Lesson 12:

- Slides
- FSMs
  - analysis

State-Machines:

0) Description
1) State Diagram
2) State & Output Tables
3) " " Eqns
4) Schematic

Design ↓ Analysis ↑

Slides w/ Questions

$D1^* = Q2 + \overline{Q1}$

Q6 - True - look at ~~4 proper~~ Figure above
4 properties of sequential circuit
- Each element is combo logic or a register
- Bank of registers w/ same clk
- at least one element is a register
- all cyclic ~~paths~~ paths contain at least one register

Q7 - 3

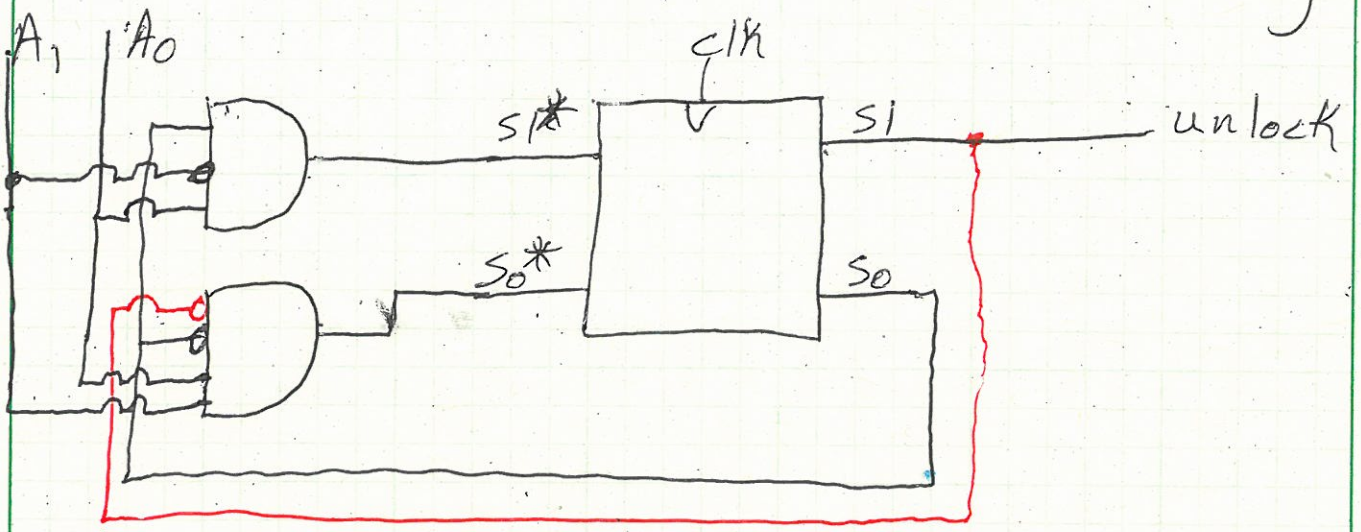
Q8 -

Q9 - 1 - No
2 - No one cyclic path doesn't have a register
3 - Yes

prob 18 in HW

Q10 - C - K-maps

Q5 - B



Draw Behind Screen

Break into Joe Homeowner's garage... we are given the schematic

States:

3) $S_1^* = S_0 \bar{A}_1 A_0$

$S_0^* = \bar{S}_1 \bar{S}_0 A_1 A_0$

Output

unlock = S1

Output:

