

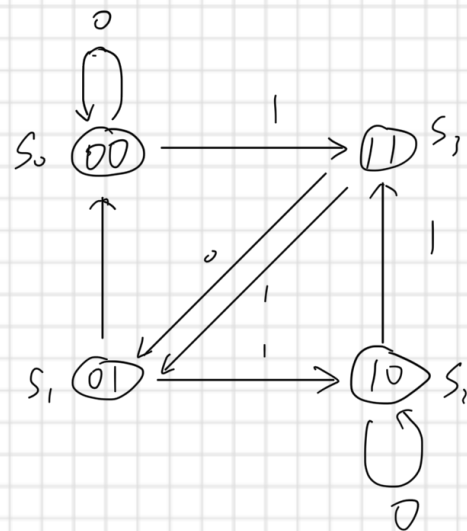
Digital logic Ass 3 123/0401 王子恒.

$$1. (a) A(t+1) = J_A A(t)' + K_A' A(t) \\ = x A(t)' + A(t) B(t)'$$

$$B(t+1) = J_B B(t)' + K_B' B(t) \\ = x B(t)' + A(t) B(t)$$

b)

Present state		Input	Next State	
Q_A	Q_B		Q_A	Q_B
0	0	0	0	0
0	0	1	1	1
0	1	0	0	0
0	1	1	1	0
1	0	0	1	0
1	0	1	1	1
1	1	0	0	1
1	1	1	0	1

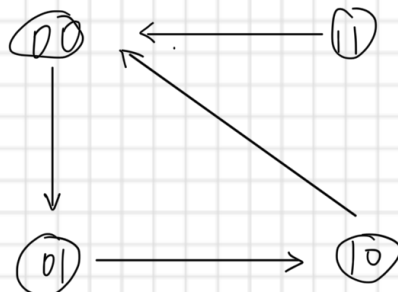


$$2. T_A = A + B \quad T_B = A' + B$$

$$A(t+1) = T_A \oplus A \\ = (A+B) \oplus A \\ = (A+B)'A + (A+B)A' \\ = A'B$$

$$B(t+1) = T_B \oplus B \\ = (A'+B) \oplus B \\ = (A'+B)'B + (A'+B)B' \\ = A'B'$$

Present State		Next State	
Q_A	Q_B	Q_A	Q_B
0	0	0	1
0	1	1	0
1	0	0	0
1	1	0	0



It's a Moore model performs a running LEDs

$$3. (a) \quad J_1 = X \quad K_1 = (X Q_2')'$$

$$J_2 = X \quad K_2 = (X Q_1)'$$

$$F = X \oplus Q_2'$$

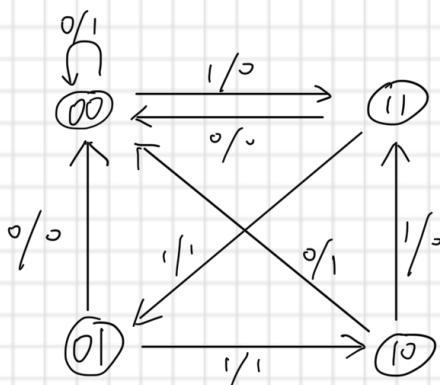
$$Q_1(t+1) = J_1 Q_1'(t) + K_1' Q_1(t)$$

$$= X Q_1'(t) + X Q_2(t)' Q_1(t)$$

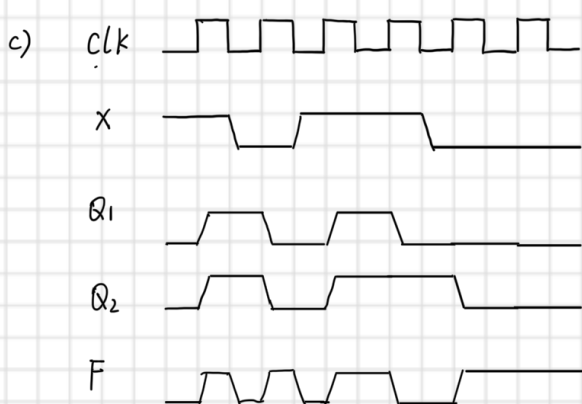
$$Q_2(t+1) = J_2 Q_2'(t) + K_2' Q_2(t)$$

