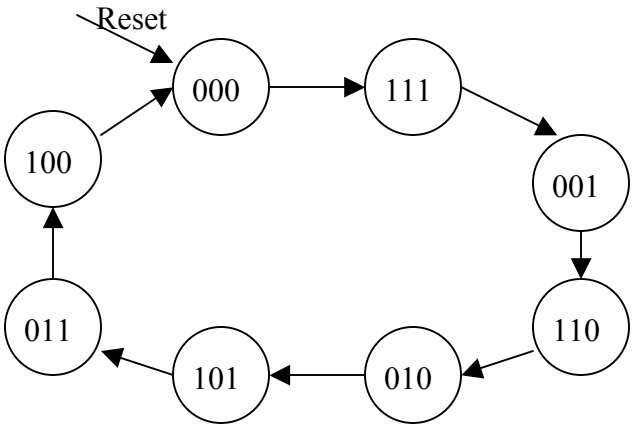
CS 150 Problem Set #6 Solution (part 1) Prepared by Wen Hui Guan

1.



Reset	cs2	cs1	cs0	ns2	ns1	ns0
1	x	x	x	0	0	0
0	0	0	0	1	1	1
0	0	0	1	1	1	0
0	0	1	0	1	0	1
0	0	1	1	1	0	0
0	1	0	0	0	0	0
0	1	0	1	0	1	1
0	1	1	0	0	1	0
0	1	1	1	0	0	1

ns2 = cs2'
ns1 = cs2'cs1' + cs1'cs0 + cs2cs1cs0'
ns0 = cs2'cs1' + cs2cs0

3. The symbolic state diagram can be simplified, depending on the level of abstraction. The clock and alarm states for the clock FSM hide some minor details such as how the HH and MM are set. Another state diagram can represent this for detailed implementation.

Assumptions:
(1) Incrementing MM from 59 will increase HH by 1 and cause MM to reset to 00.
(2) Incrementing HH from 12 will set HH to 01 and the AM/PM LED will unlit/lit accordingly.
(3) When the alarm is set and sounds, pressing the alarm set button again turns off the alarm (AlarmSet = 0).

States: **Clock** normal clock display mode where HH and MM of current time can be adjusted.
Alarm – alarm display where HH and MM can be set for alarming time.
Alarm Sounding – Alarm sounds at this state

Inputs:	TimeSetHH	1 → incrementing HH of clock or alarm by 1
	TimeSetMM	1 → incrementing MM of clock or alarm by 1
	DisplayMode	0 → clock, 1 → alarm
	AlarmSet	1 → alarm is set
Outputs:	HH++	HH is advanced by 1
	MM++	MM is advanced by 1
	Alarm sounds