

13.3

(a)

$$A^+ = AKA' + A'JA = A(B' + X) + A'(BX' + B'X)$$

$$B^+ = B'JB + BKB' = AB'X + B(A' + X')$$

$$Z = AB$$

		X	
		0	1
A ⁺	A B		
00	00	0	1
01	01	1	0
11	11	0	1
10	10	1	1

		X	
		0	1
B ⁺	A B		
00	00	0	0
01	01	1	1
11	11	1	0
10	10	0	1

(b)

$$X = 0\ 1\ 1\ 0\ 0$$

$$AB = 00\ 00\ 10\ 11\ 01\ 11$$

$$Z = (0)\ 0\ 0\ 1\ 0\ 1$$

13.7

(a)

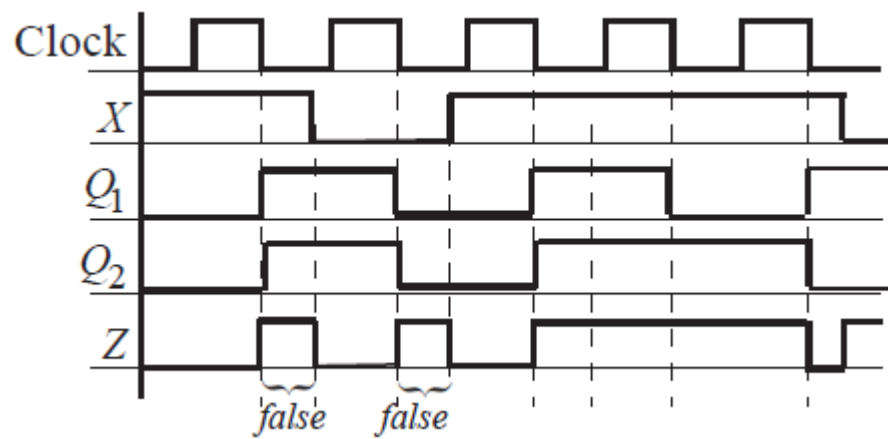
$$Q_1^+ = J_1Q_1' + K_1'Q_1 = XQ_1' + XQ_2'Q_1$$

$$Q_2^+ = J_2Q_2' + K_2'Q_2 = XQ_2' + XQ_1Q_2$$

$$Z = X'Q_2' + XQ_2$$

Present State Q_1Q_2	Next State $Q_1^+Q_2^+$		Z	
	X=0	X=1	X=0	X=1
00	00	11	1	0
01	00	10	0	1
11	00	01	0	1
10	00	11	1	0

(b)



(c)

Z = 00011

13.9

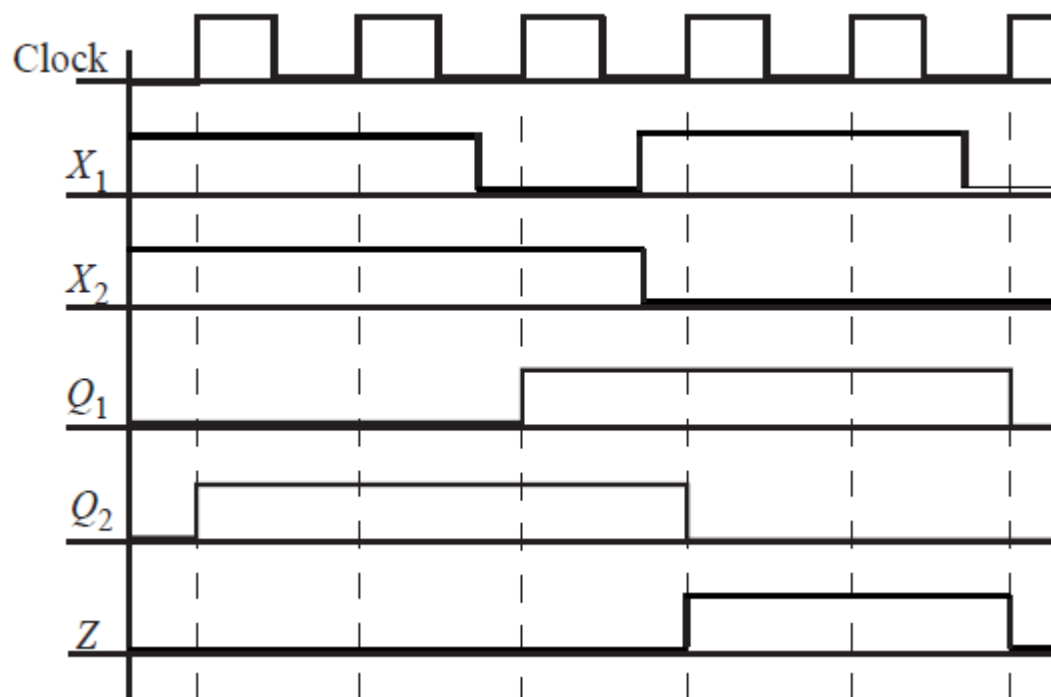
(a)

$$Q_1+ = D_1 = (X_1' + X_2' + Q_1)(Q_1 + Q_2)(X_1' + Q_2)$$

$$Q_2+ = D_2 = (X_1'X_2' + Q_1')(X_1X_2 + Q_2)$$

$$Z = Q_1Q_2'$$

(b)



