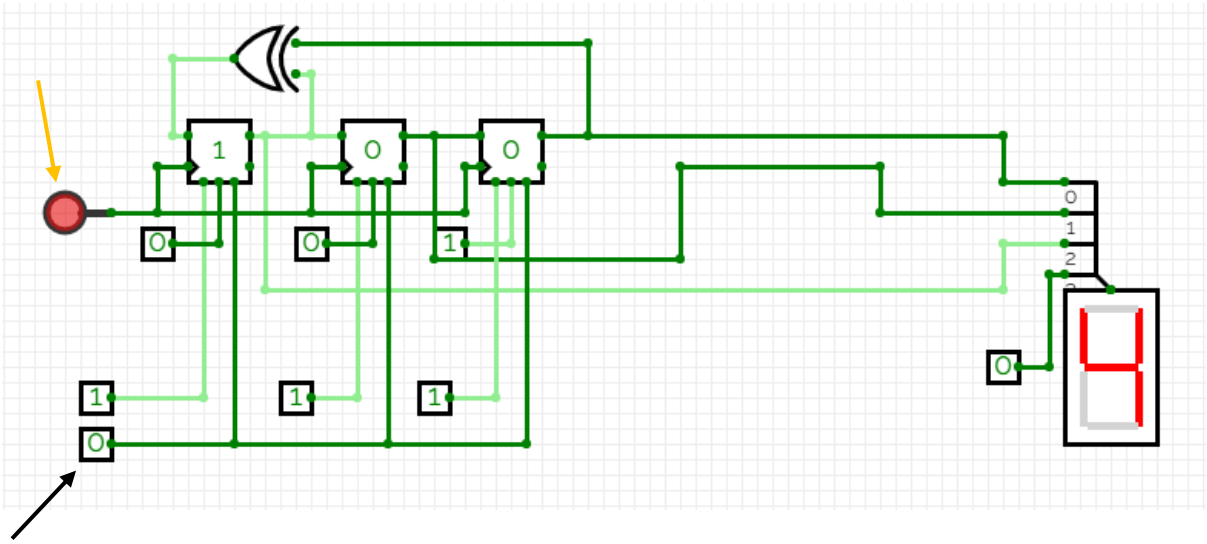
SIMULATION

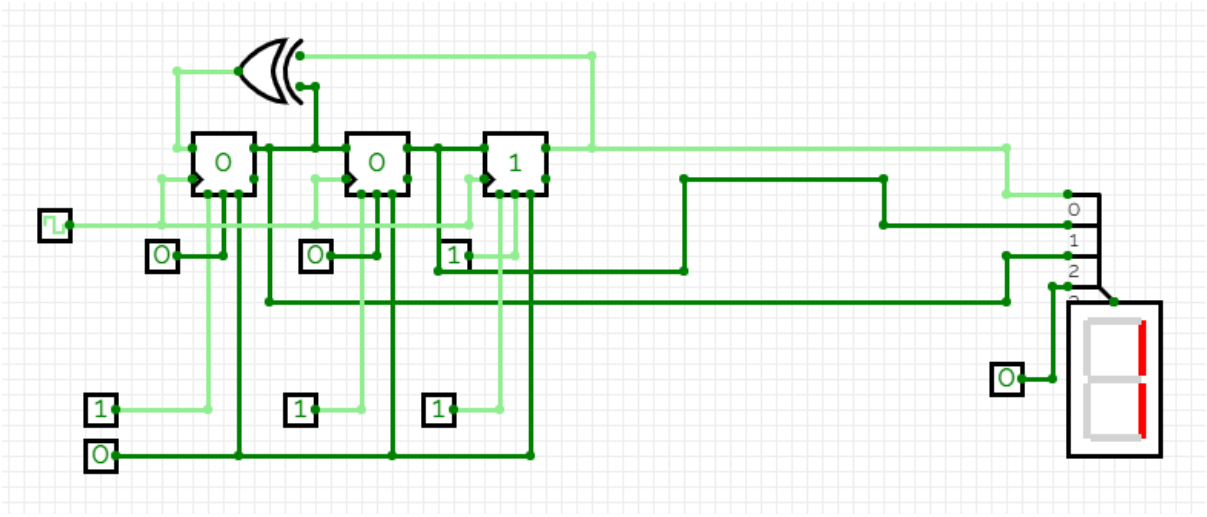
The link to the simulator:
https://circuitverse.org/users/60589/projects/random-lfsr
On an online digital circuit simulator: CircuitVerse

