

CS 20 Laboratory 9: Common Sequential Circuits

1. (0.5 pts) In the experiment done in Section 2.1.1, describe what happens to the LED, in relation to the clock. Provide screenshots for both instances (0.25 each).

At the initial state, the LED is turned off. At first tick, the clock is on the rising edge, so the LED turns on. At the next tick, the clock goes back to the falling edge and the LED remains turned on. Once the clock ticks again and returns to the rising edge, the LED turns off. Hence, the LED turns off and on every time the clock is on the rising edge.

Instance 1:



Instance 2:



2. (0.5 pts) If we treat the Q pin output of the first flip flop (2.1.1 flip flop) as the LSB, and the Q pin output of the second flip flop as the MSB. What is the pattern of the circuit's output?

For every rising edge, the output of the circuit changes in the pattern 11, 10, 01, 00 – following the order of the MSB and LSB. Hence, if we convert the binary outputs into decimal, the circuit's output follows a pattern of counting down from 3 to 0.

3. (2 pts) Provide a video of the circuit in 2.1.2 to show all the possible combinations created by the two LEDs (Do not forget to include the labels of the LED mentioned in section 2.1).
4. (4 pts) Provide a video of the circuit in 2.2 to show all the numbers that could be displayed (0-7).