Charles Zhang
305413-655

MSIA HW #8

1a) JK → $Q(t+1) = Q(t)K'(t) + Q'(t)J(t)$

$y_1(t+1) = (y_1(y_0' y_1' x_1')) + y_1'(y_0 + x_0')$

$\boxed{y_1(t+1) = y_1(y_0 + y_1 + x_1') + y_1'(y_0 + x_0')}$ → $y_1 + y_0 + x_0'$

T → $Q(t+1) = Q(t) \oplus T(t)$

$y_0(t+1) = y_0 \oplus (x_1' y_0' + y_1' x_0)$

$A \oplus B = AB' + A'B$

$\boxed{y_0(t+1) = y_0(x_1' y_0' + y_1' x_0)' + y_0'(x_1' y_0' + y_1' x_0)}$

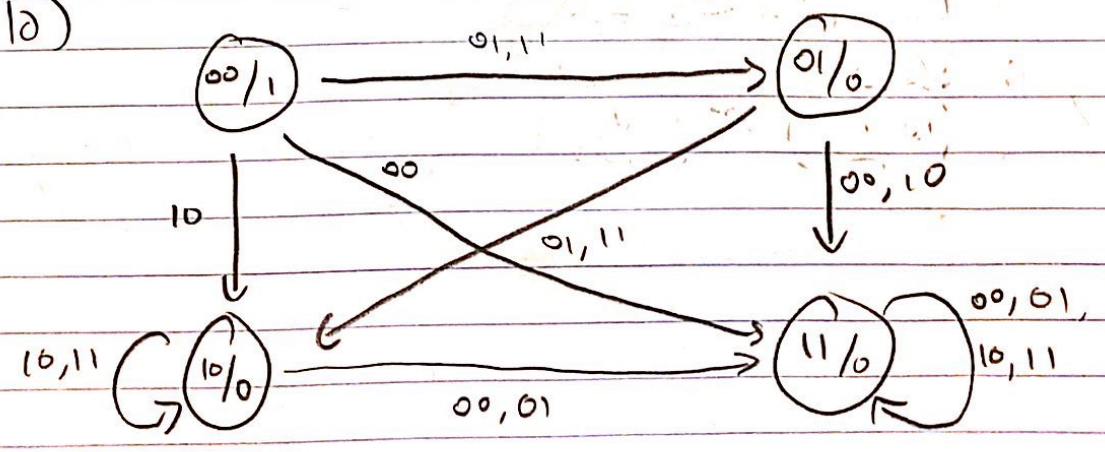
$\boxed{z = y_1' y_0'}$

1b)

PS	Input $x_1(t) x_0(t)$				Output
$y_1(t)\ y_0(t)$	00	01	10	11	z_1
00	11	01	10	01	1
01	11	10	11	10	0
10	11	11	10	10	0
11	11	11	11	11	0
	$y_1(t+1)\ y_0(t+1)$				
	NS				

1c) Moore

1d)



