UNCC, Department of Electrical and Computer Engineering
ECGR 2181, Fall 2008, Quiz #11, 11/25/2008

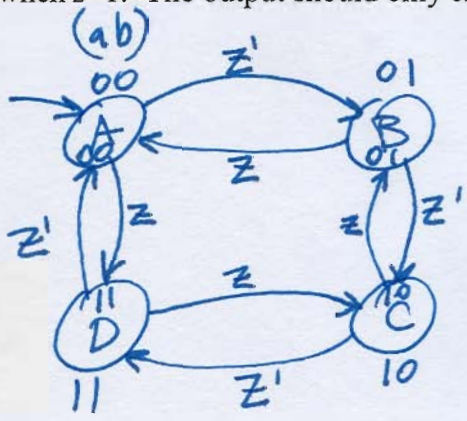
Name: Solution

Follow the five steps of designing a Controller:

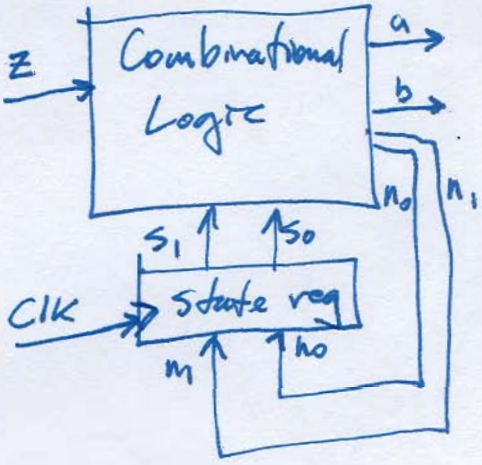
1. Create FSM 20 pts
2. Create the architecture 10 pts
3. Encode the states 10 pts
4. Create the state table 20 pts
5. Implement the Combinational Logic 20 pts

Create a controller with one input, z, and two outputs, a and b. ab should always follow the following sequence when $z = 0$: 00, 01, 10, 11, repeat. ab should go to the previous value (i.e. 01 to 00) when z=1. The output should only change on a rising clock edge. Make 00 the initial state.

Step 1



Step 2



Step 3 Included above

Step 4

s_1 s_0	z	n_1	n_0	a	b
0	0	0	1	0	0
0	1	1	1	0	0
1	0	1	0	0	1
1	1	0	0	0	1
0	0	1	1	1	0
0	1	0	1	1	0
1	0	0	0	1	1
1	1	1	0	1	1

Step 5

$n_1 = s_1 \oplus s_0 \oplus z$

$n_0 = s_0'$

$a = s_1$

$b = s_0$