21W-COMSCIM51A-1 Homework 6

CHARLES ZHANG

TOTAL POINTS

96 / 100

QUESTION 1

1 1 6 / 6

✓ **- 0 pts** **Correct; Mealy, Mealy, Moore**

- **2 pts** Error in the 1st system
- **2 pts** Error in the 2nd system
- **2 pts** Error in the 3rd system

QUESTION 2

2 12 pts

2.1 a 6 / 6

✓ **- 0 pts** **Correct**

![2a.PNG](/files/7e533001-ae9d-4930-b5f1-583ecdd9d45a)

- **1 pts** Minor error
- **3 pts** Missing outputs inside states
- **3 pts** Error
- **4.5 pts** Major error or very incorrect behavior
- **6 pts** Blank

2.2 b 6 / 6

✓ **- 0 pts** **Correct**

![2b.PNG](/files/bb0166c5-fbf7-486e-b85a-ab5d5cc61ac8)

- **1 pts** Minor error
- **3 pts** Missing outputs on transitions
- **3 pts** Error
- **4.5 pts** Major error or very incorrect behavior
- **6 pts** Blank

QUESTION 3

3 3 10 / 10

✓ **- 0 pts** **Correct**

- **1 pts** Minor error
- **4 pts** Error
- **4 pts** Does not account for overlap
- **7 pts** Major error
- **10 pts** Blank

QUESTION 4

4 32 pts

4.1 a 8 / 8

✓ **- 0 pts** **Correct; False, True, True, False**

- **2 pts** Error in the 1st question
- **2 pts** Error in the 2nd question
- **2 pts** Error in the 3rd question
- **2 pts** Error in the 4th question

4.2 b 14 / 14

✓ **- 0 pts** **Correct; state name and row ordering can be different.**

![Screen_Shot_2021-02-13_at_10.05.51_PM.png](/files/a9300128-c7f6-44cd-a356-b6732c7c5050)

- **2 pts** Error in the 1st row
- **2 pts** Error in the 2nd row
- **2 pts** Error in the 3rd row
- **2 pts** Error in the 4th row
- **2 pts** Error in the 5th row
- **2 pts** Error in the 6th row
- **10 pts** More or less than 6 states
- **14 pts** Blank

4.3 c 10 / 10

✓ **- 0 pts** **Correct; 24 edges (with label like $$input/output$$) and 6 nodes in total;**

![Screen_Shot_2021-02-13_at_10.10.43_PM.png](/files/a38a92c1-ba0f-4e5a-9b5e-dfbaa0042e67)

- **2 pts** Error in node $$A$$ itself or edges starting

from it.

- **2 pts** Error in node $$B$$ itself or edges starting from it.
- **2 pts** Error in node $$CH$$ itself or edges starting from it.
- **2 pts** Error in node $$D$$ itself or edges starting from it.
- **2 pts** Error in node $$EG$$ itself or edges starting from it.
- **2 pts** Error in node $$F$$ itself or edges starting from it.
- **10 pts** Blank

QUESTION 5

5 5 6 / 10

- **0 pts** Correct (or Mealy equivalent)

![5.PNG](/files/fee1453a-4c06-40f1-818f-f421bf45c98e)

- **2 pts** Minor error

✓ **- 4 pts** **Missing self loops on input 3 or Doesn't reset on input other than 3**

- **4 pts** Error
- **6 pts** Major error
- **8 pts** Major design error
- **10 pts** Blank

QUESTION 6

6 6 10 / 10

✓ **- 0 pts** **Correct. 16 edges (with label like $$input/output$$ or just $$input$$) and 4 nodes (with label like $$state$$ or $$state/output$$) in total;**

![Screen_Shot_2021-02-13_at_9.54.36_PM.png](/files/f06945cf-dae5-450c-bae2-82e7a5437459)

- **2.5 pts** Error in node $$00$$ or $$00/01$$ itself or edges starting from it.
- **2.5 pts** Error in node $$01$$ or $$01/11$$ itself or edges starting from it.
- **2.5 pts** Error in node $$10$$ or $$10/00$$ itself or edges starting from it.
- **2.5 pts** Error in node $$11$$ or $$11/11$$ itself or edges starting from it.
- **10 pts** Blank

QUESTION 7

7 20 pts

7.1 a 10 / 10

✓ **- 0 pts** **Correct; state name and row ordering can be different, e.g. (a-e instead of S0-S4)**

![Screen_Shot_2021-02-13_at_9.49.16_PM.png](/files/a8763421-482a-4471-9dc7-cefb1b02421d)

![Screen_Shot_2021-02-13_at_9.34.05_PM.png](/files/e6028a59-809c-42e9-8570-7a97c8a20460)

- **5 pts** 1 missing/extra state
- **7 pts** 2 or more missing/extra states
- **4 pts** Missing state transition table, but correct states
- **2 pts** Error in the 1st row.
- **2 pts** Error in the 2nd row.
- **2 pts** Error in the 3rd row.
- **2 pts** Error in the 4th row.
- **2 pts** Error in the 5th row.
- **8 pts** Major/multiple errors
- **10 pts** Blank

7.2 b 10 / 10

✓ **- 0 pts** **Correct; Correct; state name and row ordering can be different, e.g. (a-e instead of S0-S4)**

![Screen_Shot_2021-02-13_at_9.40.49_PM.png](/files/db3c39b5-399e-4d8e-a405-849f953fbdcf)

![Screen_Shot_2021-02-13_at_9.48.39_PM.png](/files/ff95fd1f-29d2-4e19-840f-ae177476bd7e)

- **5 pts** 1 extra/missing state
- **7 pts** 2 or more extra or missing states
- **4 pts** Missing state transition table, but correct states
- **2 pts** Error in the 1st row.
- **2 pts** Error in the 2nd row.

