Homework 8

ELEN 21/COEN 21
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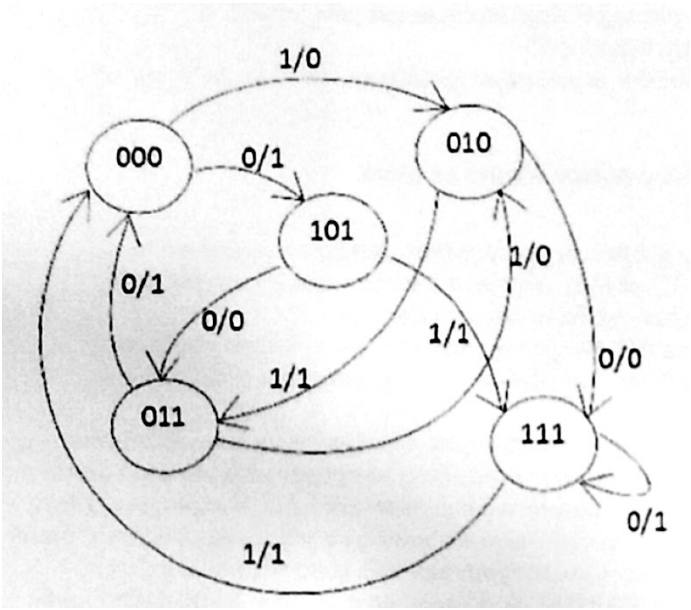
Lecture 12

1. Derive a minimal state table for a single-input and single-output Mealy-type state machine that produces an output of 1 if in the input sequence it detects either 110 or 101 patterns. Overlapping sequences should be detected.

2. The figure below shows a Mealy-type state machine. The states are presented in the form $Q_2Q_1Q_0$. Derive a circuit where the Q_2 is a positive-edge D flip-flop, the Q_1 is a positive-edge JK flip-flop, and the Q_0 is a positive-edge T flip-flop.



3. Draw the state diagram for the table below that describes a state machine that has one input x and one output z.

Present State	Next State		Output (z)	
	x = 0	x = 1	x = 0	x = 1
A	A	E	1	0
B	C	F	0	0
C	B	H	0	1
D	E	F	0	0
E	D	A	0	1
F	B	F	1	1
G	D	H	0	1
H	H	G	1	0

Lecture 13

4. Implement the following circuit $F(a,b,c,d) = \Sigma m(4,6,7,8,10,11,12,14,15)$ using only 2-to-4 decoders (without enable).

5. Implement a full adder by using a decoder and a network of OR-AND-NOT gates.