Homework 2 -- State Machines & C Programming

1. Build a sequence recognizer for the pattern 1001 using 2 JK negative edge-triggered flip-flops. When input series are '1001', the output is logic 1; otherwise, the output is logic 0. The sequence overlap is allowed, for example, the input series '1001001' can be treated as two '1001'. Design a ***Mealy machine*** to implement the sequencer with the following steps:

(a) Start with the state diagram.
(b) Set up a new state transition table with JK inputs.
(c) Derive the JK and output equations, then minimize each function.
(d) Draw the completed circuit diagram.

2. Build a sequence recognizer for the pattern 001 using 2 D positive edge-triggered flip-flops. When input series are '001', the output is logic 1; otherwise, the output is logic 0. Design a ***Moore machine*** to implement the sequencer with the following steps:

(a) Start with the state diagram.
(b) Set up a new state transition table with D inputs.
(c) Derive the D and output equations, then minimize each function.
(d) Draw the completed circuit diagram.

3. Write an interrupt service routine in C counting the falling edges on port pin B0. Assume port B has already been initialized as the input mode. Assume the other pins of port B are not used and they return 0 if they are read.