For the following problems you will be drawing the logic circuit (schematic) using the Deeds software or writing hardware description language (HDL) files in system Verilog using Quartus Prime Lite software and verifying that it works. The software can be obtained from the links below. Include your files with your homework submission.

Deeds Software
https://www.digitalelectronicsdeeds.com/downloads.html

Quartus Prime Lite Software
https://drive.google.com/file/d/13wY8oxB-TiGA0tVNV1WvHVHIrjosXAeB/view

1.) Write a System Verilog file for the seven-segment display that you designed in HW04. Start with the file information below.

```
module sevenseg(input logic [3:0] D, output logic Sa, Sb, Sc, Sd, Se, Sf, Sg);

// this is where you will assign the outputs of the module

endmodule
```

a. Use the Quartus Prime Lite software to create the file. Include the text in your homework.
b. Simulate the file in Modelsim. Get a screen shot of your Modelsim simulation and include it in the homework.
c. Include your sevenseg.sv file with your homework file submission.

2.) Design a FSM with one input **A**, and one output **X**. **X** should be 1 if **A** has been 1 for at least three cycles, altogether (not necessarily consecutively).

Example:

A = 1 0 1 0 1 1 0 1 1 0 1 1

X = 0 0 0 0 1 1 1 1 1 1 1 1

a. Make a state diagrams for the process using the Moore Machine model
b. Make a next state table using D flip-flops
c. Solve for Boolean expressions for the outputs and the inputs to the flip-flops
d. Draw out the logic circuit using the Deeds Software and verify that it works. Include the file with your homework submission.

3.) Design a FSM with one input **A**, and one output **Y**. **Y** should be 1 if **A** has been 1 for at least two consecutive cycles.

Example:

A = 1 0 1 0 1 1 0 1 1 0 1 1

Y = 0 0 0 0 0 1 1 1 1 1 1 1

e. Make a state diagrams for the process using the Moore Machine model
f. Make a next state table using D flip-flops
g. Solve for Boolean expressions for the outputs and the inputs to the flip-flops
h. Draw out the logic circuit using the Deeds Software and verify that it works. Include the file with your homework submission.