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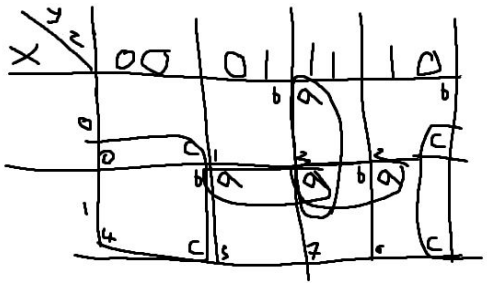
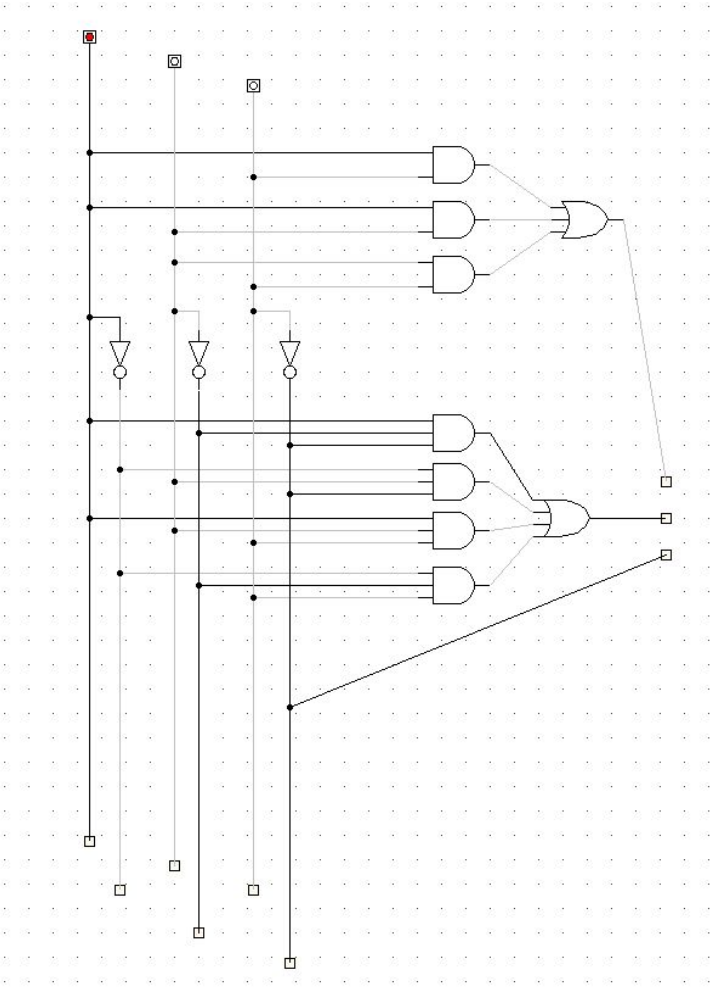
Cs231
A3 May 6 2019

1)

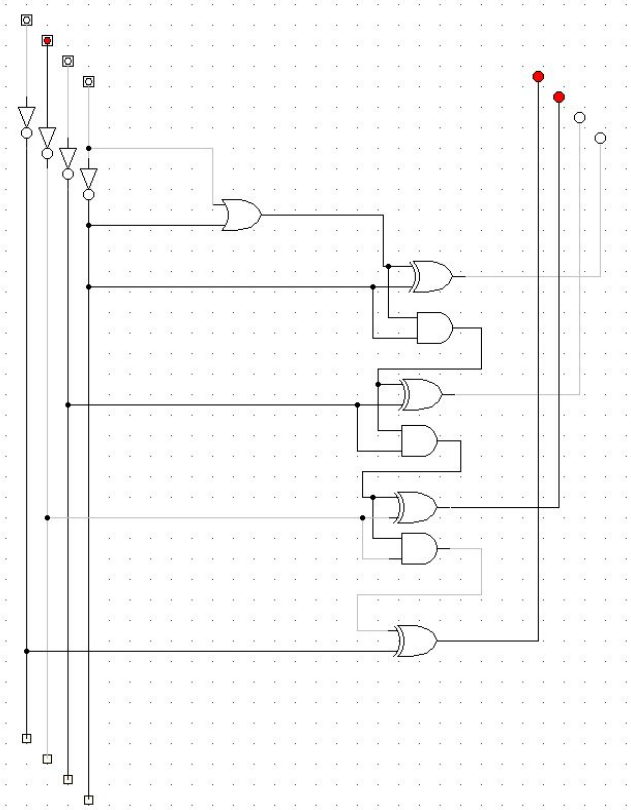
x	y	z	a	b	c
0	0	0	0	0	1
0	0	1	0	1	0
0	1	0	0	1	1
0	1	1	1	0	0
1	0	0	0	1	1
1	0	1	1	0	0
1	1	0	1	0	1
1	1	1	1	1	0



a = xz+xy+yz
b = xy'z'+x'yz'+xyz+x'y'z
c = z'



*2) flip bits then add one.