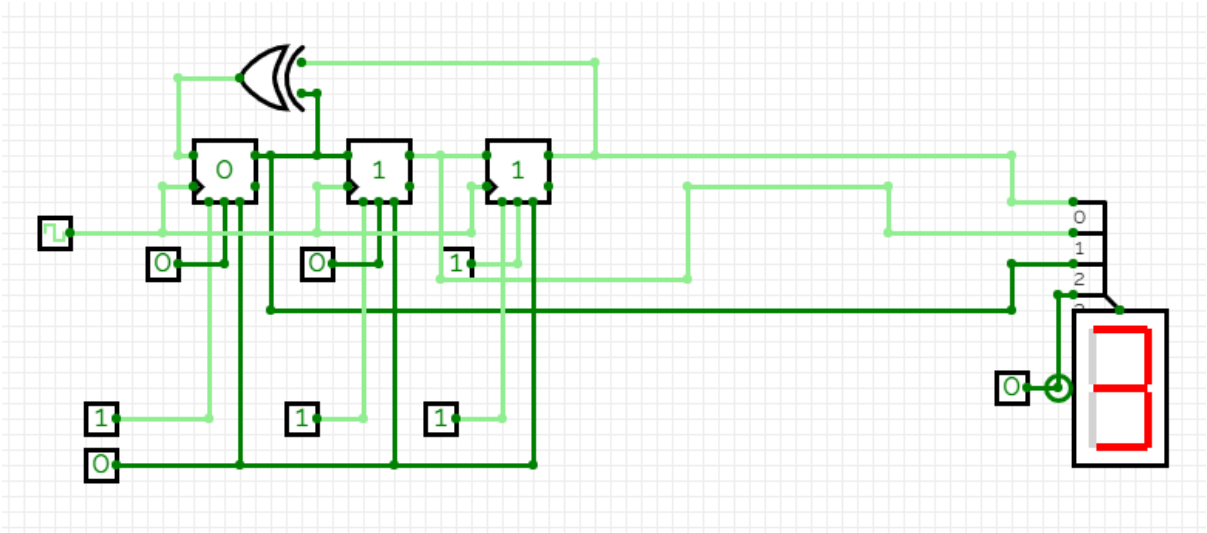
Steps to see the simulation:

1. Click on “Launch simulator” after clicking on the above link
2. Next, tap on lowermost zero (pointed to by black arrow) to feed in the initial seed value
3. Tap the lowermost zero (Now one) once again for the D-FF to not assume the preset value at all times
4. Press the button (pointed to by yellow arrow) and check out the random values generated on the hex-display



Some screenshots from the simulator (Used clock instead of a button for continuous random numbers):


