CSCE 211 CHAPTER 7 HOMEWORK DUE DEC 01 2022

You must show all your work! Answers without supporting work will not be graded.

All problems are inspired by our *Introduction to Logic Design* 3rd *Edition* text.

This homework is worth 3 points.

Name: Damian Sclafani

1. Using the following state table, create two Sequential Circuits. You must draw the block diagrams for both.

	$A^\star\ B^\star$		z	
$A\ B$	$x=0$	$x=1$	$x=0$	$x=1$
0 0	1 0	1 1	0	0
0 1	0 0	0 1	0	0
1 0	0 1	1 1	1	0
1 1	0 0	0 0	1	1

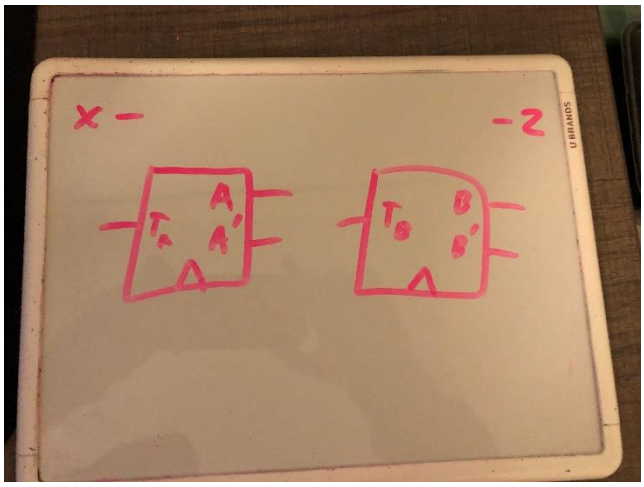
(a) Use T Flip Flops with inputs T_A and T_B to store A^*B^*.

i. T_A = x'A + A'B' + AB

ii. T_B = A = x'B + xB'

iii. z =x'A + AB

iv. Diagram:



Workspace 1.a

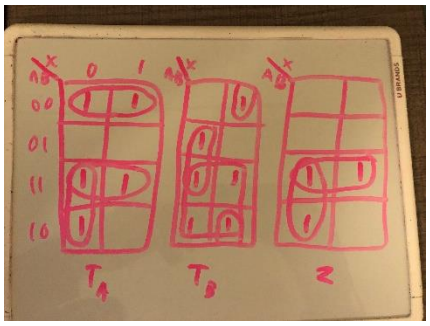
USED FOR PARTS A and B

X	A	B	A*	B*	Ta	Tb	SaRa	SbRb	z
0	0	0	1	0	1	0	1 0	0 X	0
0	0	1	0	0	0	1	0 X	0 1	0
0	1	0	0	1	1	1	0 1	1 0	1
0	1	1	0	0	1	1	0 1	0 1	1
1	0	0	1	1	1	1	1 0	1 0	0
1	0	1	0	1	0	0	0 X	X 0	0
1	1	0	1	1	0	1	X 0	1 0	0
1	1	1	0	0	1	1	0 1	0 1	1

T Flip Flop: 0 = hold, 1 = toggle
SR Flip Flop:

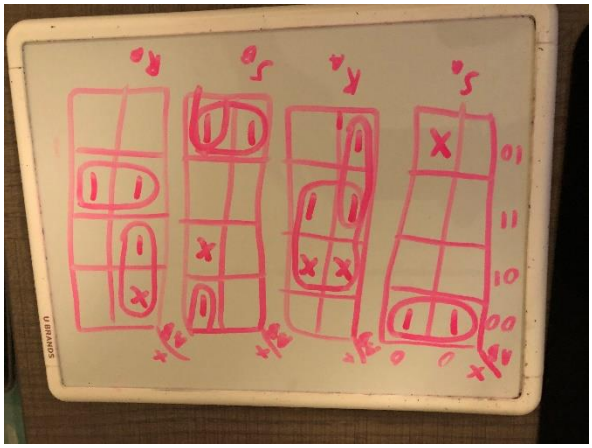
q	Q*	S	R
0	0	0	X
0	1	1	0
1	0	0	1
1	1	X	0

T



SR

Cont.



