PR 2 TBFO

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Exercise 2.3.1

Convert to DFA the following NFA :

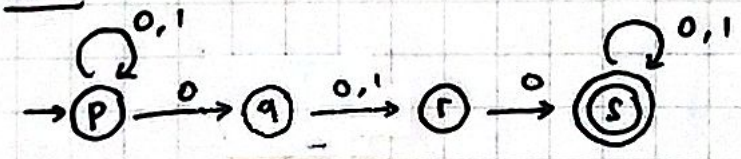
	0	1
→ p	{p,q}	{p}
q	{r}	{r}
r	{s}	∅
*s	{s}	{s}

(NFA)

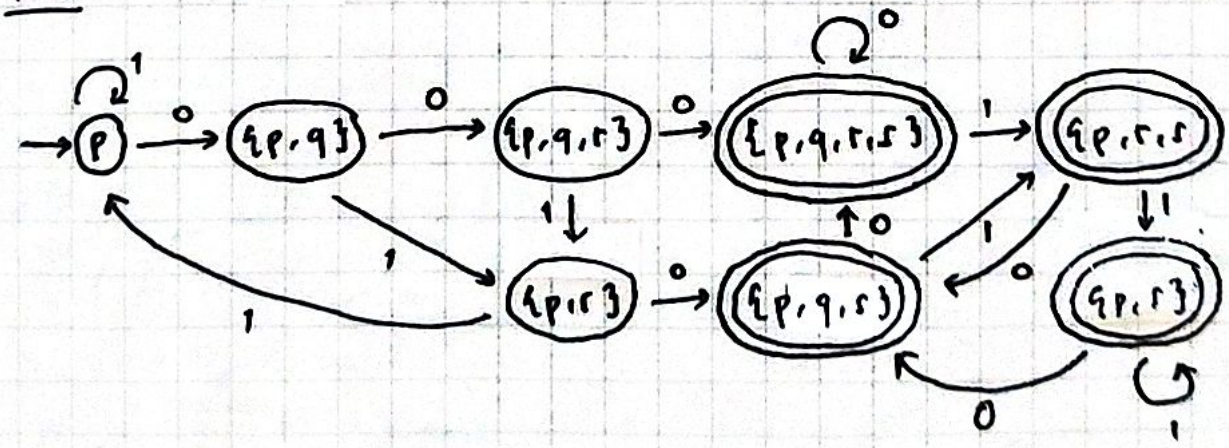
	0	1
→ {p}	{p,q}	{p}
{p,q}	{p,q,r}	{p,r}
{p,r}	{p,q,s}	{p}
{p,q,r}	{p,q,r,s}	{p,r}
* {p,q,s}	{p,q,r,s}	{p,r,s}
* {p,q,r,s}	{p,q,r,s}	{p,r,s}
* {p,r,s}	{p,q,s}	{p,s}
* {p,r}	{p,q,s}	{p,s}

(DFA)

NFA



DFA



Exercise 2.3.2

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Convert to a DFA the following NFA :

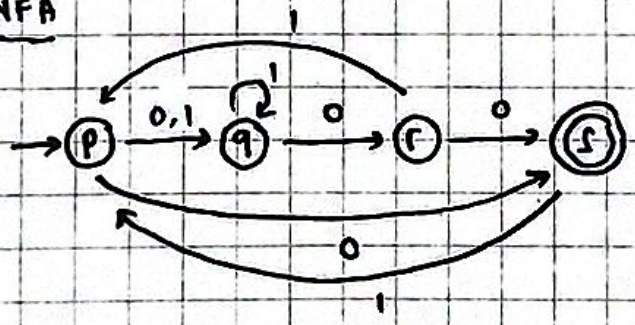
	0	1
→ p	{q,s}	{q}
*q	{r}	{q,r}
r	{s}	{p}
*s	∅	{p}