S_1	S_0	unlock	State Name
0	0	0	m_0
0	1	0	m_1
1	0	1	m_2
1	1	1	m_3

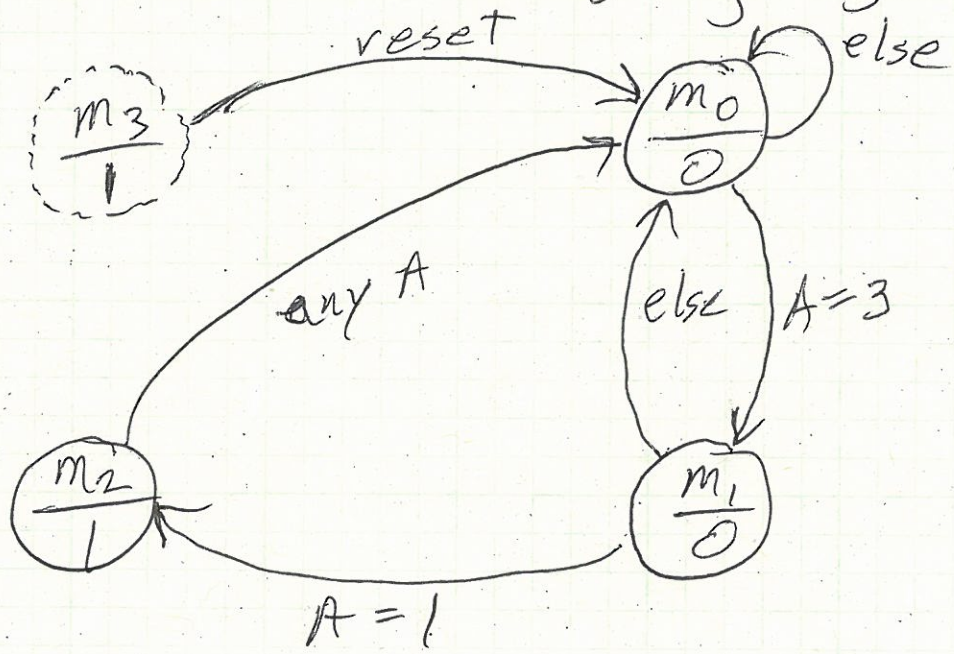
Fill in 0s first

Next state:

S_1 S_0	A_1 A_0	S_1^*	S_0^*
00	00	0	0
00	01	0	0
00	10	0	0
00	11	0	1
01	00	0	0
01	01	1	0
01	10	0	0
01	11	0	0
10	00	0	0
10	01	0	0
10	10	0	0
10	11	0	0
11	00	0	0
11	01	1	0
11	10	0	0
11	11	0	0

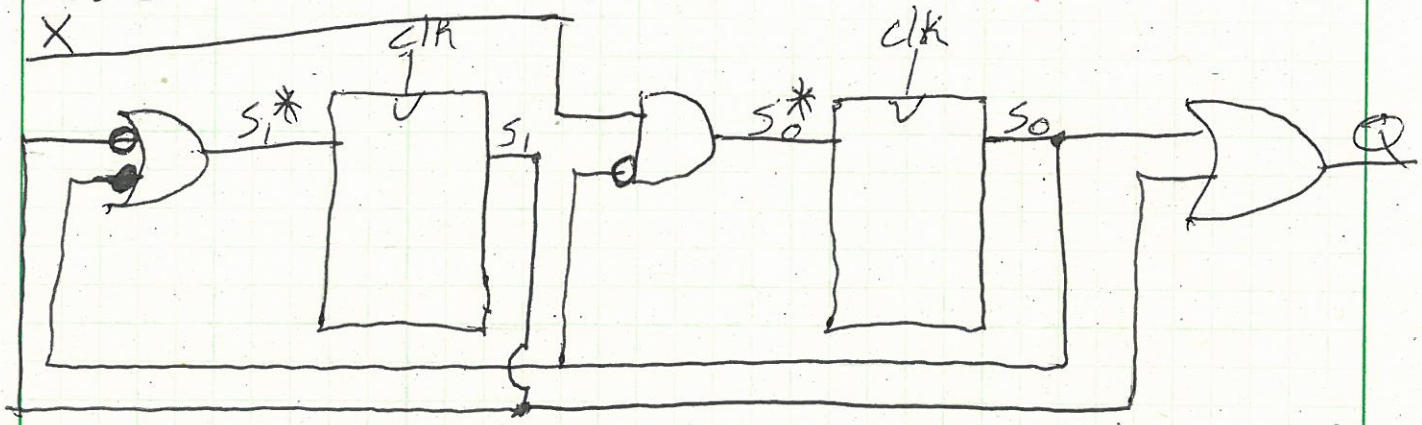
	S_1 S_0	A_1 A_0	S_1^* S_0^*	Next State Name
m_0	0 0	0 0	0 0	m_0
	0 0	0 1	0 0	m_0
	0 0	1 0	0 0	m_0
	0 0	1 1	0 1	m_1
m_1	0 1	0 0	0 0	m_0
	0 1	0 1	1 0	m_2
	0 1	1 0	0 0	m_0
	0 1	1 1	0 0	m_0
m_2	1 0	X X	0 0	m_0