- **2 pts** Error in the 3rd row.
- **2 pts** Error in the 4th row.
- **2 pts** Error in the 5th row.
- **8 pts** Major/multiple errors
- **10 pts** Blank

Charles Zhang
305413659

33

MSIA HW #6

1)

	Input	
PS	x=0	x=1
A	A,0	B,1
B	C,1	C,0
C	A,0	B,1
	NS, Output	

→ Mealy

	Input	
PS	x=0	x=1
A	B,0	C,0
B	B,1	C,0
C	A,1	B,1
	NS; Output	

→ Mealy

	Input	
PS	x=0	x=1
A	A,0	B,0
B	A,1	C,1
C	A,1	D,1
D	A,0	A,0
	NS, Output	

→ Moore

2a)

	Input	
PS	x=a	x=b
A	A,0	B,1
B	B,1	C,2
C	C,2	D,3
D	D,3	E,4
E	E,4	F,5
F	F,5	A,0
	NS, Output	

A → 0 bs
B → 1b
C → 2bs
D → 3bs
E → 4bs
F → 5bs

1 1 6 / 6

✓ - 0 pts Correct; Mealy, Mealy, Moore

- 2 pts Error in the 1st system
- 2 pts Error in the 2nd system
- 2 pts Error in the 3rd system

Charles Zhang
305413659

33

MSIA HW #6

1)

	Input	
PS	x=0	x=1
A	A,0	B,1
B	C,1	C,0
C	A,0	B,1
	NS, Output	

→ Mealy

	Input	
PS	x=0	x=1
A	B,0	C,0
B	B,1	C,0
C	A,1	B,1
	NS; Output	

→ Mealy

	Input	
PS	x=0	x=1
A	A,0	B,0
B	A,1	C,1
C	A,1	D,1
D	A,0	A,0
	NS, Output	

→ Moore

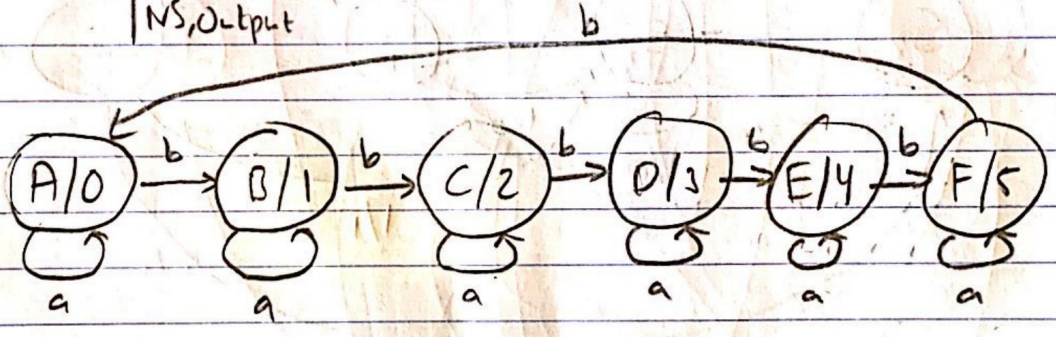
2a)

	Input	
PS	x=a	x=b
A	A,0	B,1
B	B,1	C,2
C	C,2	D,3
D	D,3	E,4
E	E,4	F,5
F	F,5	A,0
	NS, Output	

A → 0 bs
B → 1b
C → 2bs
D → 3bs
E → 4bs
F → 5bs

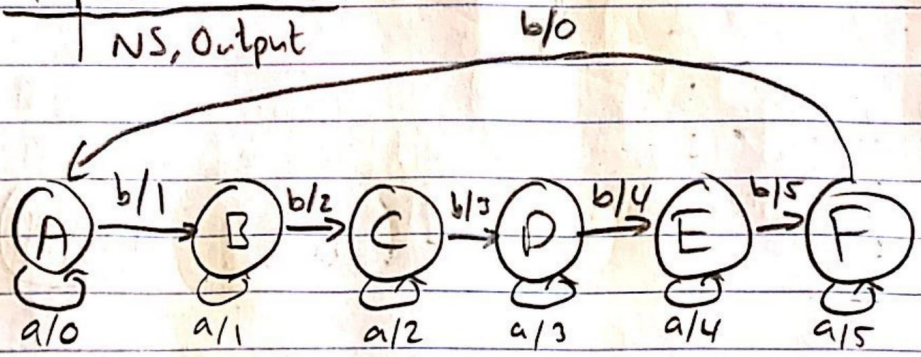
2a)