NFA

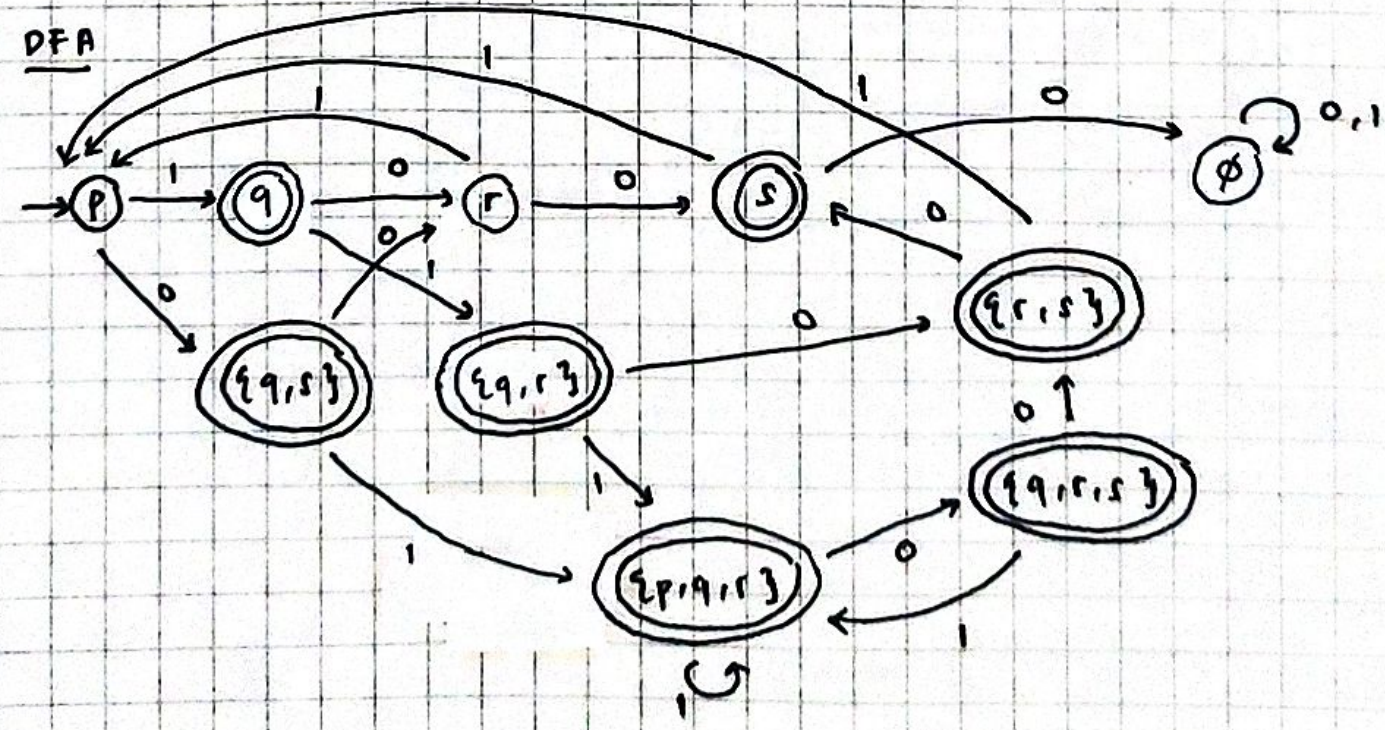
	0	1
→ p	{q,s}	{q}
* {q}	{r}	{q,r}
*{q,s}	{r}	{p,q,r}
{r}	{s}	{p}
* {q,r}	{r,s}	{p,q,r}
*{p,q,r}	{q,r,s}	{p,q,r}
* {s}	∅	{p}
∅	∅	∅
* {r,s}	{s}	{p}
*{q,r,s}	{r,s}	{p,q,r}