m_3 Ghost state - never going to get there



what is the combo to open the Garage door? **31**

Problem 3.31



3) $S_1^* = \overline{S_1} + S_0$

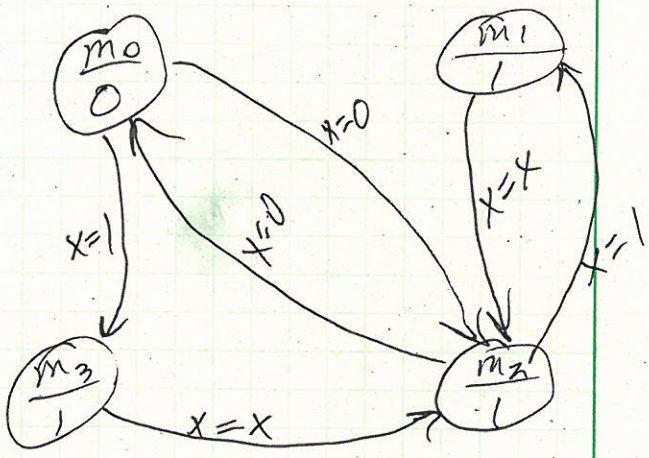
$S_0^* = X\,\overline{S_0}$

$Q = S_1 + S_0$

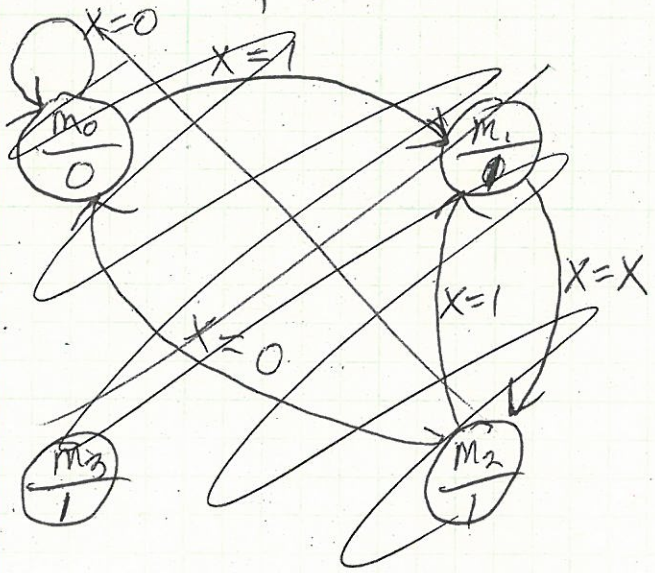
output

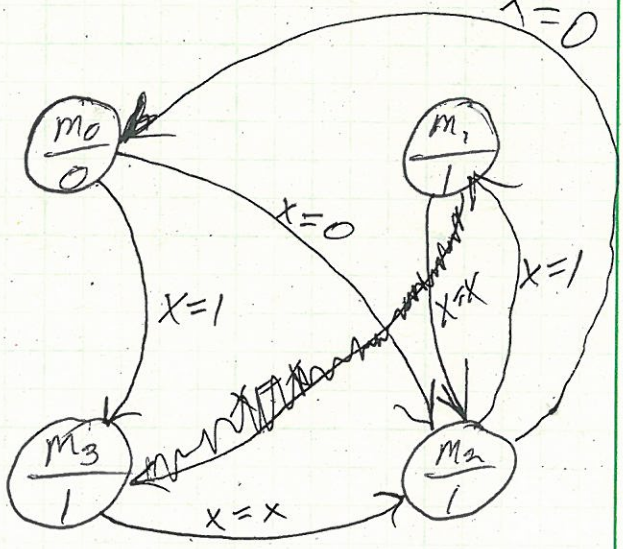
2)

Current state S_1 S_0	X	Q	Next state S_1^* S_0^*	
m_0	0 0	0	0 0	m_0
	0 1	0	0 1	m_1
m_1	1 0	1	1 0	m_2
	1 1	1	1 0	m_2
m_2	0 0	1	0 0	m_0
	0 1	1	0 1	m_1
m_3	1 0	1	1 0	m_2
	1 1	1	1 0	m_2



3)





3) $S_1^* = \bar{S}_1 + S_0$

$S_0^* = X\,\bar{S}_0$

$Q = S_1 + S_0$

2)

	S_0	S_1	X	S_0^*	S_1^*	Q	Next state	
m_0	0	0	0	0	1	0	m_1	1
	0	0	1	1	1	0	m_3	
m_1	0	1	0	0	0	1	m_0	2
	0	1	1	1	0	1	m_2	
m_2	1	0	0	0	1	1	m_1	3
	1	0	1	0	1	1	m_1	
m_3	1	1	0	0	1	1	m_1	4
	1	1	1	0	1	1	m_1	

1)