PS	Input x=a	Input x=b
A	A, 0	B, 0
B	B, 1	C, 1
C	C, 2	D, 2
D	D, 3	D, 3
E	E, 4	F, 4
F	F, 5	A, 5
	NS, Output	



2b)

PS	Input x=a	Input x=b
A	A, 0	B, 1
B	B, 1	C, 2
C	C, 2	D, 3
D	D, 3	E, 4
E	E, 4	F, 5
F	F, 5	A, 0
	NS, Output	



2.1 a **6 / 6**

✓ **- 0 pts** **Correct**

![2a.PNG](/files/7e533001-ae9d-4930-b5f1-583ecdd9d45a)

- 1 pts Minor error

- 3 pts Missing outputs inside states

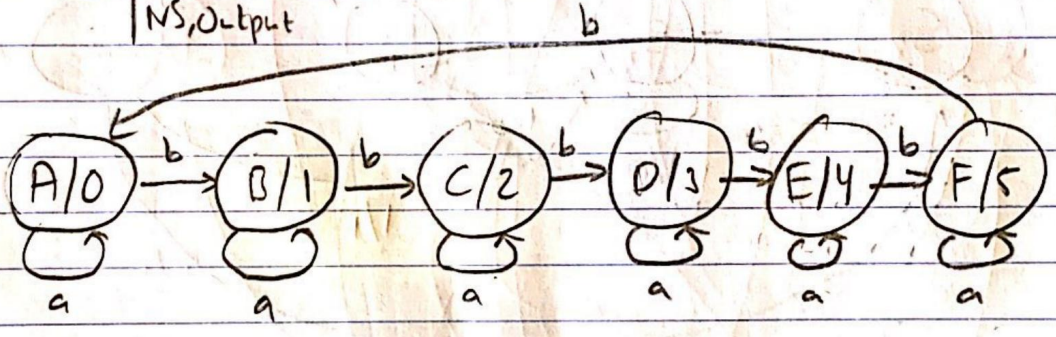
- 3 pts Error

- 4.5 pts Major error or very incorrect behavior

- 6 pts Blank

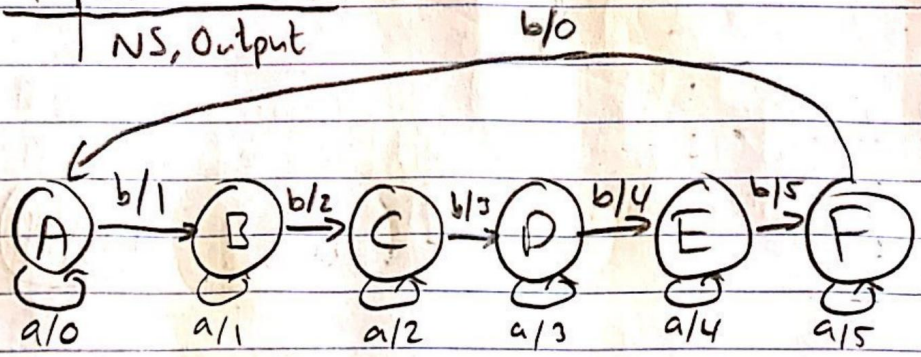
2a)

PS	Input x=a	Input x=b
A	A, 0	B, 0
B	B, 1	C, 1
C	C, 2	D, 2
D	D, 3	D, 3
E	E, 4	F, 4
F	F, 5	A, 5
	NS, Output	



2b)

PS	Input x=a	Input x=b
A	A, 0	B, 1
B	B, 1	C, 2
C	C, 2	D, 3
D	D, 3	E, 4
E	E, 4	F, 5
F	F, 5	A, 0
	NS, Output	



2.2 b 6 / 6

✓ **- 0 pts** **Correct**

![2b.PNG](/files/bb0166c5-fbf7-486e-b85a-ab5d5cc61ac8)