DFA

NFA



DFA



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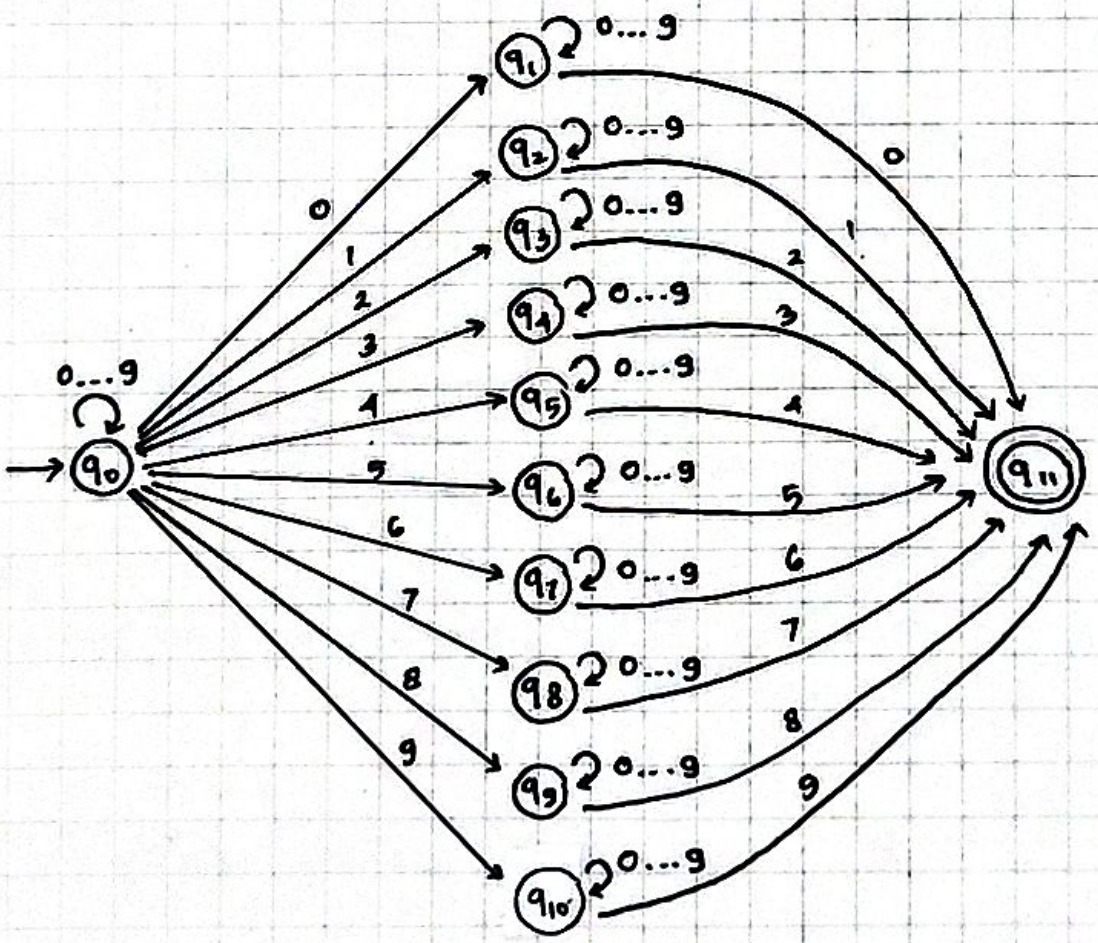
Exercise 2.3.1

Give NFA to accept the following languages. Try to take advantage of nondeterminism as much as possible.

a) The set of strings over alphabet $\{0, 1, \ldots, 9\}$ such that the final digit has appeared before.



