

ECE M16 Homework 2

Lawrence Liu

July 27, 2022

Problem 1

(a)

It will toggle, if the latch is reset, ie $Q = 0$ and $\bar{Q} = 1$. Then the output will be $Q = 1$ and $\bar{Q} = 0$ following the clock pulse

(b)

J	K	Q current	Q next
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	0

Therefore this is like a SR latch however it will toggle at $J = K = 1$, unlike the SR latch.

(c)

		$J^n K^n$			
		00	01	11	10
Q^n	0	0	0	1	1
	1	1	0	0	1

$$Q^{n+1} = J^n \cdot \overline{Q^n} + \overline{K^n} \cdot Q^n$$

(d)

The transition table of the D latch is:

C	D	Q next
0	x	Q
1	0	0
1	1	1

Which is the same as the transition table of the JK latch with $J = \bar{K} = D$.

C	J=D	$K = \bar{D}$	Q next
0	x	x	Q
1	0	1	0
1	1	0	1