第三次课后作业参考答案

March 21，2019

必做题

1 Ex.2.3.2

解答：
把NFA转化为DFA：

	0	1
$\rightarrow \{p\}$	$\{q,s\}$	$\{q\}$
$*\{q\}$	$\{r\}$	$\{q,r\}$
$\{r\}$	$\{s\}$	$\{p\}$
$*\{s\}$	ϕ	$\{p\}$
$*\{q,s\}$	$\{r\}$	$\{q,p,r\}$
$*\{q,r\}$	$\{r,s\}$	$\{q,p,r\}$
$*\{r,s\}$	$\{s\}$	$\{p\}$
$*\{q,p,r\}$	$\{q,r,s\}$	$\{q,p,r\}$
$*\{q,r,s\}$	$\{r,s\}$	$\{q,p,r\}$
ϕ	ϕ	ϕ

2 Ex.2.3.3

解答：
把NFA转化为DFA：

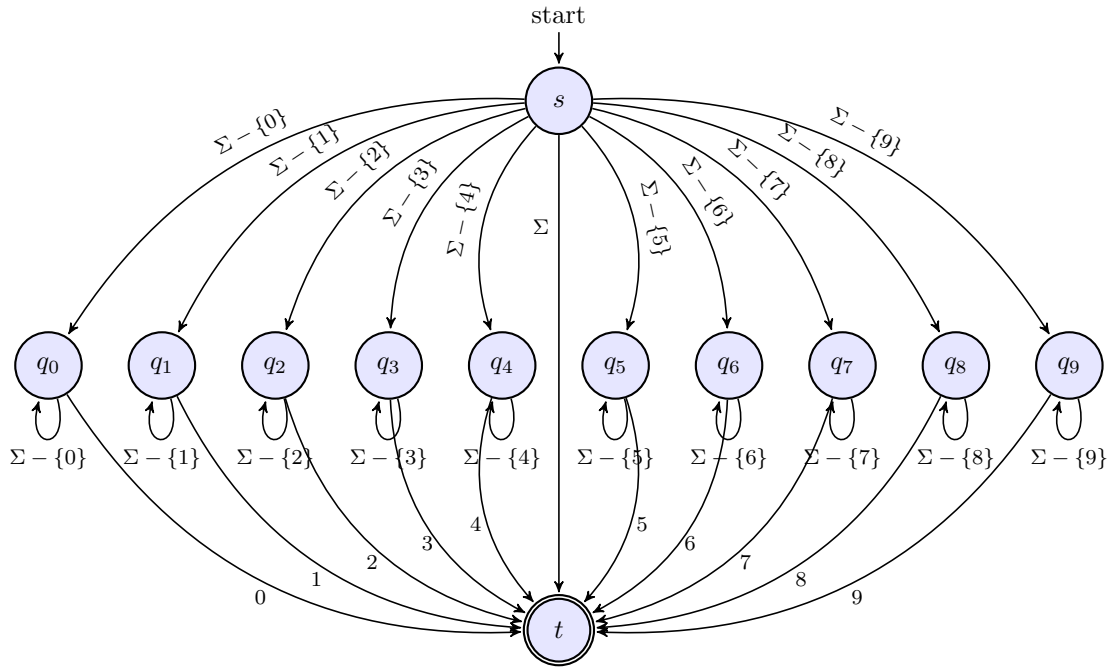
	0	1
$\rightarrow \{p\}$	$\{p,q\}$	$\{p\}$
$\{p,q\}$	$\{p,q,r,s\}$	$\{p,t\}$
$*\{p,q,r,s\}$	$\{p,q,r,s\}$	$\{p,t\}$
$*\{p,t\}$	$\{p,q\}$	$\{p\}$

非形式化地描述它接受的语言：所有以00或01结尾的串的集合。

3 Ex.2.3.4

3.1 b)