Exercise 2.3.1

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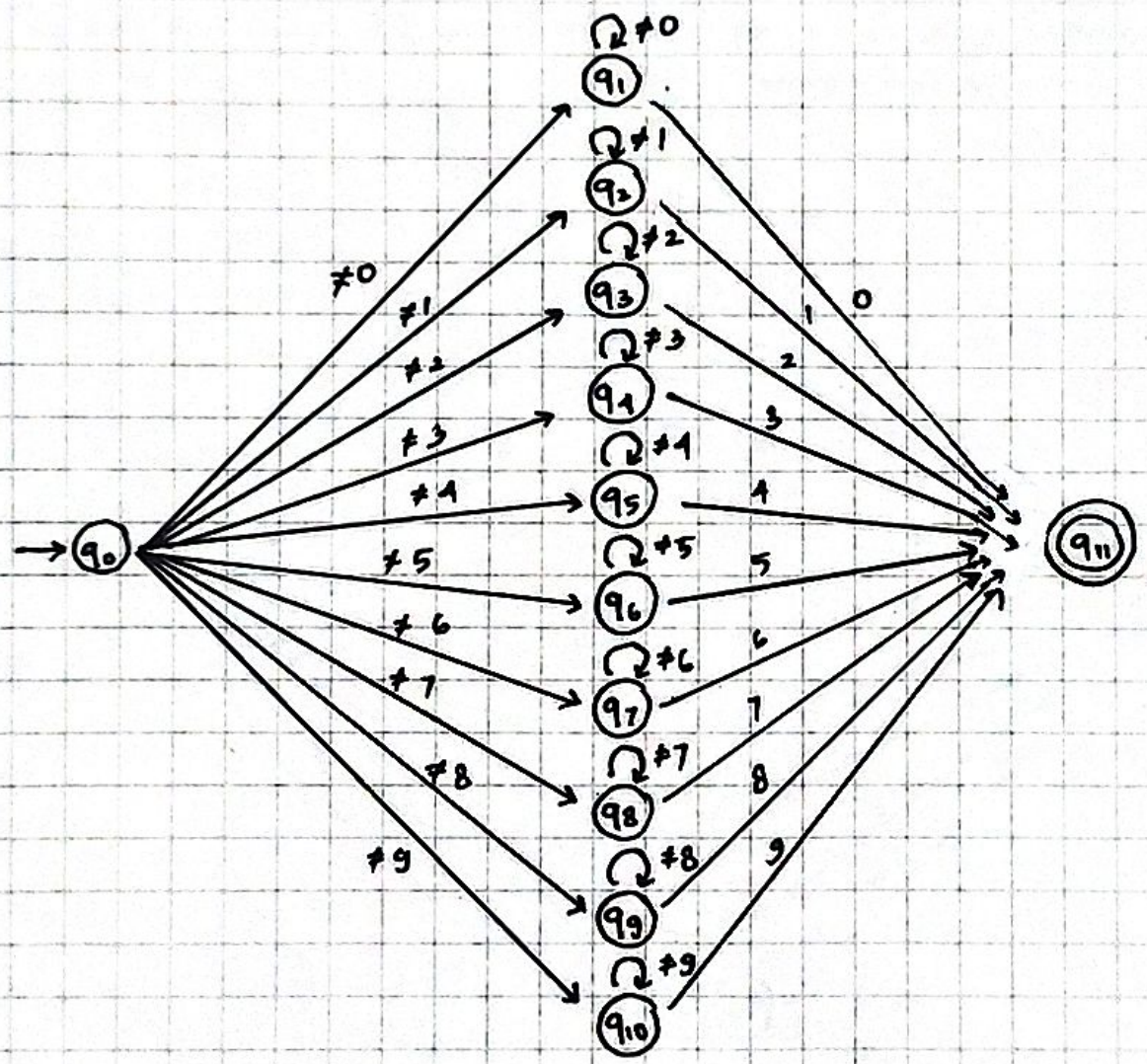
b) The set of strings over alphabet {0 ... 9} such that the final digit has not appeared before



Exercise 2.3.A

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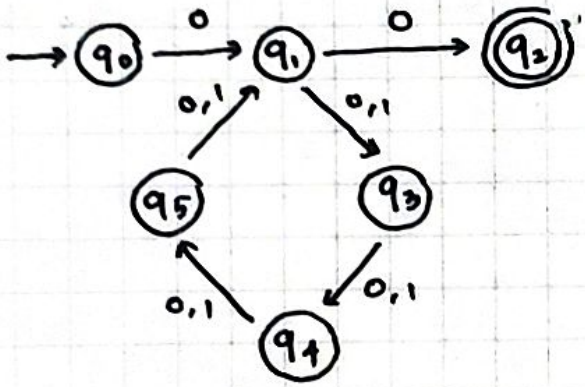
c) The set of strings of 0's & 1's such that there are two 0's separated by a number of positions that is multiple of 4. Note that 0 is an allowable multiple of 4.