- 1 pts Minor error

- 3 pts Missing outputs on transitions

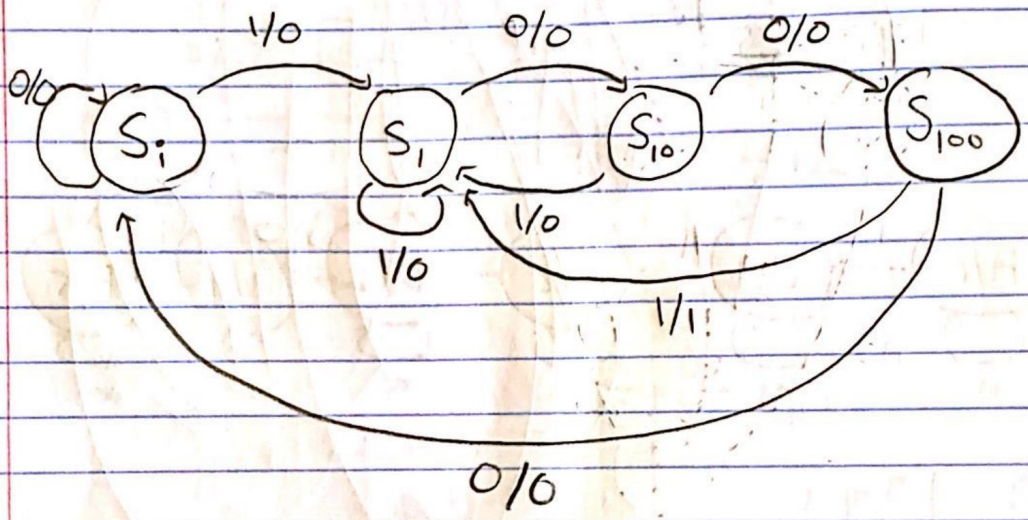
- 3 pts Error

- 4.5 pts Major error or very incorrect behavior

- 6 pts Blank

3) Student ID: 305413659
Last Digit: 9 = 1001
$z(t) = 1$ if $x(t-3, t) = 1001$ $\quad x(t) \in \{0, 1\}$
$z(t) = 0$ otherwise

S_i -> initial, S_1 -> 1 detected, S_{10} -> 10 detected, S_{100} -> 100 detected



4a) State A and B are 2-equivalent -> False
State C and D are 1-equivalent -> True
State G and H are 1-distinguishable -> True
State E and F are 1-equivalent -> False

3 3 **10 / 10**

✓ **- 0 pts** **Correct**

- 1 pts Minor error

- 4 pts Error

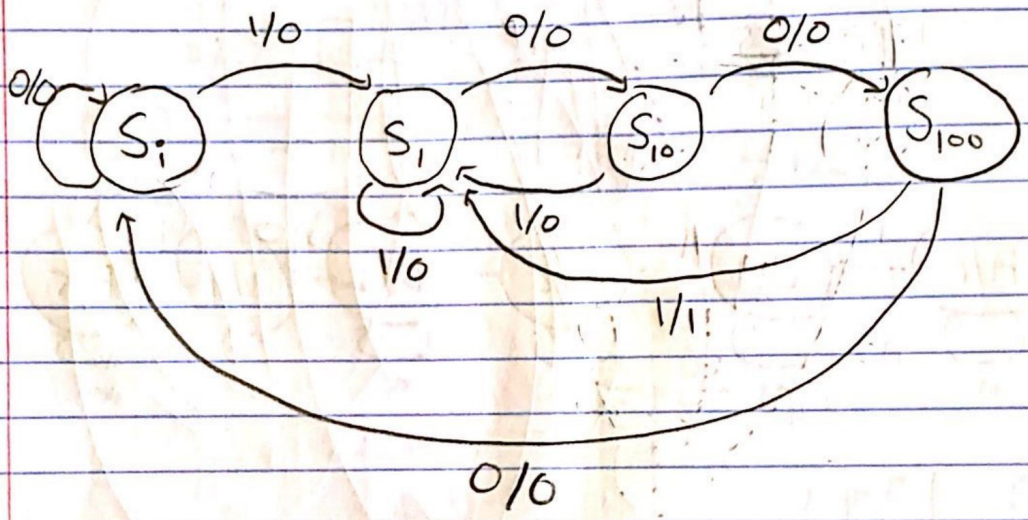
- 4 pts Does not account for overlap

- 7 pts Major error

- 10 pts Blank

3) Student ID: 305413659
Last Digit: 9 = 1001
$z(t) = 1$ if $x(t-3, t) = 1001$ $\quad x(t) \in \{0, 1\}$
$z(t) = 0$ otherwise

S_i -> initial, S_1 -> 1 detected, S_{10} -> 10 detected, S_{100} -> 100 detected



4a) State A and B are 2-equivalent -> False
State C and D are 1-equivalent -> True
State G and H are 1-distinguishable -> True
State E and F are 1-equivalent -> False

4.1 a **8 / 8**

✓ **- 0 pts** **Correct; False, True, True, False**

- 2 pts Error in the 1st question

- 2 pts Error in the 2nd question

- 2 pts Error in the 3rd question

- 2 pts Error in the 4th question

45) $P_1 = (ACDH)(BEG)(F)$

	A	CDH	BEG	F
a	2	2 2 2	1 1 1	1
b	2	2 2 2	2 2 2	2
c	2	3 3 3	2 2 2	1
d	1	1 1 1	3 3 3	2

$P_2 = (A)(CDH)(BEG)(F)$

	A	C	D	H	BEG	F
a	3	3	3	3	2 2 2	2
b	3	3	3	3	3 3 3	3
c	3	4	4	4	3 3 3	1
d	2	1	2	1	4 4 4	3

$P_3 = (A)(D)(CH)(BEG)(F)$

	A	D	CH	BEG	F
a	4	4	4 4	2 3 3	3
b	4	4	4 4	4 4 4	4
c	4	5	5 5	4 4 4	1
d	3	3	1 1	5 5 5	4

$P_4 = (A)(B)(D)(F)(CH)(EG)$

	A	B	D	F	CH	EG
a	6	3	6	5	6 6	5 5
b	6	6	6	2	6 6	6 6
c	6	6	4	1	4 4	6 6
d	5	4	5	2	1 1	4 4

