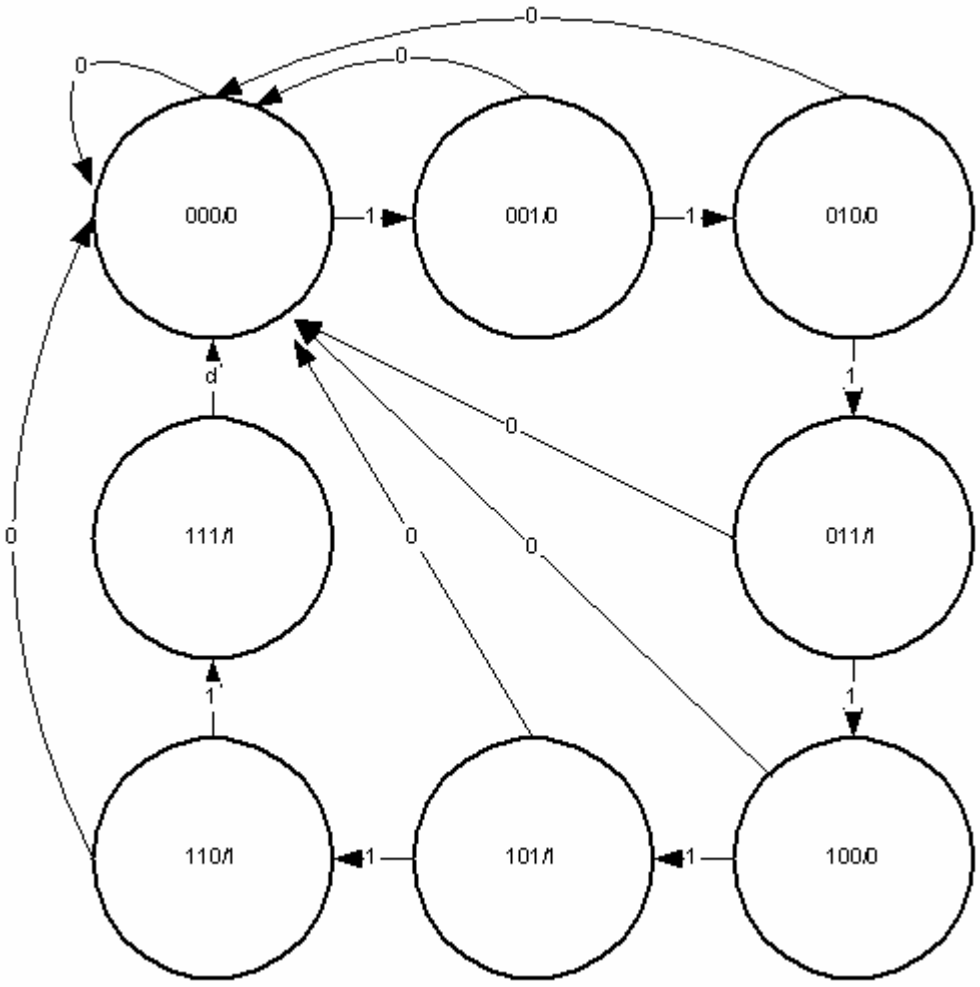
CSE 260M - Homework 9

Due November 8, 2006

1. You have a keypad with three keys (labeled 1, 2 and 3) that is used as a combination lock. The combination for the safe is 1-2-3 (that is 1 then 2 then 3). Build a circuit that will have an output that is high when ever this sequence is pressed. Assume that the output from the keypad is a two-bit binary number equal to the value of the button pressed and zero (00) when no button is pressed. Show the state diagram and the equations for the output and the next states.

2. Design a circuit that implements the following state diagram. Use D-type flip-flops and any other gates you need. There is one input and one output as shown. Simulate your **schematic** circuit with the Xilinx tools. **Also write VHDL** for this circuit and simulate it. For both simulations, let the input start at zero (0) for two clocks and then set the input high for thirteen (13) clock cycles after which time it should go low (0) again. **Turn in your schematic, VHDL source and both simulations.** Clearly indicate which simulation is for which circuit.



3. You have two switches (S_1 and S_2) that control a sequential circuit. The circuit has two outputs that are equal to the state of the two state bits. Find the next state equations for a circuit that will increment the state when only S_1 is high, decrement the state when only S_2 is high, hold the state when neither is high and flip both state bits when both switches are high. Draw the state diagram and then determine the next state equations for each bit in SOP form.