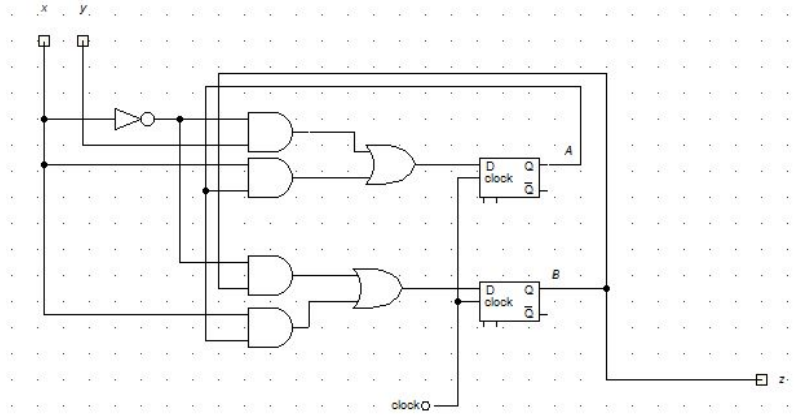
3) We can derive a truth table with the given equation Q'(t+1) = J'Q' + KQ and compare if it is the same as Q'(t+1) from a JK flip flop Since we know the jk truth table is

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

J	K	Q	Q'(t+1)	Same as JK? Yes
0	0	0	1	J=0 K=0 Q=0 then Q' which is the same as Q'(t+1), True
0	0	1	0	J=0 K=0 Q=1 then Q' which is the same as Q'(t+1), True
0	1	0	1	J=0 K=1 Q=0 then 1 which is the same as Q'(t+1), True
0	1	1	1	J=0 K=1 Q=1 then 1 which is the same as Q'(t+1), True
1	0	0	0	J=1 K=0 Q=0 then 0 which is the same as Q'(t+1), True
1	0	1	0	J=1 K=0 Q=1 then 0 which is the same as Q'(t+1), True
1	1	0	0	J=1 K=1 Q=0 then Q which is the same as Q'(t+1), True
1	1	1	1	J=1 K=1 Q=1 then Q which is the same as Q'(t+1), True

Since Q'(t+1) derived from the equation is the same as Q'(t+1) from a JK flip flop for all cases of J,K, and Q then Q'(t+1) = J'Q' + KQ is the characteristic equation for the complement output of a JK flip flop.

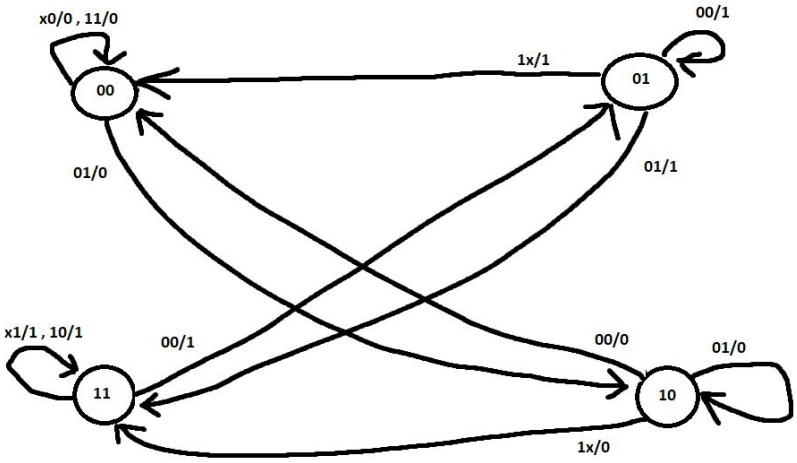
4a)



4b)

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

4c)

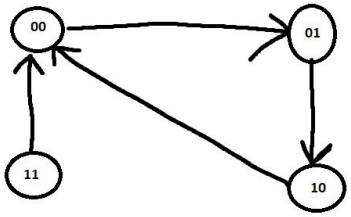


5)

State table:

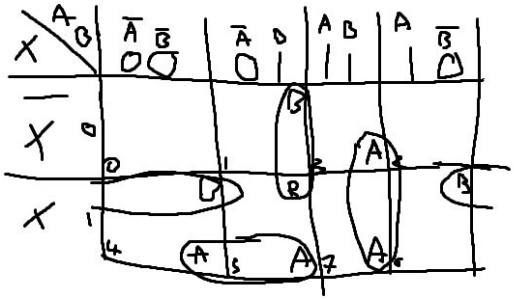
A(t)	B(t)	A(t+1)	B(t+1)	Ta	Tb
0	0	0	1	0	1
0	1	1	0	1	1
1	0	0	0	1	0
1	1	0	0	1	1

State Diagram:



6a)

x	A(t)	B(t)	A(t+1)	B(t+1)	Ja	Ka	Jb	Kb
0	0	0	0	0	0	1	0	0
0	0	1	0	1	0	0	0	0
0	1	0	0	0	0	1	0	1
0	1	1	1	0	0	0	0	1
1	0	0	1	1	1	1	1	0
1	0	1	1	1	1	0	1	0
1	1	0	0	1	1	1	1	1
1	1	1	1	0	1	0	1	1



A(t+1)=xA'+AB
B(t+1)=xB'+A'B

6b)