	Inputs			
PS	x=a	x=b	x=c	x=d
A	EG,1	EG,0	EG,1	CH,0
B	D,0	EG,0	EG,0	F,1
D	EG,1	EG,0	F,1	CH,0
F	CH,1	B,1	A,0	B,1
CH	EG,1	EG,0	F,1	A,0
EG	CH,0	EG,0	EG,0	F,1
	NS, z			

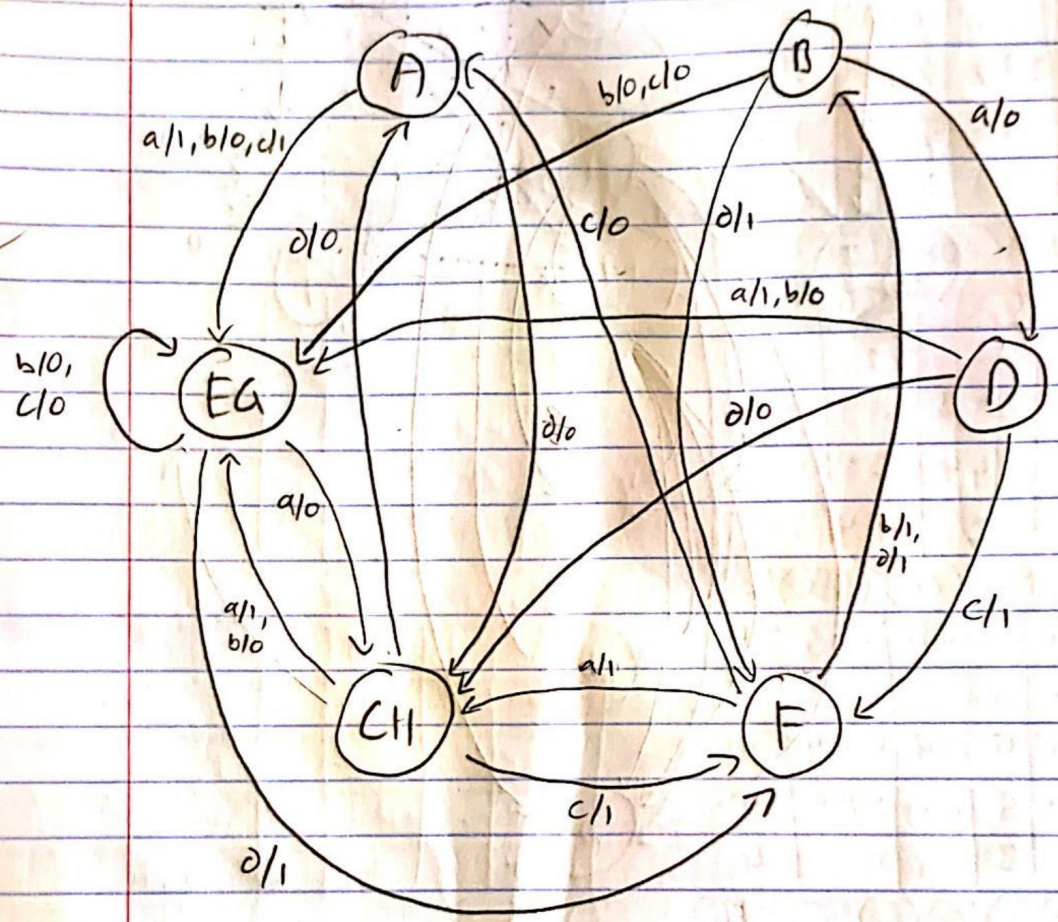
4.2 b **14 / 14**

✓ **- 0 pts Correct; state name and row ordering can be different.**

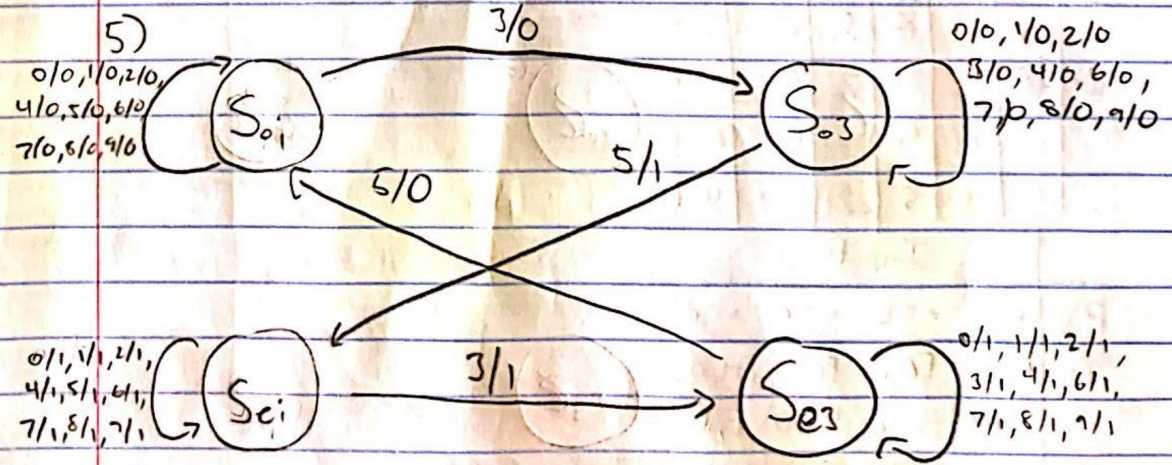
![Screen_Shot_2021-02-13_at_10.05.51_PM.png](/files/a9300128-c7f6-44cd-a356-b6732c7c5050)

