You must work alone on the following take-home portion of this quiz. Work that is copied from other people will result in zero credit.

Due date: 3:30pm Monday November 15, 2002 (turn in at lecture)

(25 Points)
Design a Finite State Machine for the following water storage and well pump system. Show all of your work including state diagrams, state tables and transition tables. Implement the final design two ways, 1 using D-type flip-flops and the other using JK type flip-flops. Show the final circuitry in a clearly drawn and labeled schematic diagram.

(5 points extra credit)
Implement your design on Xilinx foundation, simulate and print out results.

Operation:
The water tank shown below has three float sensor switches. The switches make a connection (consider a connection a 1) when the water level is at or above the mark. The switches are at 100%, 75% and 50% full. The water tank needs to fill anytime water level is below 75%. Should water level fall below 50% a low water level alarm should sound. Water level should never go above 100%. Tank is filled by turning on the submersible water pump located down in the well. You may assume that a simple 1 or 0 output may suffice to turn the pump on/off (in reality you would need some sort of relay to switch the power).

[Diagram of water storage tank with float switches and pump controller]