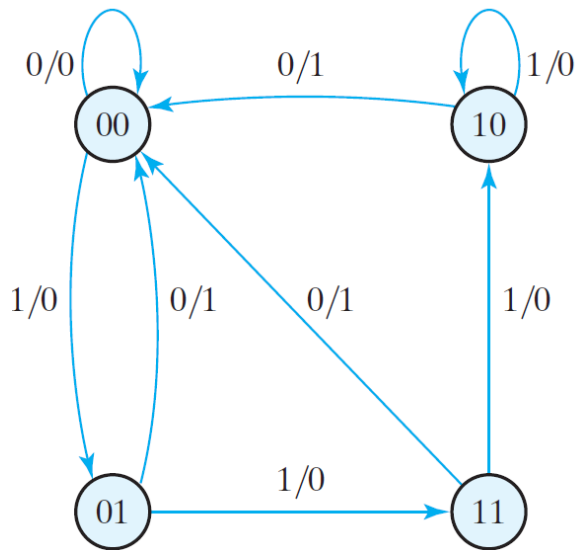


April 8, 2014

Name: _____

1. (1 point)) A _____ is a combinational circuit that forms the arithmetic sum of three bits.
2. (1 point) Unspecified minterms of a function are called _____ conditions.
3. (1 point). _____ (True/False) Latches exhibit edge sensitive behavior.
4. (1 point) A _____ defines the logical properties of a flip-flop by describing its operation in tabular form.
5. (1 point) A _____ specifies the next state as a function of the present state and inputs.
6. (15 points) Starting from state 00 in the state diagram shown, determine the state transitions and output sequence that will be generated when an input sequence of 00100110011110001 occurs.

[illegible]

J	K	$Q(t+1)$
0	0	$Q(t)$
0	1	0
1	0	1
1	1	$Q'(t)$

D	$Q(t+1)$
0	0
1	1

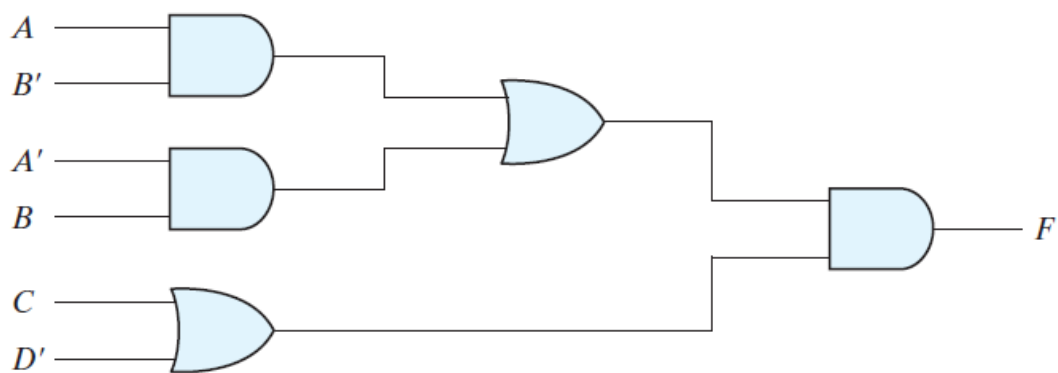
T	$Q(t+1)$
0	$Q(t)$
1	$Q'(t)$

7. (20 points) Design a 3-bit counter which counts in the sequence 000, 101, 010, 111, 100, 001, 110, 011, 000 using clocked JK flip-flops. You do not have to draw the circuit diagram.

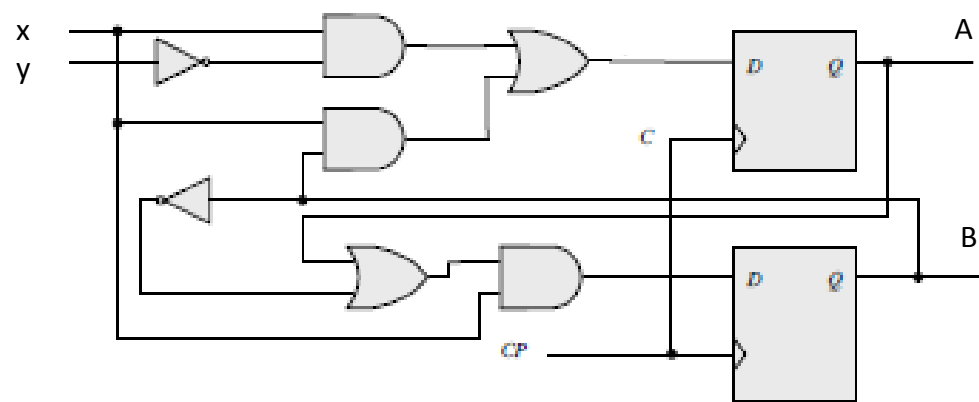
8. (10 points) Reduce the number of states in the following state table, and tabulate the reduced state table:

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

9. (15 points) Convert the following circuit into a circuit that contains only NAND gates.



10. (15 points) For the figure given, derive the state table.



x	y	A	B	A(t+1)	B(t+1)
0	0	0	0		
0	0	0	1		
0	0	1	0		
0	0	1	1		
0	1	0	0		
0	1	0	1		
0	1	1	0		
0	1	1	1		
1	0	0	0		
1	0	0	1		
1	0	1	0		
1	0	1	1		
1	1	0	0		
1	1	0	1		
1	1	1	0		
1	1	1	1		

11. (20 points) Design a Mealy sequential circuit that has an output of 1 whenever its input string has the sequence 1010 and otherwise has an output of 0. These sequences can overlap. Use T flip-flops. You do not have to draw the circuit diagram.

Input: 001010101010001101010

Output: 000001010101000000101