Switching Circuits & Logic Design, Fall 2013

Quiz # 2 (2013-12-12, **from 2:20pm ~ 3:20pm**)

Problem 1: (30 points)

Please design an even-odd counter which counts in sequence (ABC) = 000, 010, 100, 110, 111, 101, 011, 001, 000 …, using 3 J-K Flip Flops and minimum logic gates. Given the state table of J-K Flip Flops below, please finish the K-map of $J_A, K_A, J_B, K_B, J_C, K_C$, and show the SOP of them.

Q	Q^+	J	K
0	0	0	x
0	1	1	x
1	0	x	1
1	1	x	0

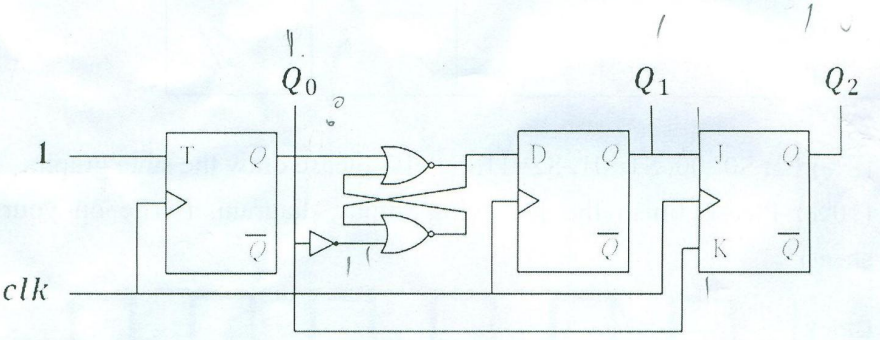
Figure p1.1 State table of J-K Flip Flop

BC \ A	0	1
00		
01		
11		
10		

Figure p1.2 K-map

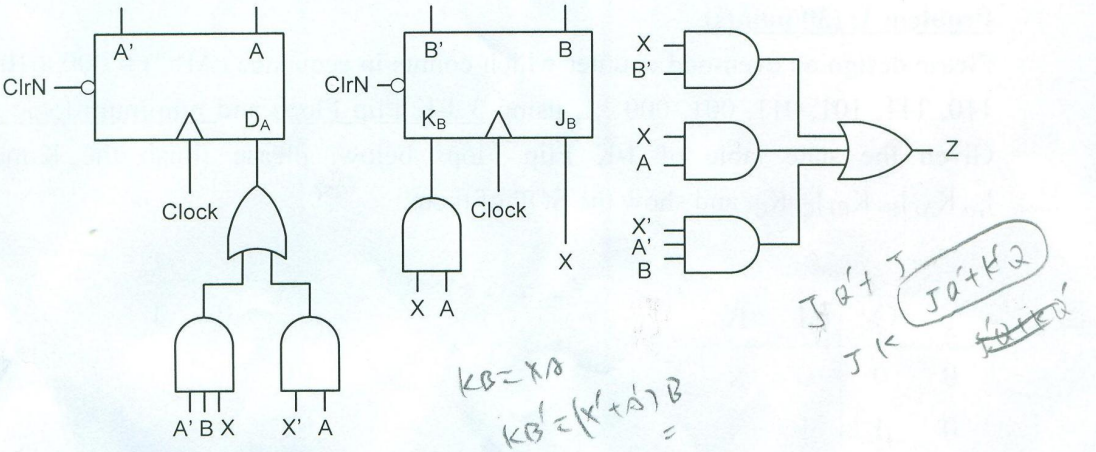
Problem 2: (30 points)

Derive the state graph of circuit below. Assume the circuit with initial value $(Q_2Q_1Q_0) = (000)$



Problem 3: (40 points)

For the following sequential circuit, where X is the input pin and Z is the output pin, please answer the followings questions:



(a) (5%) Is it a Moore machine or a mealy machine?

(b) (9%) Please derive the next state and output equations. That is, $A^+=f_A(A, B, X)$, $B^+=f_B(A, B, X)$, $Z= f_Z(A, B, X)$

(c) (8%) Please derive the state transition table. (write on your answer sheet)

	A+B+		Z	
AB	X=0	1	X=0	1
00				
01				
11				
10				

(d) (8%) Let S0=00, S1=01, S2=11, S3=10, please draw the state graph.

(e) (10%) Please finish the following timing diagram. (write on your answer sheet)