

## EE313 - Sequential Design Problems Homework

1. Design a circuit that receives as input a serial stream of bits. Bits are received one at a time, one per clock cycle, and an individual input bit is denoted as  $X$ . The circuit produces an output (denoted as  $Z$ ) of 1 if and only if the input has been 1 for at least the two most recent consecutive bits.

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2. Design a counter that counts from 1 to 6 with each clock cycle when its input  $X=1$  and “freezes” when its input  $X=0$ . The counter should reset to one after it reaches 6. In other word, the counter counts:

001, 010, 011, 100, 101, 110, 001, ...

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3. Design a circuit that has one input,  $X$ , and outputs the following sequence:

1, 7, 3, 5, if  $X = 1$ ,

0 if  $X = 0$ .