2a) $T2 = Q_0 + (Q_2 \oplus Q_1)'$

$T2 = Q_0 + (Q_2Q_1' + Q_2'Q_1)'$

$T2 = Q_0 + (Q_2Q_1')'(Q_2'Q_1)'$

$T2 = Q_0 + (Q_2' + Q_1)(Q_2 + Q_1')$

$\boxed{T2 = Q_0 + (Q_1Q_2) + (Q_1'Q_2')}$

$\boxed{T1 = Q_1 + Q_0}$

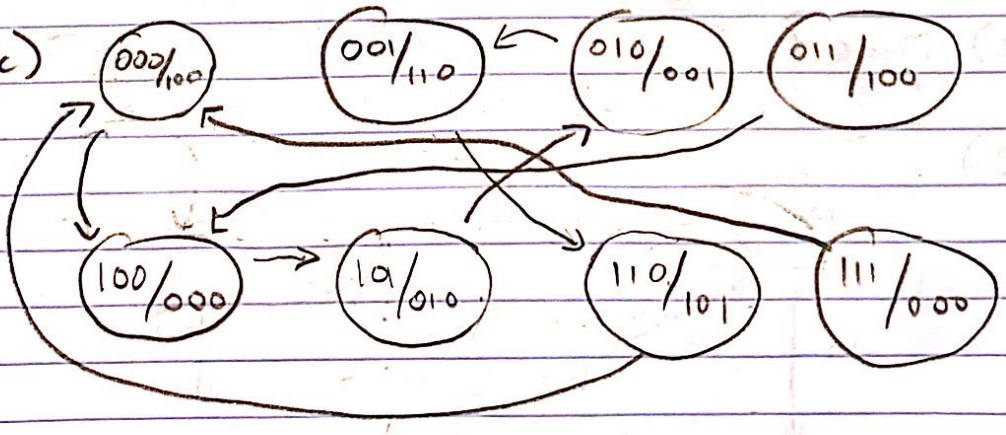
$T0 = Q_0 + (Q_2 \oplus Q_1)$

$\boxed{T0 = Q_0 + (Q_2Q_1' + Q_2'Q_1)}$

2b)

PS	NS/output	T-inputs
$Q_2Q_1Q_0$	$Q_2(t+1)Q_1(t+1)Q_0(t+1)$	T2T1T0
000	100	100
001	110	111
010	001	011
011	100	111
100	101	001
101	010	111
110	000	110
111	000	111

2c)

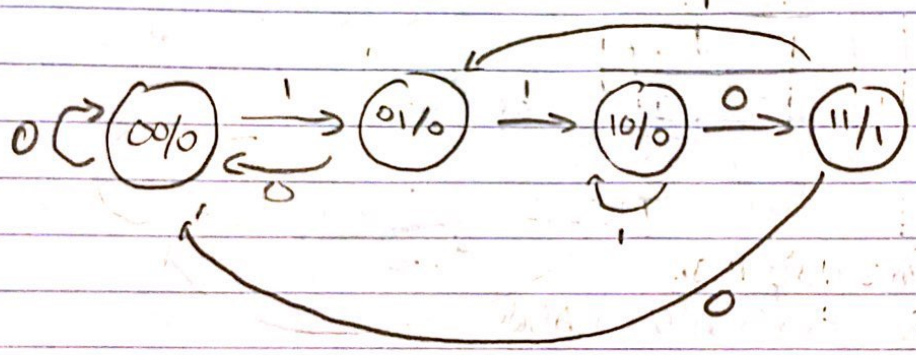


3) 001

4a) Input: $x(t) \in \{0,1\}$

Output: $z(t) \in \{0,1\}$

Function: $z(t) = \begin{cases} 1 \text{ if } x(t-3,t) = 110 \\ 0 \text{ otherwise} \end{cases}$



4b)

	Input		
PS	$x(t)=0$	$x(t)=1$	z
00	00	01	0
01	00	10	0
10	11	10	0
11	00	01	1
	NS		

4c) $D_A \rightarrow$ left, $D_B \rightarrow$ right

PS		Input	NS				
A	B	x	A	B	D_A	D_B	z
0	0	0	0	0	0	0	0
0	0	1	0	1	0	1	0
0	1	0	0	0	0	0	0
0	1	1	1	0	1	0	0
1	0	0	1	1	1	1	0
1	0	1	1	0	1	0	0
1	1	0	0	0	0	0	1
1	1	1	0	1	0	1	1

4c) D_A:

A \ x	00	01	11	10
0	0	0	1	0
1	1	1	0	0

$D_A = B$

D_B:

A \ x	00	01	11	10
0	0	1	0	0
1	1	0	1	0

$D_B = B$

z:

