



另一种画法:



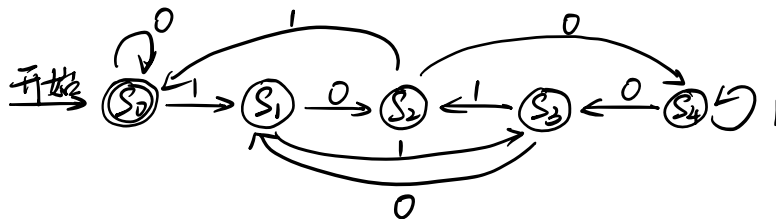
2.

(1) DFA D:

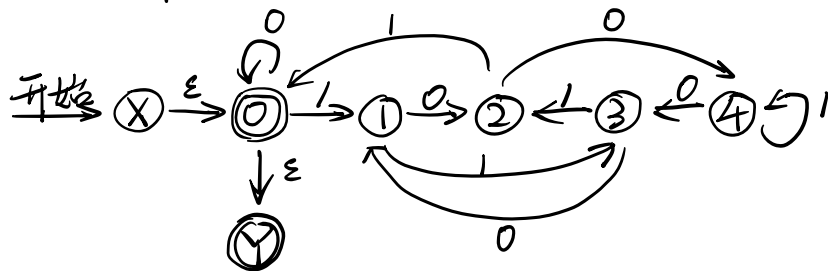
状态 S_i : 模5余 i ($0 \leq i \leq 4$) 假设从高位读取二进制数.

状态	输入字符	
	0	1
S_0	S_0	S_1
S_1	S_2	S_3
S_2	S_4	S_0
S_3	S_1	S_2
S_4	S_3	S_4

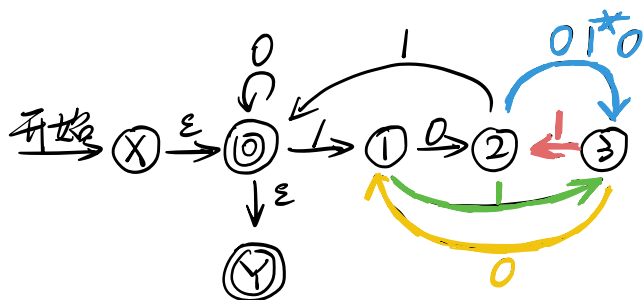
\therefore DFA为:



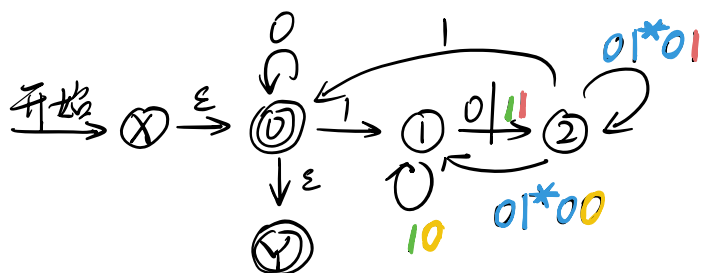
(2) 添加新的开始状态 X 和接受状态 Y.



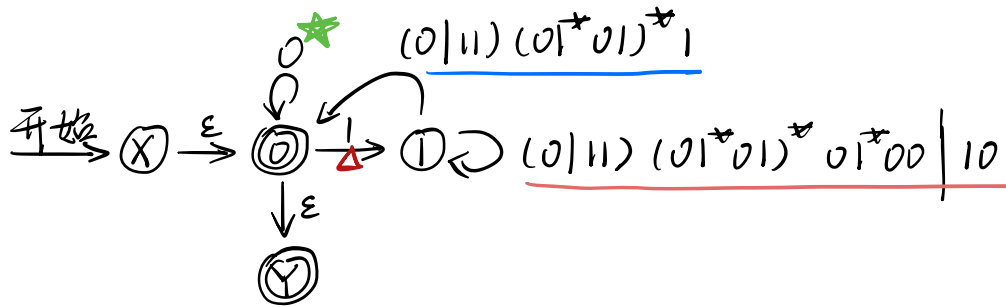
删除 4: 从 ④ 的入边开始与 ④ 的出边相连



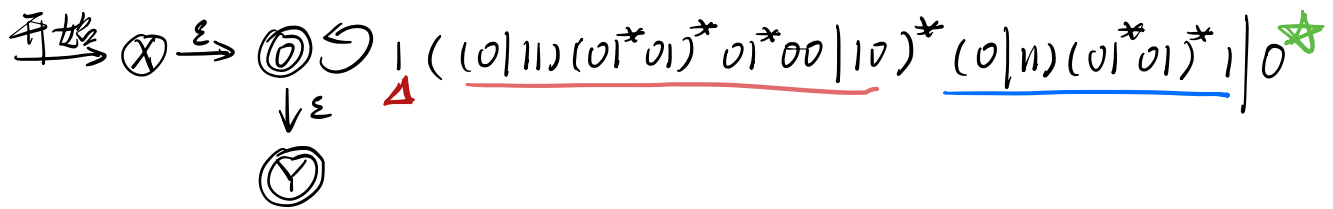
删除 3



删除, 2



删除, 1



$$\Rightarrow R_1 = (0|1((0|11)(01^*01)^*01^*00|10)^*(0|11)(01^*01)^*1)^*$$

类似地, 按 3241 依次删去节点可得:

$$R_2 = (0|1((0|11)0(1|010)^*00|10)^*(0|11)1|(0|11)0(1|010)^*0|0)^*$$

https://blog.csdn.net/qq_40294512/article/details/89004777
<https://cyberzhg.github.io/toolbox/>