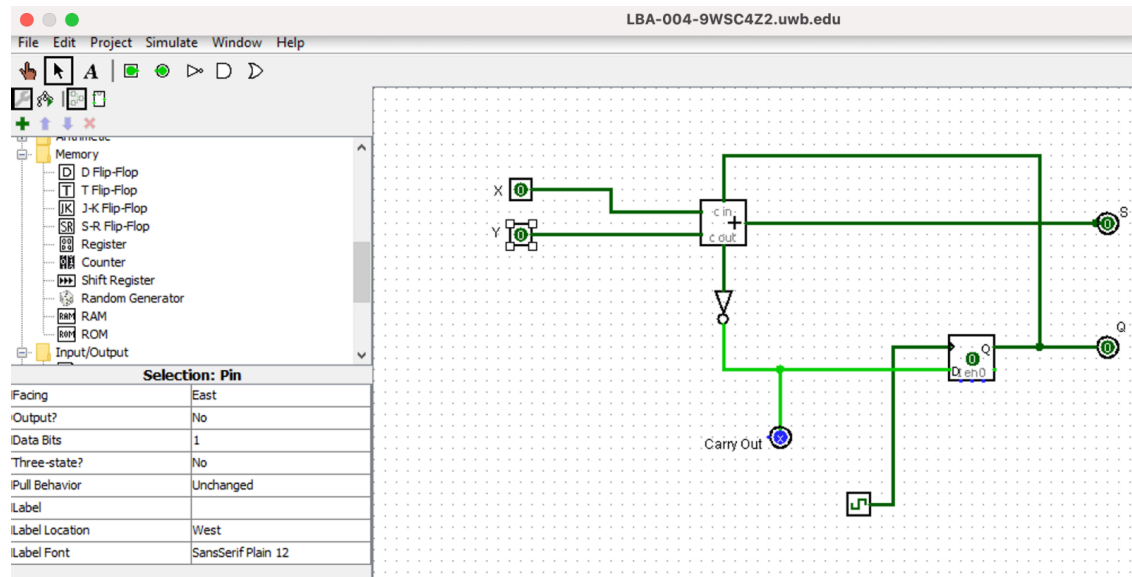Anushka Chougule
Homework #6
March 4, 2025
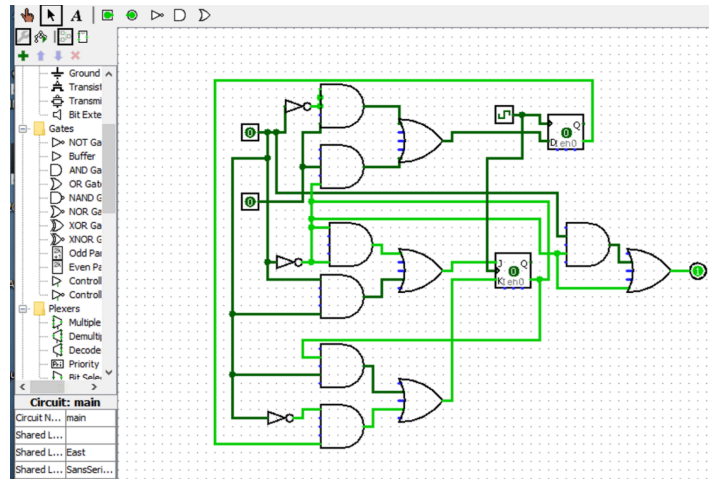
Q1.

| X	Y	Carry-in (Q before clock)	S (before clock)	Carry-out (before clock)	S (after clock)	Carry-out (after clock)
0	0	0	0	0	0	0
0	0	1	1	0	1	0
0	1	0	1	0	1	0
0	1	1	0	1	0	1
1	0	0	1	0	1	0
1	0	1	0	1	0	1
1	1	0	0	1	0	1
1	1	1	1	1	1	1

Q2

1.

* Worked on this diagram with a QSC tutor, not too confident but still working on getting more practice.

X	Y	A(t)	B(t)	A(t + 1)	B(t + 1)	Z
0	0	0	0	0	0	0
0	0	0	1	0	0	0
0	0	1	0	0	0	0
0	0	1	1	0	1	0
0	1	0	0	1	1	1
0	1	0	1	1	1	1
0	1	1	0	1	1	1
0	1	1	1	1	1	1
1	0	0	0	0	0	1
1	0	0	1	0	1	1
1	0	1	0	0	0	1
1	0	1	1	0	1	1
1	1	0	0	0	1	1
1	1	0	1	1	0	1
1	1	1	0	0	1	1
1	1	1	1	1	0	1

State Diagram:
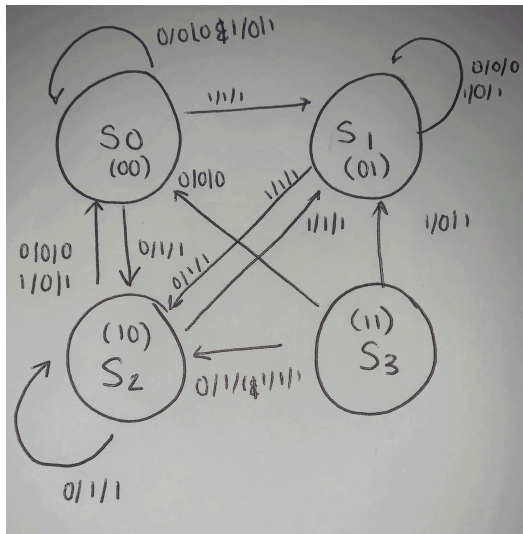
Q3.

Q3-1.

Inputs:	X = 0		X = 1	
Current State	Next State	Output Z	Next State	Output Z
S0	S0	0	S4	1
S1	S4	1	S2	0
S2	S0	1	S3	1
S3	S5	0	S6	1
S4	S1	1	S2	0
S5	S5	0	S4	1
S6	S0	1	S3	1

Inputs:

Current State	X = 0 Next State	Output Z	X = 1 Next State	Output Z
S05	S05	0	S14	1
S3	S05	0	S26	1
S14	S14	1	S26	0
S26	S0	1	S3	1

Q3-2.

Q(t)	Q(t-1)	J	k
0	0	0	*
0	1	1	*
1	0	*	1
1	1	*	0

Q3-3.

AB	AB	Z	AB	Z	Ja	Ka	Ja	Ka	Jb	Kb	Jb	Kb
S05 == 00	00	0	11	1	0	*	1	*	0	*	1	*
S3 = 01	01	0	10	1	0	*	1	*	*	1	*	1
S14 = 11	11	1	10	0	*	0	*	0	*	0	*	1
S26 = 10	00	1	01	1	*	1	*	1	0	*	1	*

Ja = X

X/AB	00	01	11	10
0	0	0	*	*
1	1	1	*	*

Ka = ~B

X/AB	00	01	11	10
0	*	*	0	1
1	*	*	0	1

Jb = X

X/AB	00	01	11	10
0	0	*	*	0
1	1	*	*	1

Kb = ~A + X

X/AB	00	01	11	10
0	*	1	0	*
1	*	1	1	*

Q3-4.

Z = X·A +~XA + A~B

X/AB	00	01	11	10
0	0	0	1	1
1	1	1	0	1

Q3-5.