	0	1
→ q_0	$\{q_1\}$	$\emptyset$
q_1	$\{q_2, q_5\}$	$\{q_3\}$
q_2	$\emptyset$	$\emptyset$
q_3	$\{q_4\}$	$\{q_4\}$
q_4	$\{q_5\}$	$\{q_5\}$
* q_5	$\{q_1\}$	$\{q_1\}$

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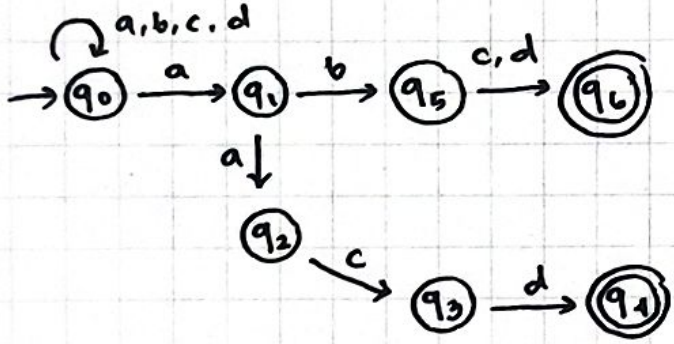
Exercise 2.1.1

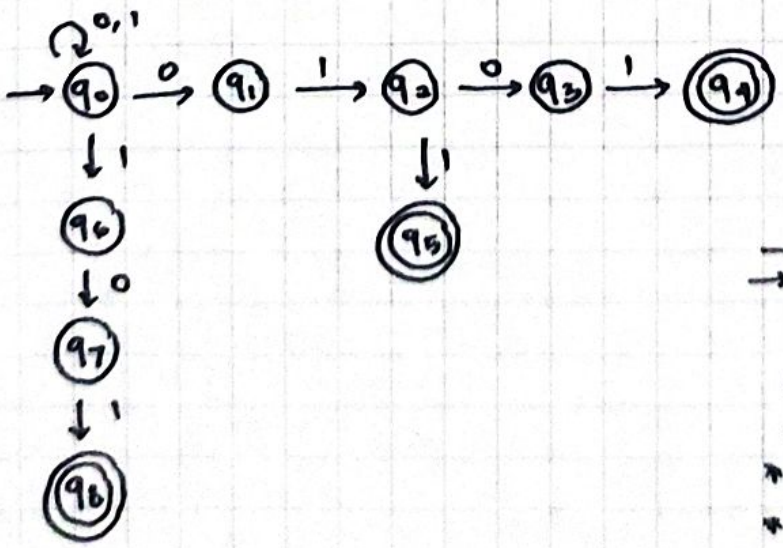
Design NFA's to recognize the following set of strings.

a) abc, abd, and aacd ; $\Sigma = \{a, b, c, d\}$



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

b) 0101, 101, and 011



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

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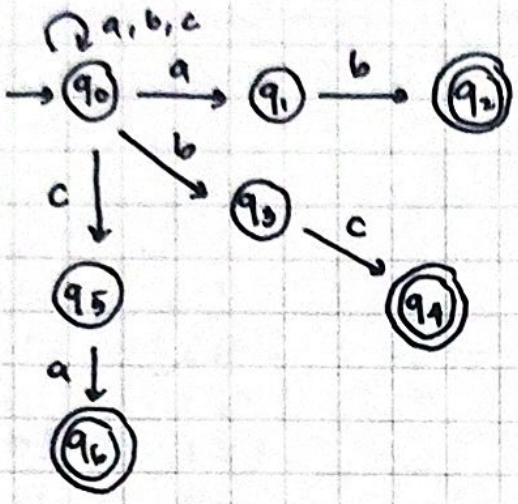
c) ab, bc, and ca; $\Sigma = \{a, b, c\}$



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