- **2 pts** Error in the 1st row
- **2 pts** Error in the 2nd row
- **2 pts** Error in the 3rd row
- **2 pts** Error in the 4th row
- **2 pts** Error in the 5th row
- **2 pts** Error in the 6th row
- **10 pts** More or less than 6 states
- **14 pts** Blank

4c)



5)



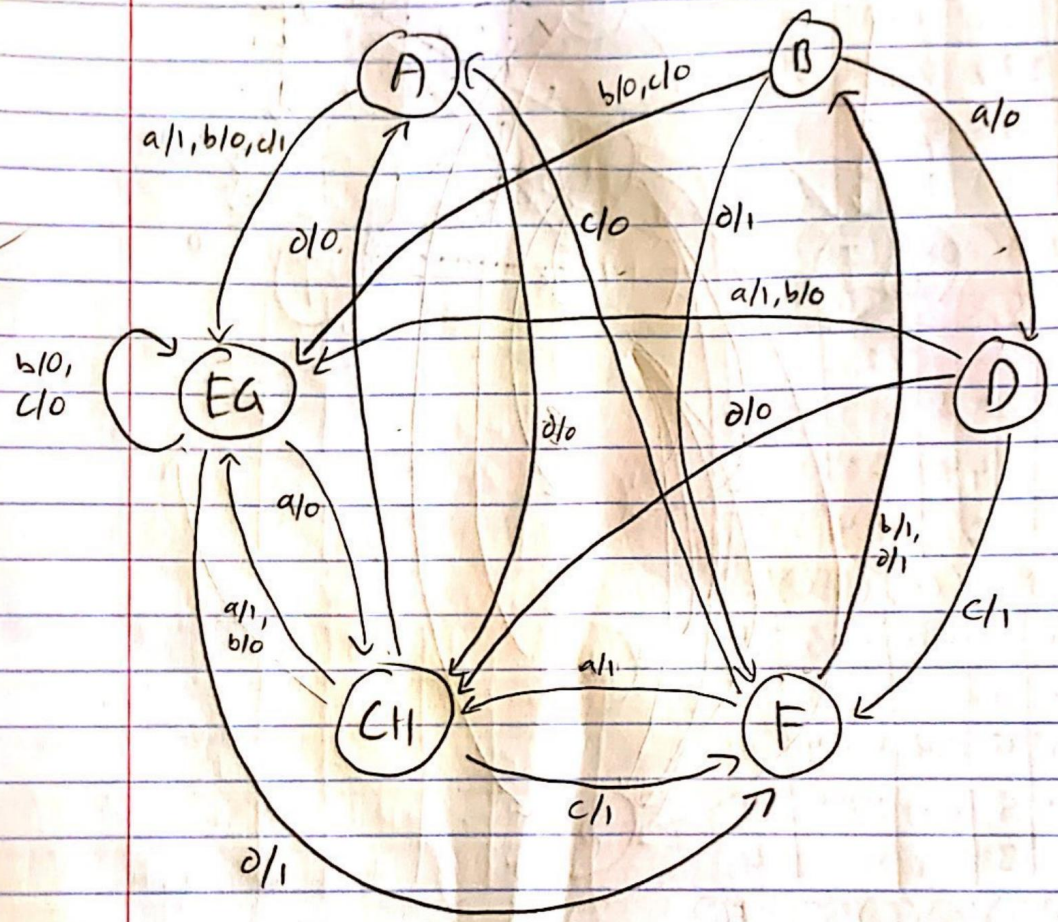
4.3 C **10 / 10**

✓ **- 0 pts Correct; 24 edges (with label like $$input/output$$) and 6 nodes in total;**