A \ x	00	01	11	10
0	0	0	0	0
1	0	0	1	11

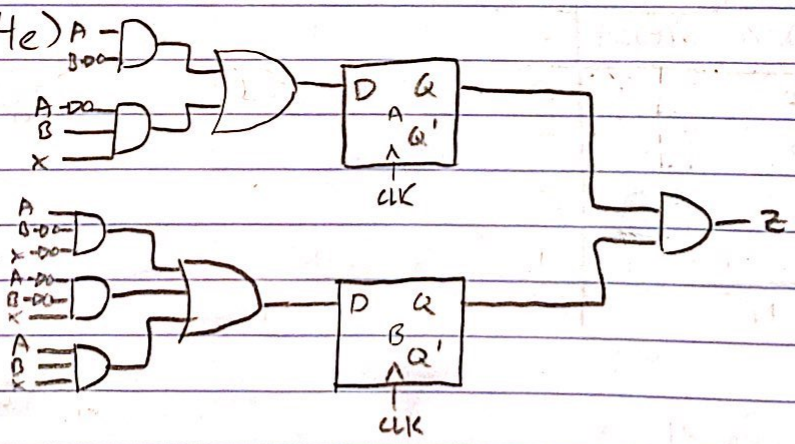
$z = B$

4d) $D_A = AB' + A'Bx$

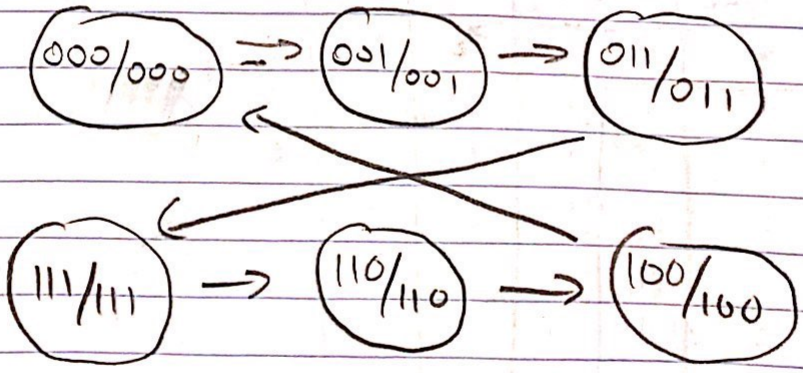
$D_B = AB'x' + A'B'x + ABx$

$z = AB$

4e)



5a)



5b)

	PS	NS	T-inputs
	$Q_2Q_1Q_0$	$Q_2(t+1)Q_1(t+1)Q_0(t+1)$	$T_2T_1T_0$
0	000	001	001
1	001	011	010
3	011	111	100
7	111	110	001
6	110	100	010
4	100	000	100

5c) T_2:

Q_2 \ Q_1	0	0	1	X
1	1	X	0	0

T_1:

Q_2 \ Q_0	0	1	0	X
0	0	X	0	1

T_0:

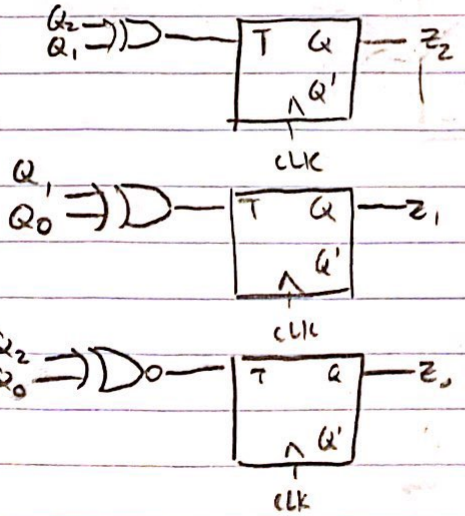
Q_2 \ Q_1	1	0	0	X
0	0	X	1	0

5d) $T_2 = Q_2Q_1' + Q_2'Q_1 = Q_2 \oplus Q_1$

$T_1 = Q_1'Q_0 + Q_1Q_0' = Q_1 \oplus Q_0$

$T_0 = Q_2'Q_0' + Q_2Q_0 = (Q_2 \oplus Q_0)'$

5e)

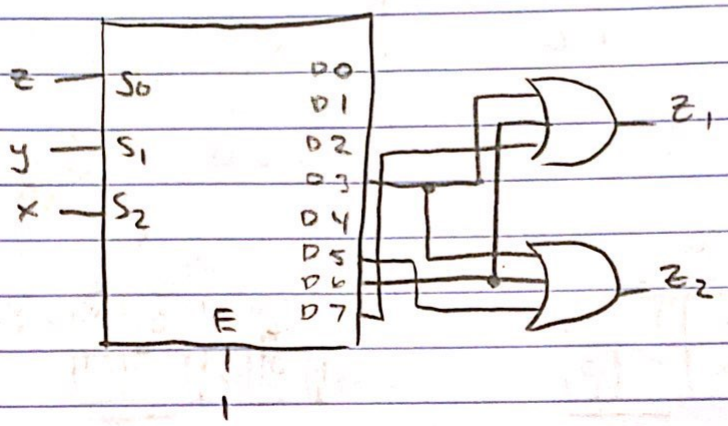


6) $z_1 = xyz + xyz' + x'yz$

$z_2 = xy'z + xyz' + x'yz$

$z_1 = \Sigma m(3,6,7)$

$z_2 = \Sigma m(3,5,6)$



7)