0
0
1
0
0
1
1
1
1
0
0
1
2
0


0
1
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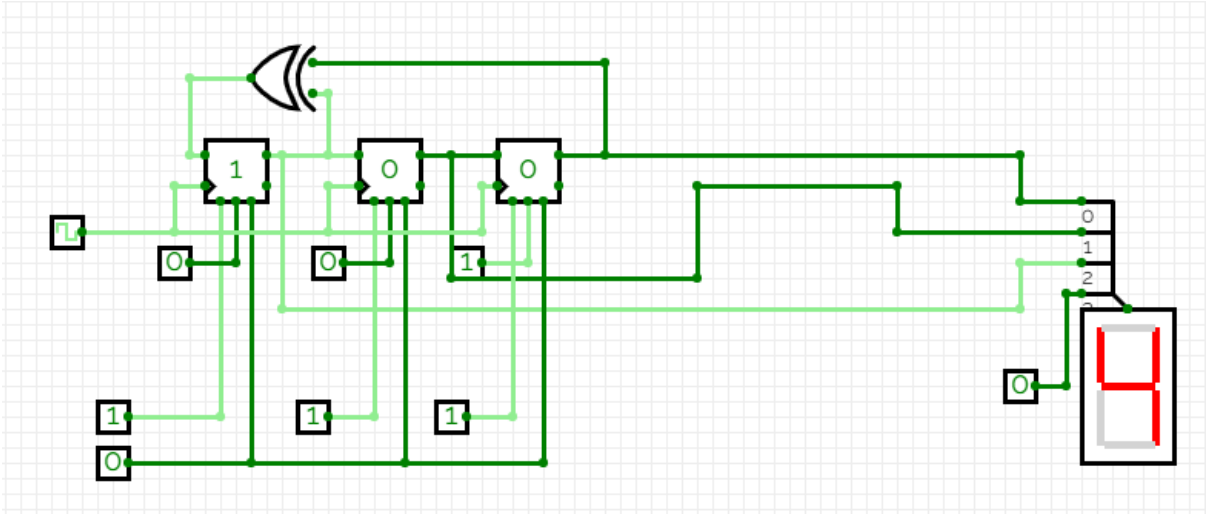
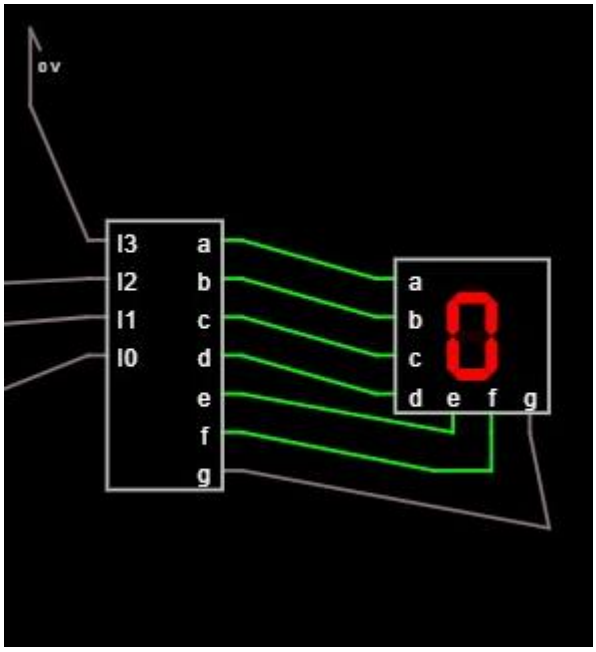
2
0


1
0
0
0
0
1
1
1
1
0
0
1
2
0

We have used an inverted input splitter followed by a hex-display in this simulation due to the unavailability of a BCD to 7 segment display decoder/ driver. Constructing one on online simulator was causing problems as too many wires were establishing joints among them even when it was not intended.

Though, on another simulator, we found a driver and therefore, the right side of the circuit would have been something like:



Where I0, I1, I2 would have been connected to the corresponding output of each of the D-Flip Flop

Functioning in simulator:

The Clock input, D and Q (output) have their usual positions in the D-flip flop of the simulator

However, the 3 inputs at the bottom are (L to R) Enable, Preset and Asynchronous Reset

Enable - acts on or ignores the clock. From the name ("enable", as opposed to "disable" or "enable-not") is assume a high voltage makes the thing work and a low voltage makes it ignore the clock. So, it should be high.

Preset - the value to load into the FF when you reset it.

Asynch Reset - tells the FF to load the "preset" value instead of the D input. Since it's async, you either pulse the line to load in the value, or leave it low to latch the D input when the clock pulses.

Hence, we set enable to high, the preset to what we want as the initial value (the seed), and reset low. At the start, we pulse reset to load in the seed, then tap the button to send in 1 to generate a random number and then tap to generate another random number and repeat