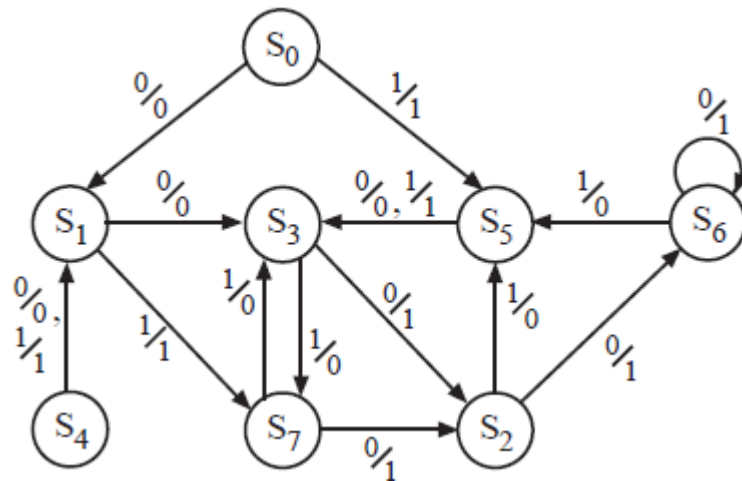
(c)

$Z = (0)000110$

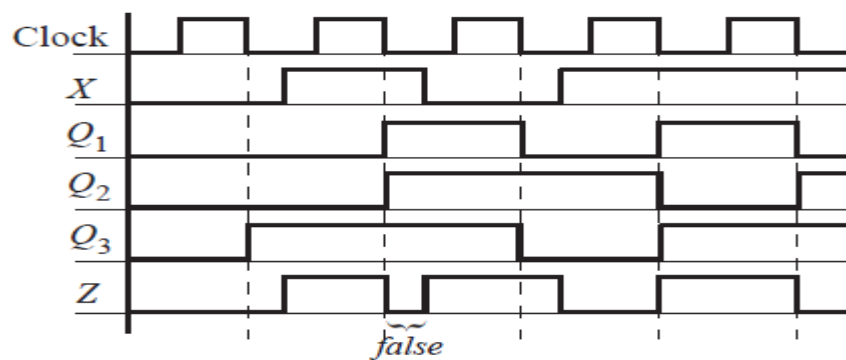
13.15

(a)

State	Present State $Q_1Q_2Q_3$	Next State $Q_1^+Q_2^+Q_3^+$		Z	
		$X=0$	$X=1$	$X=0$	$X=1$
S_0	000	001	101	0	1
S_1	001	011	111	0	1
S_2	010	110	101	1	0
S_3	011	010	111	1	0
S_4	100	001	001	0	1
S_5	101	011	011	0	1
S_6	110	110	101	1	0
S_7	111	010	011	1	0



(b)



(c)

From diagram: 0, 1, (0), 1, 0, 1

From graph: 0, 1, 1, 0, 1

(They are the same, except for the false output)

13.23

Clock Cycle	Information Gathered
1	$Q_1Q_2 = 00, X_1X_2 = 01 \Rightarrow Z_1Z_2 = 10, Q_1^+Q_2^+ = 01$
2	$Q_1Q_2 = 01, X_1X_2 = 01 \Rightarrow Z_1Z_2 = 01; X_1X_2 = 10 \Rightarrow Z_1Z_2 = 10, Q_1^+Q_2^+ = 10$
3	$Q_1Q_2 = 10, X_1X_2 = 10 \Rightarrow Z_1Z_2 = 00; X_1X_2 = 11 \Rightarrow Z_1Z_2 = 00, Q_1^+Q_2^+ = 01$
4	$Q_1Q_2 = 01, X_1X_2 = 11 \Rightarrow Z_1Z_2 = 11; X_1X_2 = 01 \Rightarrow (Z_1Z_2 = 01), Q_1^+Q_2^+ = 11$
5	$Q_1Q_2 = 11, X_1X_2 = 01 \Rightarrow Z_1Z_2 = 01$

Present State Q_1Q_2	$Q_1^+Q_2^+$				Z_1Z_2			
	$X_1X_2 =$				$X_1X_2 =$			
	00	01	11	10	00	01	11	10
00	?	01	?	?	?	10	?	?
01	?	11	?	10	?	01	11	10
11	?	?	?	?	?	01	?	?
10	?	?	01	?	?	?	00	00

When $Q_1Q_2 = 01$, the outputs Z_1Z_2 vary depending on the inputs X_1X_2 , so this is a Mealy machine.