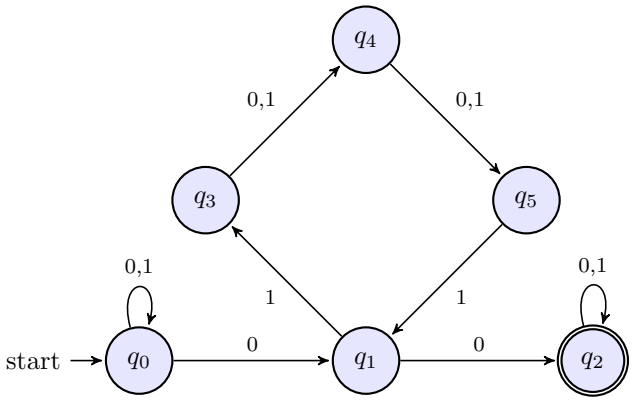
在字母表$\{0,1,\ldots,9\}$上的串的集合，使得结尾数字在前面没有出现过。
解答：
设$\Sigma = \{0,1,2,3,4,5,6,7,8,9\}$，



其中从状态s到t的迁移表示输入只有1个字符的情况。

3.2 c)

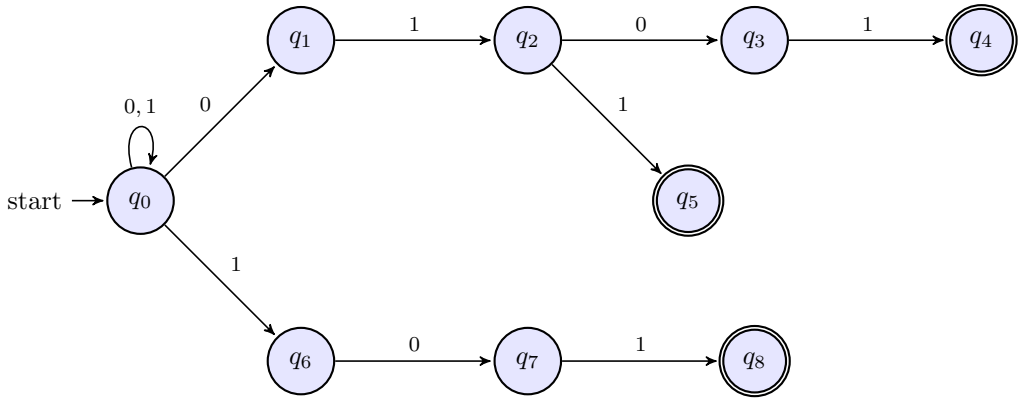
0和1的串的集合，使得有两个0间隔的位置数是4的倍数。注意，0算是4的倍数。
解答：



4 Ex.2.4.1

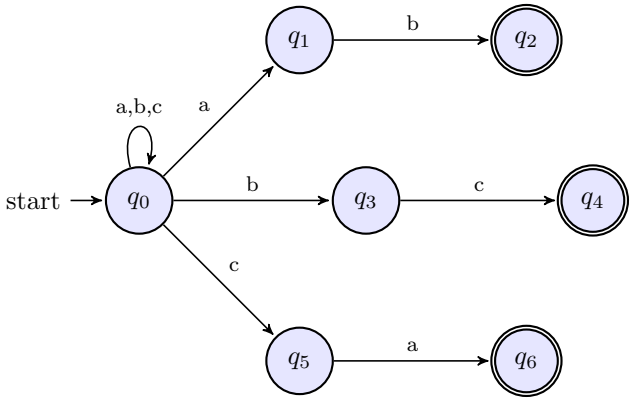
4.1 b)