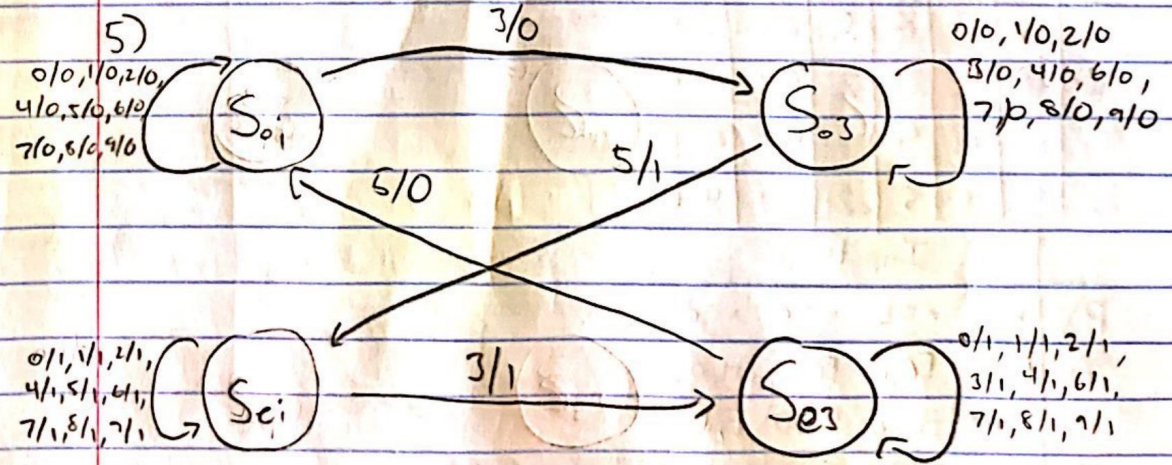
![Screen_Shot_2021-02-13_at_10.10.43_PM.png](/files/a38a92c1-ba0f-4e5a-9b5e-dfbaa0042e67)

- **2 pts** Error in node $$A$$ itself or edges starting from it.
- **2 pts** Error in node $$B$$ itself or edges starting from it.
- **2 pts** Error in node $$CH$$ itself or edges starting from it.
- **2 pts** Error in node $$D$$ itself or edges starting from it.
- **2 pts** Error in node $$EG$$ itself or edges starting from it.
- **2 pts** Error in node $$F$$ itself or edges starting from it.
- **10 pts** Blank

4c)



5)



5 5 6 / 10

- **0 pts** Correct (or Mealy equivalent)

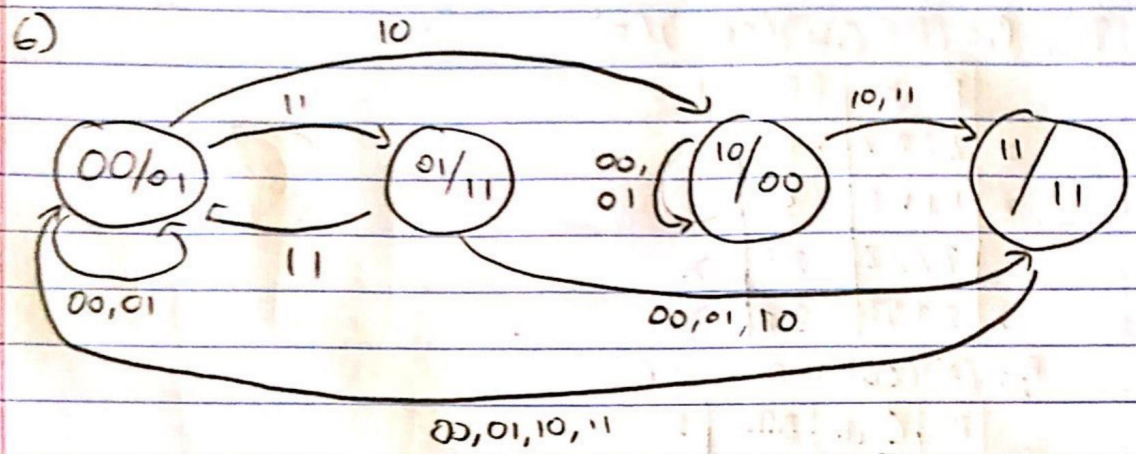
![5.PNG](/files/fee1453a-4c06-40f1-818f-f421bf45c98e)

- **2 pts** Minor error

✓ **- 4 pts** **Missing self loops on input 3 or Doesn't reset on input other than 3**

- **4 pts** Error
- **6 pts** Major error
- **8 pts** Major design error
- **10 pts** Blank

6)



7a) $P_1 = (abce)(dh)(f)(g)$

	abce	dh	f	g
0	3232	4 4	x	x
1	1111	1 1	x	x

$P_2 = (ac)(be)(dh)(f)(g)$

	ac	be	dh	f	g
0	4 4	3 3	5 5	x	x
1	2 2	1 1	1 1	x	x

	Input	
PS	x=0	x=1
ac	f, 0	be, 0
be	dh, 0	ac, 0
dh	g, 1	ac, 0
f	f, 1	be, 1
g	g, 0	dh, 1
	Ns, z	

