CMSC 313 Spring 2024
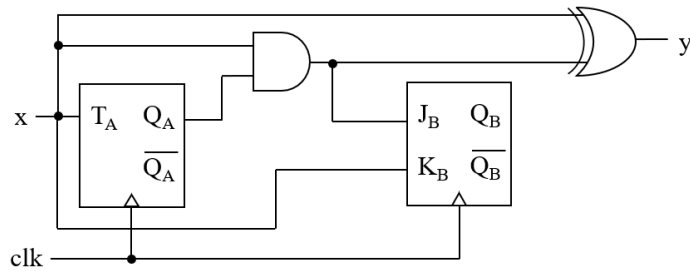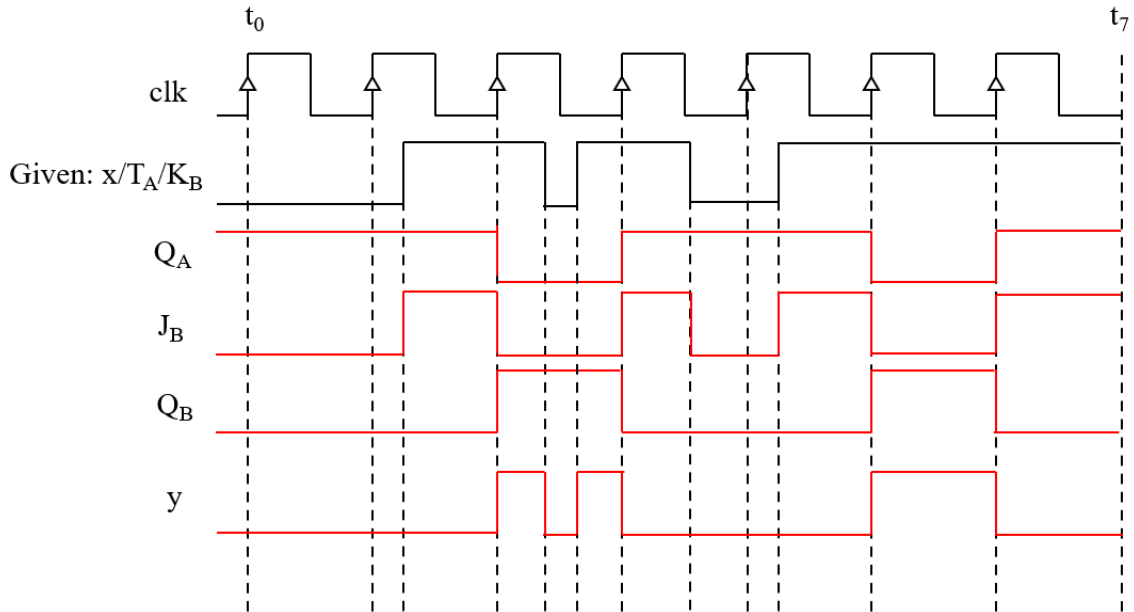## Practice questions for Quiz 3

Exercise 1. Given the circuit below:

a. Given input x in the trace, find Q_A, J_B, and Q_B.

b. Find the state equations $Q_A(t+1)$ and $Q_B(t+1)$ and output y in terms of x, $Q_A(t)$, $Q_B(t)$.

Step 1

$T_A = x$

$J_B = xQ_A(t)$

$K_B = x$

Step 2

$Q_A(t+1) = T\overline{Q_A(t)} + \overline{T}Q_A(t)$

$Q_B(t+1) = J\overline{Q_B(t)} + \overline{K}Q_B(t)$

Step 3

$Q_A(t+1) = x\overline{Q_A(t)} + \bar{x}Q_A(t)$

$Q_B(t+1) = xQ_A(t)\overline{Q_B(t)} + \bar{x}Q_B(t)$

$y = x \oplus (xQ_A(t))$

b. Complete the state table and complete the state diagram.
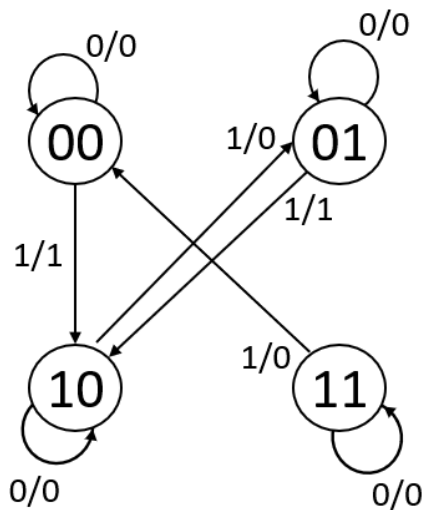
x	Q_A	Q_B	Q_A+	Q_B+	y
0	0	0	0	0	0
0	0	1	0	1	0
0	1	0	1	0	0
0	1	1	1	1	0
1	0	0	1	0	1
1	0	1	1	0	1
1	1	0	0	1	0
1	1	1	0	0	0