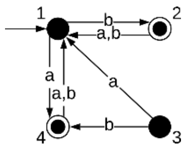
Khuyen Le Thi Minh – s5128

Homework 07

1. $Minimize\ the\ following\ finite-state\ deterministic\ automata$

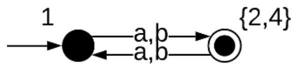
	a	b
$\rightarrow 1$	4	2
$F2$	1	1
3	1	4
$F4$	1	1



$We\ can\ group\ two\ states\ if\ they're equivalence. Two\ states\ are\ equivalence\ if\ and\ only\ if:$
$(\delta(A,X) \rightarrow F\ AND\ \delta(B,X) \rightarrow F\ ) OR\ (\delta(A,X) \nrightarrow F\ AND\ \delta(B,X) \nrightarrow F\ )$
$Since\ we\ cannot\ reach\ state\ 3\ from\ any\ other\ state, we'll eliminate\ it\ from\ our\ automata.$
$0-equivalence: \{1\}\ \{2,4\}$
$1-equivalence: \{1\}\ \{2,4\}$
$since\ \delta(2,a) \rightarrow 1\ and\ \delta(4,a) \rightarrow 1;\ \delta(2,b) \rightarrow 1\ and\ \delta(4,b) \rightarrow 1$

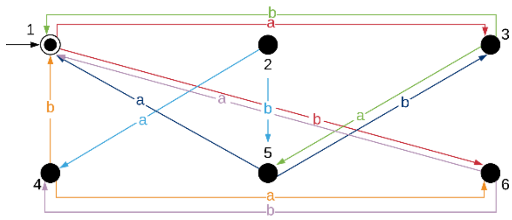
	a	b
$\rightarrow 1$	{2,4}	{2,4}
$F\{2,4\}$	1	1

1		
F	2	
F	T	4



2. $Minimize\ the\ following\ finite-state\ deterministic\ automata$

	a	b
$\rightarrow F1$	3	6
2	4	5
3	5	1
4	6	1
5	1	3
6	1	4



$Since\ we\ cannot\ reach\ state\ 2\ from\ any\ other\ state, we'll eliminate\ it\ from\ our\ automata.$
$0-equivalence: \{1\}\ \{3,4,5,6\}\ since\ \{1\} \in Fand\ \{3,4,5,6\} \notin F$
$1-equivalence: \{1\}\ \{3,4\}\{5,6\}$
$since\ \delta(3,a) \rightarrow 5\ and\ \delta(4,a) \rightarrow 6\ and\ \{5,6\} \in \{3,4,5,6\};\ \delta(3,b) \rightarrow 1\ and\ \delta(4,b) \rightarrow 1$
$since\ \delta(5,a) \rightarrow 1\ and\ \delta(6,a) \rightarrow 1\ ;\ \delta(5,b) \rightarrow \{3\} and\ \delta(5,b) \rightarrow \{4\}\ and\ \{3,4\} \in \{3,4,5,6\}$
$2-equivalence: \{1\}\ \{3,4\}\{5,6\}$
$since\ \delta(3,a) \rightarrow 5\ and\ \delta(4,a) \rightarrow 6\ and\ \{5,6\} \in \{5,6\};\ \delta(3,b) \rightarrow 1\ and\ \delta(4,b) \rightarrow 1$
$since\ \delta(5,a) \rightarrow 1\ and\ \delta(6,a) \rightarrow 1\ ;\ \delta(5,b) \rightarrow \{3\} and\ \delta(5,b) \rightarrow \{4\}\ and\ \{3,4\} \in \{3,4\}$

	a	b
$\rightarrow F1$	{3,4}	{5,6}
{3,4}	{5,6}	1
{5,6}	1	{3,4}

1				
F	3			
F	T	4		
F	F	F	5	
F	F	F	T	6