BLG311E – FORMAL LANGUAGES AND AUTOMATA

2013 SPRING

RECITEMENT 2

1) Transform the Moore machine defined below into the Mealy model and reduce the states of the transformed machine.

	0	**1**	**Output**
$\mathbf{S_0}$	S_4	S_2	1
$\mathbf{S_1}$	S_4	S_2	1
$\mathbf{S_2}$	S_5	S_0	0
$\mathbf{S_3}$	S_7	S_6	0
$\mathbf{S_4}$	S_1	S_4	0
$\mathbf{S_5}$	S_0	S_4	0
$\mathbf{S_6}$	S_3	S_2	1
$\mathbf{S_7}$	S_1	S_5	0

2) Reduce the states of the incompletely specified Mealy machine below using complete cover and draw the state transition table of the reduced machine in Moore model.

	00	**01**	**11**	**10**
a	a / 0	b / 0	c / 0	d / 1
b	b / 0	- / -	c / 0	- / -
c	a / 0	f / 0	c / 0	- / -
d	d / 0	- / -	e / 0	a / 0
e	e / 0	g / 0	d / 0	b / 0
f	- / -	f / 0	- / -	a / 0
g	- / -	g / 0	e / 0	c / 0

SOLUTIONS

1)

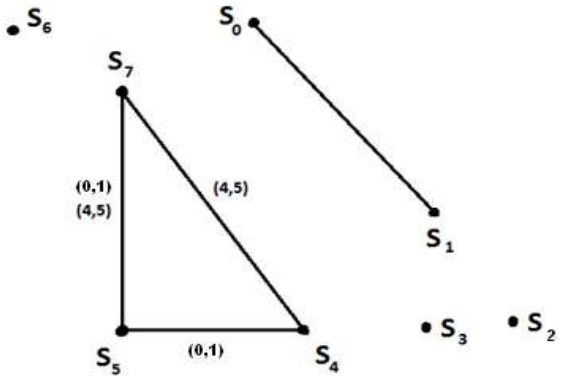
	0	**1**	**Output**
S_0	S_4	S_2	1
S_1	S_4	S_2	1
S_2	S_5	S_0	0
S_3	S_7	S_6	0
S_4	S_1	S_4	0
S_5	S_0	S_4	0
S_6	S_3	S_2	1
S_7	S_1	S_5	0

Moore

	0	**1**
S_0	S_4/0	S_2/0
S_1	S_4/0	S_2/0
S_2	S_5/0	S_0/1
S_3	S_7/0	S_6/1
S_4	S_1/1	S_4/0
S_5	S_0/1	S_4/0
S_6	S_3/0	S_2/0
S_7	S_1/1	S_5/0

Mealy

S_0	**S_1**	**S_2**	**S_3**	**S_4**	**S_5**	**S_6**	**S_7**
OK							
X	X						
X	X	(5,7) (0,6) X					
X	X	X	X				
X	X	X	X	(0,1) OK			
(3,4) X	(3,4) X	X	X	X	X		
X	X	X	X	(4,5) OK	(0,1) (4,5) OK	X	



	0	**1**
A	D/0	B/0
B	D/0	A/1
C	D/0	E/1
D	A/1	D/0
E	C/0	B/0

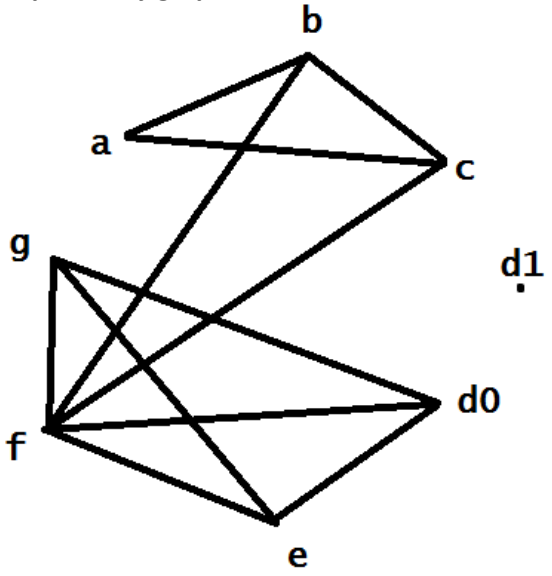
A={S_0,S_1}
B={S_2}
C={S_3}
D={S_4,S_5,S_7}
E={S_6}

2) Mealy →Moore:

	00	01	11	10	Output
a	a	b	c	d_1	0
b	b	-	c	-	0
c	a	f	c	-	0
d_0	d_0	-	e	a	0
e	e	g	d_0	b	0
f	-	f	-	a	0
g	-	g	e	c	0
d_1	d_0	-	e	a	1

a							
√	**b**						
(b,f) **√**	(a,b) **√**	**c**					
(c,e), (a,d_1) **X**	(c,e) **X**	(a,d_0), (c,e) **X**	**d_0**				
(b,g), (c,d_0), (b,d_1) **X**	(c,d_0) **X**	(a,e), (f,g), (c,d_0) **X**	(a,b) **√**	**e**			
(b,f), (a,d_1) **X**	**√**	**√**	**√**	(a,b), (g,f) **√**	**f**		
(b,g), (c,e), (c,d_1) **X**	(c,e) **X**	(c,e), (f,g) **X**	(a,c) **√**	(b,c), (d_0,e) **√**	(a,c) **√**	**g**	
X	**X**	**X**	**X**	**X**	**X**	**X**	**d_1**

Dependency graph:



Complete cover:

$S_1 = \{a,b,c\}$
$S_2 = \{d_0,e,f,g\}$
$S_3 = \{b,c,f\}$
$S_4 = \{d_1\}$

Reduced State Transition Table:

	00	01	11	10	Output
S1	S1	S3	S1,S3	S4	0
S2	S2	S2	S2	S1	0
S3	S1	S2,S3	S1,S3	S1	0
S4	S2	-	S2	S1	1