Cont.

(b) Use SR Flip Flops with inputs S_AR_A and S_BR_B to store A^*B^*.

i. S_A = A'B'

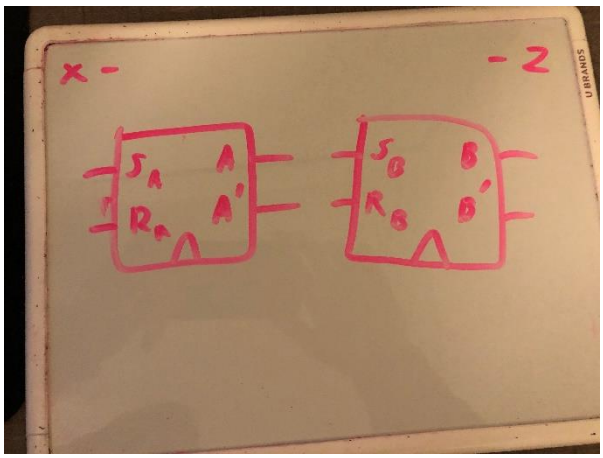
ii. R_A = B + x'A

iii. S_B = xB' + AB'

iv. R_B = x'A' + AB

v. z = X'A + AB

vi. Diagram:



Workspace 1.b

Cont.

Workspace 1.b continued

Cont.

2. Use the following State Table and state mapping to create two Sequential Circuits. You need not draw block diagrams.

	q^*		z	
q	$x=0$	$x=1$	$x=0$	$x=1$
A	C	B	1	1
B	A	A	1	0
C	C	A	1	0

q	$q_1 q_2$
A	0 0
B	1 1
C	0 1

(a) For the first, use JK Flip Flops with inputs J_1K_1 and J_2K_2 to store $q^*_1 q^*_2$.

i. J_1 = xB'

ii. K_1 =1

iii. J_2 = 1

iv. K_2 = x + A

v. z = x' + B'

Workspace 2.a

Cont.

Workspace 2.a continued

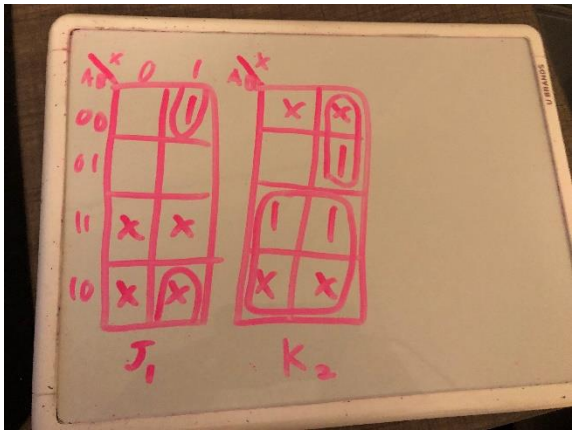
USED FOR PARTS A and B

X	Q1	Q2	Q1* / D1	Q2* / D2	z	J1K1	J2K2
0	0	0	0	1	1	0 X	1 X
0	0	1	0	1	1	0 X	X 0
0	1	0	X	X	X	X X	X X
0	1	1	0	0	1	X 1	X 1
1	0	0	1	1	1	1 X	1 X
1	0	1	0	0	0	0 X	X 1
1	1	0	X	X	X	X X	X X
1	1	1	0	0	0	X 1	X 1

JK Flip Flop:

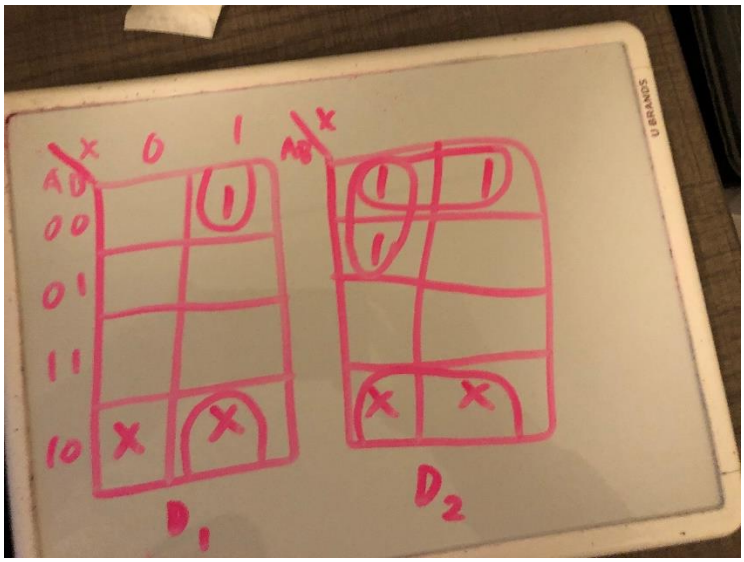
q	Q*	J	K
0	0	0	X
0	1	1	X
1	0	X	1
1	1	X	0

JK



D

Cont.



Cont.

(b) Use D Flip Flops with inputs D_1 and D_2 to store $q_1^* q_2^*$.

i. D_1 = xB′

ii. D_2 = B′ + x′A′

iii. z = x′ + B′

Workspace 2.b

Cont.

3. Create a sequential circuit with no output which passes through the following states and repeats:

$$1, 3, 5, 7, 6, 4, 2, 0, \ldots$$

You must use q_1, q_2, and q_3 as your state variables from highest (q_1) to lowest (q_3) bits. Notice the circuit visits all possible states. Use J_1K_1, D_2, and T_3 as inputs to three (a JK, D, and T) flip flops. You need not draw the block diagram.

(a) J_1 = q2q3

(b) K_1 = q2'q3'

(c) D_2 = xA' + xB + A'B

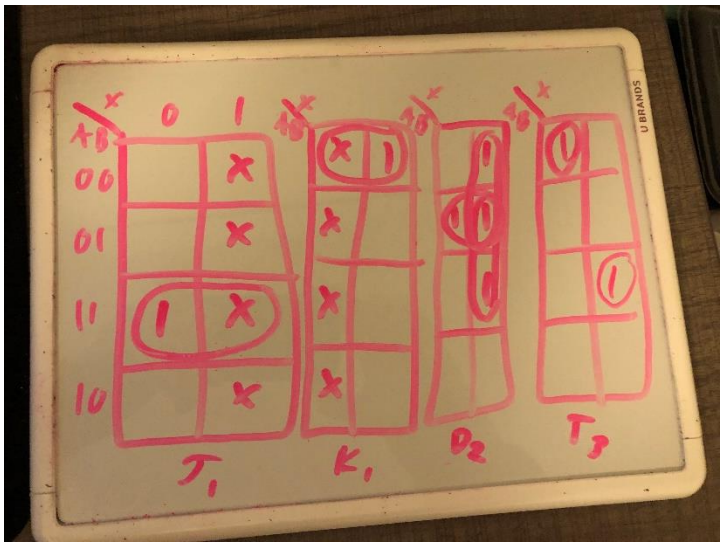
(d) T_3 = q1'q2'q3' + q1q2q3

Workspace 3

Cont.

Workspace 3 continued

Q1	Q2	Q3	Q1*	Q2* / D2	Q3*	J1K1	T3
0	0	0	0	0	1	0 X	1
0	0	1	0	1	1	0 X	0
0	1	0	0	0	0	0 X	0
0	1	1	1	0	1	1 X	0
1	0	0	0	1	0	X 1	0
1	0	1	1	1	1	X 0	0
1	1	0	1	0	0	X 0	0
1	1	1	1	1	0	X 0	1



The End.