EE 231

**Homework 8**

Due October 20, 2010

1. Consider the circuit below. It has three inputs (x and clock), and one output (z). At reset, the circuit starts with the outputs of all flip-flops at 0.

   (a) Is this a Mealy machine or a Moore machine?

   (b) Derive the state transition table for the circuit

   (c) Draw a state diagram for the circuit.

   (d) Write a Verilog program to implement the functionality of the circuit. Be sure to reset the machine with all flip-flops at 0.
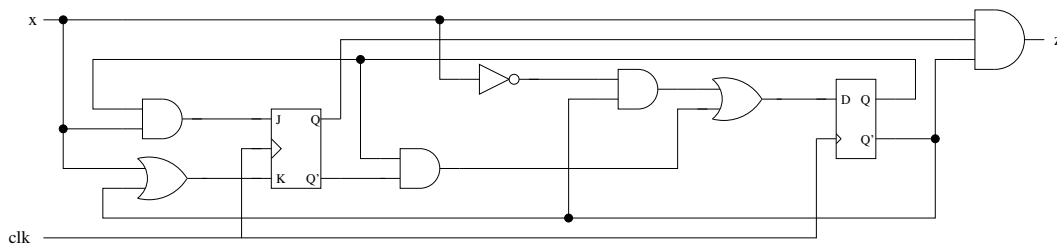
2. Consider the following state transition table. It implements a twisted ring counter:

Present State			Next State		
A	B	C	A	B	C
0	0	0	1	0	0
1	0	0	1	1	0
1	1	0	1	1	1
1	1	1	0	1	1
0	1	1	0	0	1
0	0	1	0	0	0

   (a) Draw a state diagram for the system.

   (b) Write a Verilog program to implement the system.

3. Design a synchronous sequential circuit to control the operation of an automatic coffee machine. A cup of coffee costs 15¢ and the machine has two input slots. In one slot, only 10¢ coins can be inserted; in the other, only 5¢ coins. The machine will give change in 5¢ coins only, and only one such coin per transaction.

   (a) Draw a state diagram for the circuit.

   (b) Assign states, and draw a state transition table.

   (c) Write a Verilog program to implement the circuit.