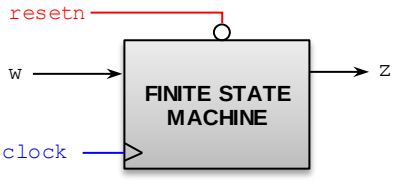
Solutions - Quiz 4

(November 17th @ 5:30 pm)

PROBLEM 1 (35 PTS)

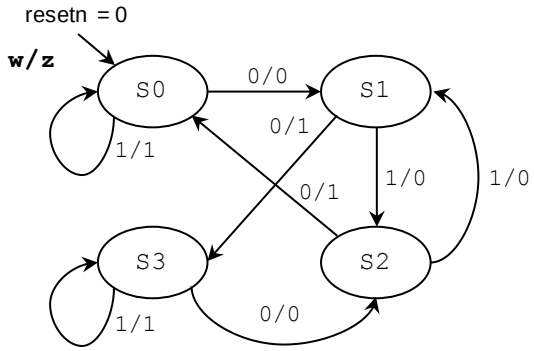
- The following FSM has 4 states, one input w and one output z. (12 pts)
  - ✓ The excitation equations are given by:
    - $Q_1(t+1) \leftarrow Q_0(t)$
    - $Q_0(t+1) \leftarrow \overline{Q_1(t) \oplus w}$
  - ✓ The output equation is given by: $z = Q_1(t) \oplus Q_0(t) \oplus w$
  - ✓ Provide the Excitation Table and the State Diagram (any representation).



PRESENT STATE			NEXTSTATE		
w	Q_1	Q_0 (t)	Q_1	Q_0 (t+1)	z
0	0	0	0	1	0
0	0	1	1	1	1
0	1	0	0	0	1
0	1	1	1	0	0
1	0	0	0	0	1
1	0	1	1	0	0
1	1	0	0	1	0
1	1	1	1	1	1

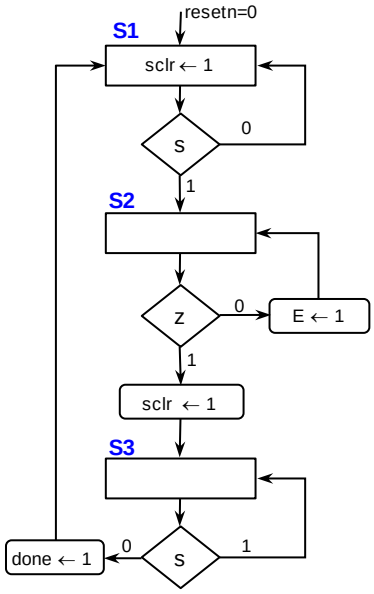
w	PRESENT STATE	NEXT STATE	z
0	S0	S1	0
0	S1	S3	1
0	S2	S0	1
0	S3	S2	0
1	S0	S0	1
1	S1	S2	0
1	S2	S1	0
1	S3	S3	1

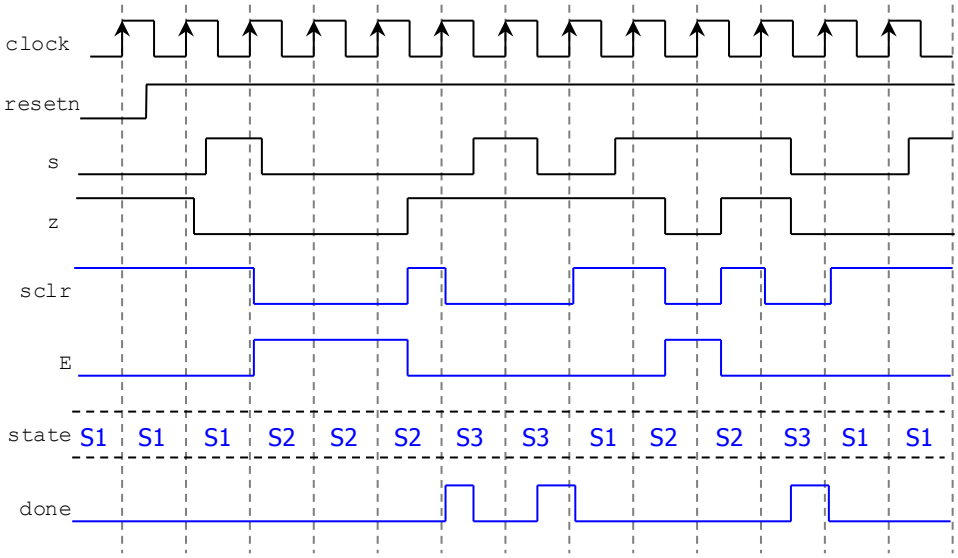
State Assignment:
S0: Q=00 S1: Q=01
S3: Q=10 S2: Q=11



PROBLEM 2 (35 PTS)

- Complete the timing diagram of the following FSM (represented in ASM form):





PROBLEM 3 (30 PTS)

- Sequence detector: Draw the state diagram (any representation) of an FSM with input x and output z. The detector asserts $z = 1$ when the sequence 0110 is detected. Right after the sequence is detected, the circuit looks for a new sequence.