0101、101和011。
解答：



4.2 c)

ab、bc和ca，假设字母表是a,b,c,d。
解答：



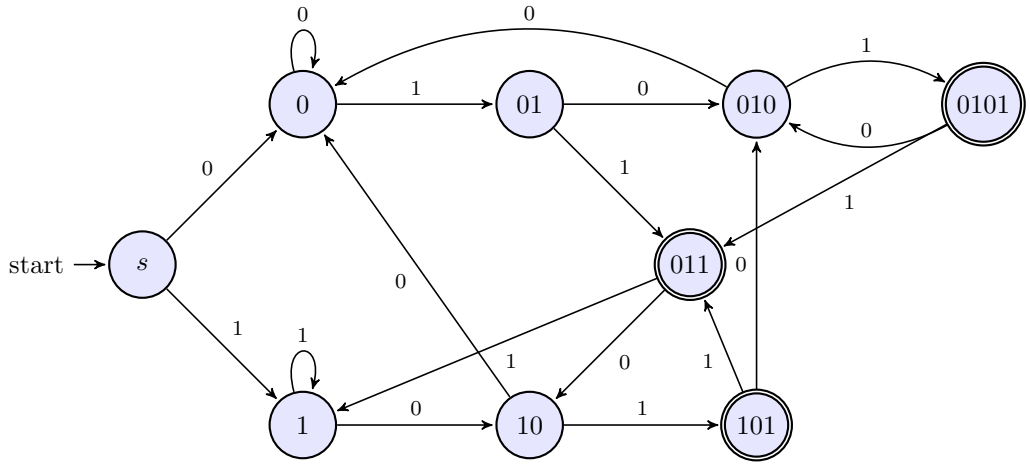
5 Ex.2.4.2

5.1 b)

解答：
从NFA转化：

	0	1
$\rightarrow \{q_0\}$	$\{q_0, q_1\}$	$\{q_0, q_6\}$
$\{q_0, q_1\}$	$\{q_0, q_1\}$	$\{q_0, q_6, q_2\}$
$\{q_0, q_6, q_2\}$	$\{q_0, q_1, q_7, q_3\}$	$\{q_0, q_6, q_5\}$
$\{q_0, q_1, q_7, q_3\}$	$\{q_0, q_1\}$	$\{q_0, q_6, q_2, q_8, q_4\}$
$*\{q_0, q_6, q_2, q_8, q_4\}$	$\{q_0, q_1, q_7, q_3\}$	$\{q_0, q_6, q_5\}$
$*\{q_0, q_6, q_5\}$	$\{q_0, q_1, q_7\}$	$\{q_0, q_6\}$
$\{q_0, q_1, q_7\}$	$\{q_0, q_1\}$	$\{q_0, q_6, q_2, q_8\}$
$*\{q_0, q_6, q_2, q_8\}$	$\{q_0, q_1, q_7, q_3\}$	$\{q_0, q_6, q_5\}$
$\{q_0, q_6\}$	$\{q_0, q_1, q_7\}$	$\{q_0, q_6\}$

也可以根据NFA直接构造DFA：

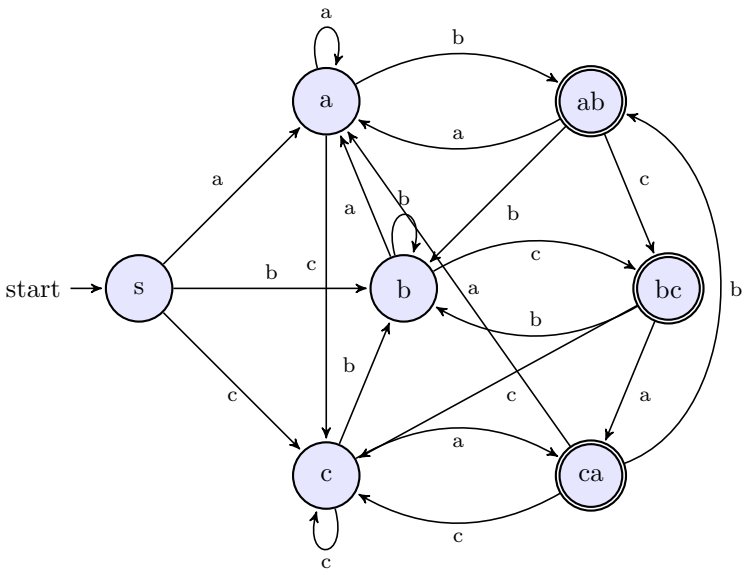


5.2 c)