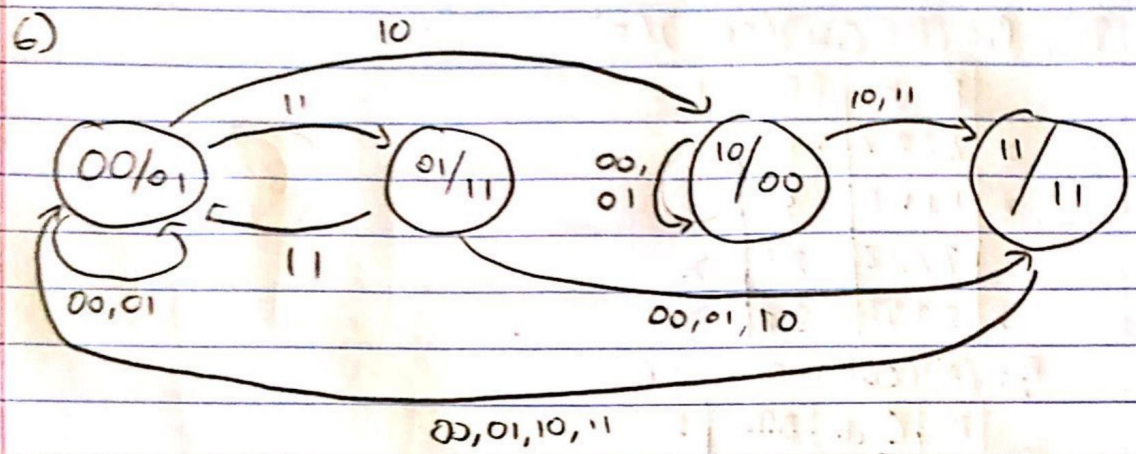
6 6 **10 / 10**

✓ **- 0 pts Correct. 16 edges (with label like $$input/output$$ or just $$input$$) and 4 nodes (with label like $$state$$ or $$state/output$$) in total;**

![Screen_Shot_2021-02-13_at_9.54.36_PM.png](/files/f06945cf-dae5-450c-bae2-82e7a5437459)

- **2.5 pts** Error in node $$00$$ or $$00/01$$ itself or edges starting from it.
- **2.5 pts** Error in node $$01$$ or $$01/11$$ itself or edges starting from it.
- **2.5 pts** Error in node $$10$$ or $$10/00$$ itself or edges starting from it.
- **2.5 pts** Error in node $$11$$ or $$11/11$$ itself or edges starting from it.
- **10 pts** Blank

6)



7a) $P_1 = (abce)(dh)(f)(g)$

	abce	dh	f	g
0	3232	4 4	x	x
1	1111	1 1	x	x

$P_2 = (ac)(be)(dh)(f)(g)$

	ac	be	dh	f	g
0	4 4	3 3	5 5	x	x
1	2 2	1 1	1 1	x	x

	Input	
PS	x=0	x=1
ac	f, 0	be, 0
be	dh, 0	ac, 0
dh	g, 1	ac, 0
f	f, 1	be, 1
g	g, 0	dh, 1
	Ns, z	

7.1 a **10 / 10**

✓ **- 0 pts Correct; state name and row ordering can be different, e.g. (a-e instead of S0-S4)**

![Screen_Shot_2021-02-13_at_9.49.16_PM.png](/files/a8763421-482a-4471-9dc7-cefb1b02421d)

![Screen_Shot_2021-02-13_at_9.34.05_PM.png](/files/e6028a59-809c-42e9-8570-7a97c8a20460)

- **5 pts** 1 missing/extra state
- **7 pts** 2 or more missing/extra states
- **4 pts** Missing state transition table, but correct states
- **2 pts** Error in the 1st row.
- **2 pts** Error in the 2nd row.
- **2 pts** Error in the 3rd row.
- **2 pts** Error in the 4th row.
- **2 pts** Error in the 5th row.
- **8 pts** Major/multiple errors
- **10 pts** Blank

7b) $P_1 = (ACGH)(BDE)(F)$

	ACGH	BDE	F
a	2222	111	X
b	1111	333	X
c	2222	222	X
d	2333	222	X

$P_2 = (A)(CGH)(BDE)(F)$

	A	CGH	BDE	F
a	X	333	222	X
b	X	112	444	X
c	X	333	333	X
d	X	444	333	X

$P_2 = (A)(CG)(H)(BDE)(F)$

	A	CG	H	BDE	F
a	X	44	X	222	X
b	X	11	X	555	X
c	X	44	X	444	X
d	X	55	X	444	X

	Input			
PS	x=a	x=b	x=c	x=d
A	BDE,1	CG,0	BDE,1	ADE,1
CG	BDE,1	A,0	BDE,1	F,1
H	BDE,1	CG,0	BDE,1	F,1
BDE	CG,0	F,1	BDE,1	BDE,0
F	CG,1	F,1	BDE,0	H,0
	NS,Z			

7.2 b **10 / 10**

✓ **- 0 pts** **Correct; Correct; state name and row ordering can be different, e.g. (a-e instead of S0-S4)**

![Screen_Shot_2021-02-13_at_9.40.49_PM.png](/files/db3c39b5-399e-4d8e-a405-849f953fbdcf)

![Screen_Shot_2021-02-13_at_9.48.39_PM.png](/files/ff95fd1f-29d2-4e19-840f-ae177476bd7e)

- **5 pts** 1 extra/missing state
- **7 pts** 2 or more extra or missing states
- **4 pts** Missing state transition table, but correct states
- **2 pts** Error in the 1st row.
- **2 pts** Error in the 2nd row.
- **2 pts** Error in the 3rd row.
- **2 pts** Error in the 4th row.
- **2 pts** Error in the 5th row.
- **8 pts** Major/multiple errors
- **10 pts** Blank