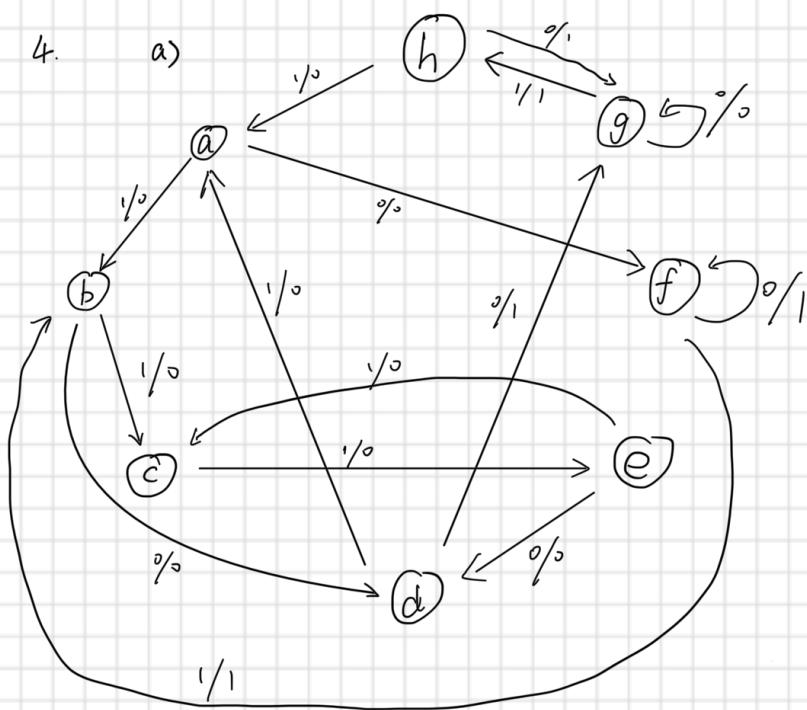
$$= X Q_2'(t) + X Q_1(t) Q_2(t)$$

Present State	Input	Next State	Output
$Q_1 \quad Q_2$	X	$Q_1 \quad Q_2$	F
0 0	0	0 0	1
0 0	1	1 1	0
0 1	0	0 0	0
0 1	1	1 0	1
1 0	0	0 0	1
1 0	1	1 1	0
1 1	0	0 0	0
1 1	1	0 1	1



b) Mealy machine because the output depends on current state and state.





b) Present State Next State Output

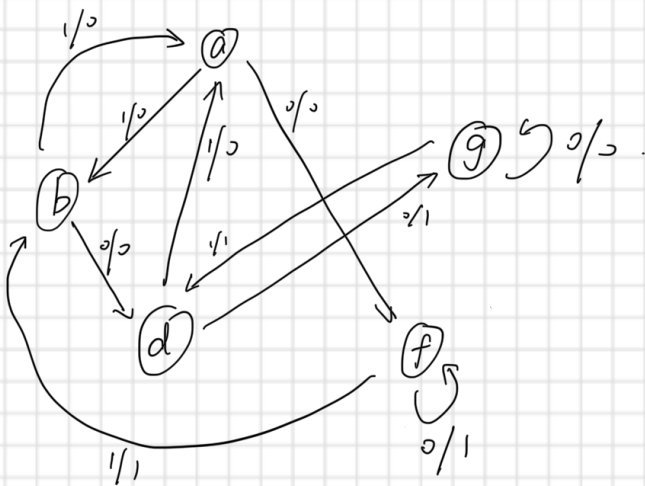
1st		x=0	x=1	x=0	x=1
	a	f	b	0	0
	b	d	c	0	0
	c	f	e b	0	0
	d	g	a	1	0
	e	d	c	0	0
	f	f	b	1	1
	g	g	h d	0	1
	h	g	a	1	0

Handwritten notes: b=e (purple arrow from row b to row e), d=h (blue arrow from row d to row h)

2nd

	Present State	Next state		Output	
		x=0	x=1	x=0	x=1
a=c	a	f	b	0	0
	b	d	c a	0	0
	c	f	b	0	0
	d	g	a	1	0
	f	f	b	1	1
	g	g	d	0	1

Present state	Next state		Output	
	$x=0$	$x=1$	$x=0$	$x=1$
a	f	b	0	0
b	d	a	0	0
d	g	a	1	0
f	f	b	1	1
g	g	d	0	1



c) original state table

t	0	1	2	3	4	5	6	7	8	9	10	11
s	a	f	b	d	a	f	f	b	d	a	b	a
x	0	1	0	1	0	0	1	0	1	1	1	
y	0	1	0	0	0	1	1	0	0	0	0	

$$y = 01000110000$$

reduced state table

t	0	1	2	3	4	5	6	7	8	9	10	11
s	a	f	b	d	a	f	f	b	d	a	b	a
x	0	1	0	1	0	0	1	0	1	1	1	
y	0	1	0	0	0	1	1	0	0	0	0	

$$y = 01000110000$$

5. a)

$R=0$	$H=0$:	$Q=0$	$P=1$	Reset output
$R=0$	$H=1$:	$Q_{prev}=0$		$Q_{prev}=1$
			$\left\{ \begin{array}{l} Q=0 \\ P=1 \end{array} \right.$		$Q=1$
					$P=0$

$Q = Q_{prev}$ Memory

$R=1$	$H=0$:	$Q=1$	$P=1$	Invalid
$R=1$	$H=1$:	$Q=1$	$P=0$	Set output

S	R	Q	P/Q'	
0	0	0	1	Reset state
0	1	last Q	last P/Q'	no change
1	0	1	1	forbidden
1	1	1	0	Set state

b)

