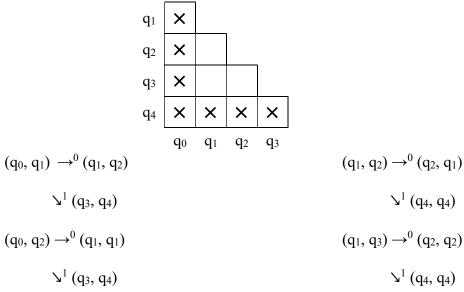
## Minimization of DFA

1)

δ	0	1
$\rightarrow q_0$	$q_1$	$q_3$
$q_1$	$q_2$	q <sub>4</sub>
$q_2$	$q_1$	q <sub>4</sub>
q <sub>3</sub>	$q_2$	q <sub>4</sub>
*q4	q4	q <sub>4</sub>

Solution:



$$(q_0, q_3) \rightarrow^0 (q_1, q_2)$$
  $(q_2, q_3) \rightarrow^0 (q_1, q_2)$   $\searrow^1 (q_3, q_4)$   $\searrow^1 (q_4, q_4)$ 

 $(q_1, q_2), (q_1, q_3), (q_2, q_3)$  are indistinguishable.

 $\searrow^1 (q_3, q_4)$ 

 $\searrow^1 (q_3, q_4)$ 

$$Q = \{\{q_0\},\,\{q_1,\,q_2,\,q_3\},\,\{q_4\}\}$$

δ	0	1
$\rightarrow q_0$	q <sub>123</sub>	q <sub>123</sub>
q <sub>123</sub>	<b>q</b> <sub>123</sub>	q <sub>4</sub>
*q <sub>4</sub>	q <sub>4</sub>	q <sub>4</sub>

δ	0	1
$\rightarrow q_0$	qı	$q_2$
*q1	$q_3$	q <sub>4</sub>
*q <sub>2</sub>	q <sub>5</sub>	<b>q</b> 5
*q <sub>3</sub>	q <sub>3</sub>	q <sub>4</sub>
*q <sub>4</sub>	<b>q</b> 5	<b>q</b> <sub>5</sub>
q <sub>5</sub>	q <sub>6</sub>	q <sub>5</sub>
q <sub>6</sub>	q <sub>6</sub>	q <sub>6</sub>

 $Q = \{\{q_0\}, \, \{q_1, \, q_3\}, \, \{q_2, \, q_4\}, \, \{q_5, \, q_6\}\}$ 

δ	0	1
$\rightarrow q_0$	<b>q</b> 13	<b>q</b> 24
*q <sub>13</sub>	<b>q</b> 13	<b>q</b> 24
*q <sub>24</sub>	q <sub>56</sub>	<b>q</b> 56
<b>q</b> 56	<b>q</b> 56	<b>q</b> 56

δ	0	1
$\rightarrow$ *q <sub>0</sub>	$q_1$	$q_2$
$\mathbf{q}_1$	$\mathbf{q}_1$	$q_1$
$q_2$	q <sub>3</sub>	q <sub>4</sub>
*q <sub>3</sub>	$q_1$	$q_2$
q <sub>4</sub>	q <sub>1</sub>	q <sub>1</sub>

 $Q = \{\{q_0,\,q_3\},\,\{q_1,\,q_4\},\,\{q_2\}\}$ 

δ	0	1
→*q <sub>03</sub>	<b>q</b> 14	$q_2$
<b>q</b> <sub>14</sub>	q <sub>14</sub>	q <sub>14</sub>
$q_2$	q <sub>03</sub>	q <sub>14</sub>

4)

δ	0	1
→a	b	f
b	g	С
*c	a	С
d	С	g
e	h	f
f	С	g
g	g	e
h	g	С

Solution:

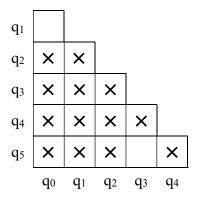
 $Q = \{ae, bh, c, df, g\}$ 

δ	0	1
→ae	bh	df
bh	g	С
*c	ae	С
df	С	g
g	g	ae

5)

δ	0	1
$\rightarrow q_0$	$q_1$	$q_3$
$q_1$	$q_0$	$q_3$
$q_2$	$\mathbf{q}_1$	q <sub>4</sub>
*q3	q <sub>5</sub>	<b>q</b> 5
q <sub>4</sub>	q <sub>3</sub>	<b>q</b> <sub>3</sub>
*q <sub>5</sub>	<b>q</b> 5	<b>q</b> 5

Solution:



 $Q = \{\{q_0, \, q_1\}, \, \{q_2\}, \, \{q_3, \, q_5\}, \, \{q_4\}\}$ 

δ	0	1
$\rightarrow$ q <sub>01</sub>	q <sub>01</sub>	q <sub>35</sub>
$q_2$	<b>q</b> 01	q <sub>4</sub>
*q <sub>35</sub>	<b>q</b> 35	<b>q</b> 35
q <sub>4</sub>	<b>q</b> 35	<b>q</b> 35

