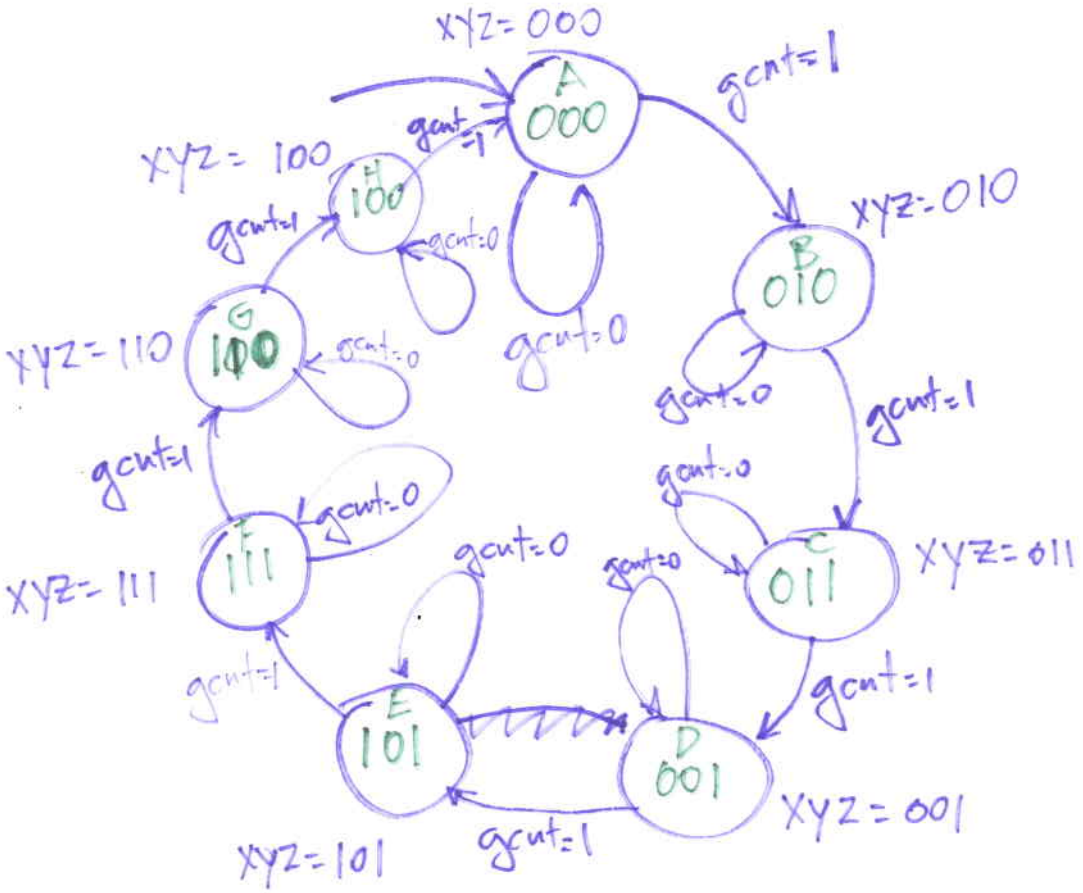
(1)

UNCC – ECGR2181- Pop Quiz – December 08, 2015

Name: Solution Mosaic User ID Solution

Name: _____ Mosaic User ID _____

1. Draw a state diagram for an FSM with an input gcnt and three outputs x, y, and z. The xyz outputs generate a sequence called a Gray Code in which exactly one of the three outputs changes from 0 to 1 or from 1 to 0. The Gray Code sequence that the FSM should output is 000, 010, 011, 001, 101, 111, 110, 100, repeat. The output should change only on a rising clock edge and when the input gcnt = 1. Make the initial state 000.



Note: You do not need to give the state a value (i.e 000) for this quiz.

Points:

1 ~~i~~ Initial state

4 Correct transitions on gcnt = 1

2 Correct transitions on gcnt = 0

~~1~~ State names (i.e '000' or A)

2 outputs xyz

(2)

2. Using the process for designing a controller, convert the FSM you created in previous problem to a controller, implementing the controller using a state register and logic gates.

StopA Truth Table

S2	S1	S0	gout	N2	N1	N0	X	Y	Z
0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	1	0	0	0	0
0	0	1	0	0	0	1	0	0	1
0	0	1	1	1	0	1	0	0	1
0	1	0	0	0	1	0	0	1	0
0	1	0	1	0	1	1	0	1	0
0	1	1	0	0	1	1	0	1	1
0	1	1	1	0	0	1	0	1	1
1	0	0	0	1	0	0	1	0	0
1	0	0	1	0	0	0	1	0	0
1	0	1	0	1	0	1	1	0	1
1	0	1	1	1	1	1	1	0	1
1	1	0	0	1	1	0	1	1	0
1	1	0	1	1	0	0	1	1	0
1	1	1	0	1	1	1	1	1	1
1	1	1	1	1	1	0	1	1	1

Step B
kmaps

N2

S2S1 \ S0gcnt	00	01	11	10
00	0	0	1	0
01	0	0	0	0
11	1	1	1	1
10	1	0	1	1

$N2 = S2S1 + S1'S0gcnt + S2gcnt'$

N1

S2S1 \ S1gcnt	00	01	11	10
00	0	1	0	0
01	1	1	0	1
11	1	0	1	1
10	0	0	1	0

$N1 = S1gcnt' + S2'S0'gcnt + S2S0gcnt$

N0

S2S1 \ S0gcnt	00	01	10	11
00	0	0	1	1
01	0	1	1	1
11	0	0	0	1
10	0	0	1	1

$N0 = S0gcnt + S1'S0 + S2'S1gcnt'$

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