解答：
从NFA转化：

	a	b	c
$\rightarrow \{q_0\}$	$\{q_0, q_1\}$	$\{q_0, q_3\}$	$\{q_0, q_5\}$
$\{q_0, q_1\}$	$\{q_0, q_1\}$	$\{q_0, q_3, q_2\}$	$\{q_0, q_5\}$
$*\{q_0, q_3, q_2\}$	$\{q_0, q_1\}$	$\{q_0, q_3\}$	$\{q_0, q_5, q_4\}$
$*\{q_0, q_5, q_4\}$	$\{q_0, q_1, q_6\}$	$\{q_0, q_3\}$	$\{q_0, q_5\}$
$*\{q_0, q_1, q_6\}$	$\{q_0, q_1\}$	$\{q_0, q_3, q_2\}$	$\{q_0, q_5\}$
$\{q_0, q_3\}$	$\{q_0, q_1\}$	$\{q_0, q_3\}$	$\{q_0, q_5, q_4\}$
$\{q_0, q_5\}$	$\{q_0, q_1, q_6\}$	$\{q_0, q_3\}$	$\{q_0, q_5\}$

也可以根据NFA直接构造DFA：



6 Ex.2.5.2

解答：
a)
ECLOSE(p)=$\{p, q, r\}$
ECLOSE(q)=$\{q\}$
ECLOSE(r)=$\{r\}$
b)

长度为0的串：ε
长度为1的串：a，b，c
长度为2的串：aa，ab，ac，ba，bb，bc，ca，cb，cc
长度为3的串：aaa，aab，aac，aba，abb，abc，aca，acb，acc，baa，bab，bac，bca，bcb，bcc，caa，cab，cac，cba，cbb，cbc，cca，ccb，ccc

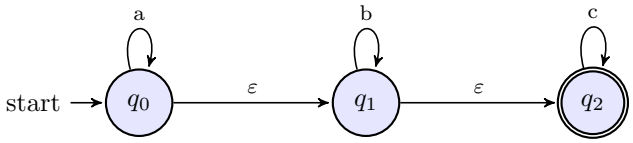
c)

	a	b	c
$\rightarrow *\{p,q,r\}$	$\{p,q,r\}$	{q,r}	$\{p,q,r\}$
$*\{q,r\}$	$\{p,q,r\}$	$\{r\}$	$\{p,q,r\}$
$*\{r\}$	ϕ	ϕ	ϕ
ϕ	ϕ	ϕ	ϕ

7 Ex.2.5.3(a)

包含零个或多个a，后面跟着零个或多个b，再跟着零个或多个c 的串的集合。（原文为consist of）

解答：



思考题

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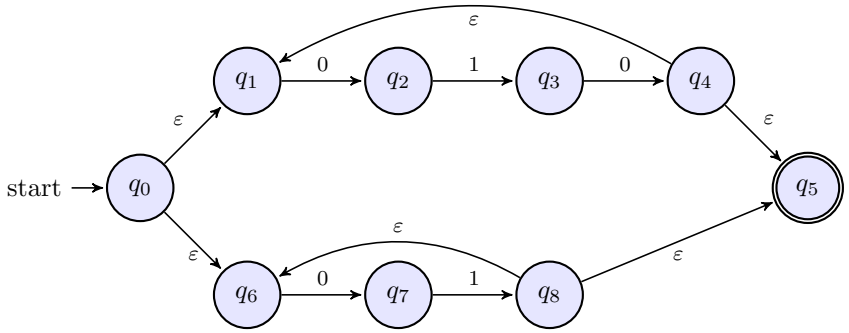
8 Ex.2.5.3

8.1 b)

包含着01重复一次或多次或010重复一次或多次的串的集合。（原文为consist of）

解答：



8.2 c)

使得最后10个位置上至少有一个是1的0和1的串的集合。

解答：