δ	0	1
$\rightarrow q_0$	$q_1$	<b>q</b> 5
$q_1$	$q_6$	$q_2$
*q <sub>2</sub>	$q_2$	$q_0$
q <sub>3</sub>	q <sub>2</sub>	q <sub>6</sub>
q <sub>4</sub>	q <sub>7</sub>	<b>q</b> 5
q <sub>5</sub>	q <sub>2</sub>	q <sub>6</sub>
q <sub>6</sub>	q <sub>6</sub>	q <sub>4</sub>
<b>q</b> <sub>7</sub>	$q_6$	$q_2$

$$Q = \{\{q_0,\,q_4\},\,\{q_1,\,q_7\},\,\{q_2\},\,\{q_3,\,q_5\},\,\{q_6\}\}$$

δ	0	1
$\rightarrow$ q <sub>04</sub>	<b>q</b> 17	<b>q</b> 35
<b>q</b> 17	$q_6$	$q_2$
*q2	$q_2$	<b>q</b> 04
q <sub>35</sub>	$q_2$	$q_6$
q <sub>6</sub>	q <sub>6</sub>	<b>q</b> 04

δ	a	b
$\rightarrow q_0$	$q_1$	$q_0$
q <sub>1</sub>	q <sub>0</sub>	$q_2$
q <sub>2</sub>	q <sub>3</sub>	q <sub>1</sub>
*q <sub>3</sub>	q <sub>3</sub>	$q_0$
q <sub>4</sub>	q <sub>3</sub>	q <sub>5</sub>
<b>q</b> 5	$q_2$	q <sub>4</sub>
q <sub>6</sub>	q <sub>5</sub>	q <sub>6</sub>
<b>q</b> 7	q <sub>6</sub>	<b>q</b> <sub>3</sub>

 $Q = \{q_0,\,q_1,\,q_2,\,q_3,\,q_4,\,q_5,\,q_6,\,q_7\}$ 

δ	a	b
$\rightarrow q_0$	$q_1$	$q_0$
$q_1$	$\mathbf{q}_0$	$q_2$
$q_2$	$q_3$	$q_1$
*q <sub>3</sub>	q <sub>3</sub>	q <sub>0</sub>
q <sub>4</sub>	q <sub>3</sub>	<b>q</b> 5
q <sub>5</sub>	q <sub>2</sub>	q <sub>4</sub>
q <sub>6</sub>	q <sub>5</sub>	q <sub>6</sub>
q <sub>7</sub>	q <sub>6</sub>	q <sub>3</sub>

8)

δ	0	1
$\rightarrow q_0$	$q_0$	$q_3$
$q_1$	$\mathbf{q}_2$	<b>q</b> 5
$q_2$	q <sub>3</sub>	q <sub>4</sub>
q <sub>3</sub>	$q_0$	<b>q</b> 5
q <sub>4</sub>	$q_0$	<b>q</b> 6
<b>q</b> 5	q <sub>1</sub>	q <sub>4</sub>
*q <sub>6</sub>	$\mathbf{q}_1$	$q_3$

Solution:

 $Q = \{q_0,\,q_1,\,q_2,\,q_3,\,q_4,\,q_5,\,q_6\}$ 

δ	0	1
$\rightarrow q_0$	$q_0$	$q_3$
$q_1$	$q_2$	<b>q</b> 5
$q_2$	$q_3$	q <sub>4</sub>
<b>q</b> <sub>3</sub>	$q_0$	<b>q</b> 5
q <sub>4</sub>	q <sub>0</sub>	q <sub>6</sub>
q <sub>5</sub>	q <sub>1</sub>	q <sub>4</sub>
*q <sub>6</sub>	$q_1$	$q_3$

δ	0	1
$\rightarrow q_0$	$q_1$	$q_0$
$q_1$	$q_0$	$q_2$
$q_2$	$q_3$	$q_1$
*q <sub>3</sub>	q <sub>3</sub>	q <sub>0</sub>
q <sub>4</sub>	$q_3$	<b>q</b> 5
q <sub>5</sub>	q <sub>6</sub>	q <sub>4</sub>
q <sub>6</sub>	q <sub>5</sub>	q <sub>6</sub>
<b>q</b> <sub>7</sub>	$q_6$	$q_3$

$$Q = \{\{q_0,\,q_6\},\,\{q_1,\,q_5\},\,\{q_2,\,q_4\},\,\{q_3\}\}$$

δ	0	1
→q <sub>06</sub>	<b>q</b> 15	<b>q</b> 06
<b>q</b> 15	<b>q</b> 06	<b>q</b> 24
q <sub>24</sub>	$q_3$	q <sub>15</sub>
*q <sub>3</sub>	q <sub>3</sub>	q <sub>06</sub>

10)

δ	a	b
→1	2	3
2	3	5
3	4	3
4	3	5
*5	2	5

Solution:

$$Q = \{13, 24, 5\}$$

δ	a	b
→13	24	13
24	13	5
*5	24	5

11)

δ	a	b
→1	2	1
*2	4	1
3	2	5
4	3	6
*5	4	5
6	5	2

12)

δ	a	b
→1	2	6
2	1	3
* 3	2	4
4	4	2
5	4	5
*6	5	4

δ	a	b
→1	4	6
2	1	7
3	2	4
4	6	5
5	7	5
*6	3	6
*7	3	7

14)

δ	a	b
→1	2	3
2	4	5
3	6	7
*4	4	5
5	6	7
*6	4	5
*7	6	ф

15)

δ	a	b
<b>→*</b> 1	2	3
*2	4	5
3	6	7
4	5	4
5	7	5
6	ф	7
*7	7	4

δ	a	b
→1	2	3
*2	4	5
3	6	7
4	4	5
5	6	7
*6	4	5
7	6	7