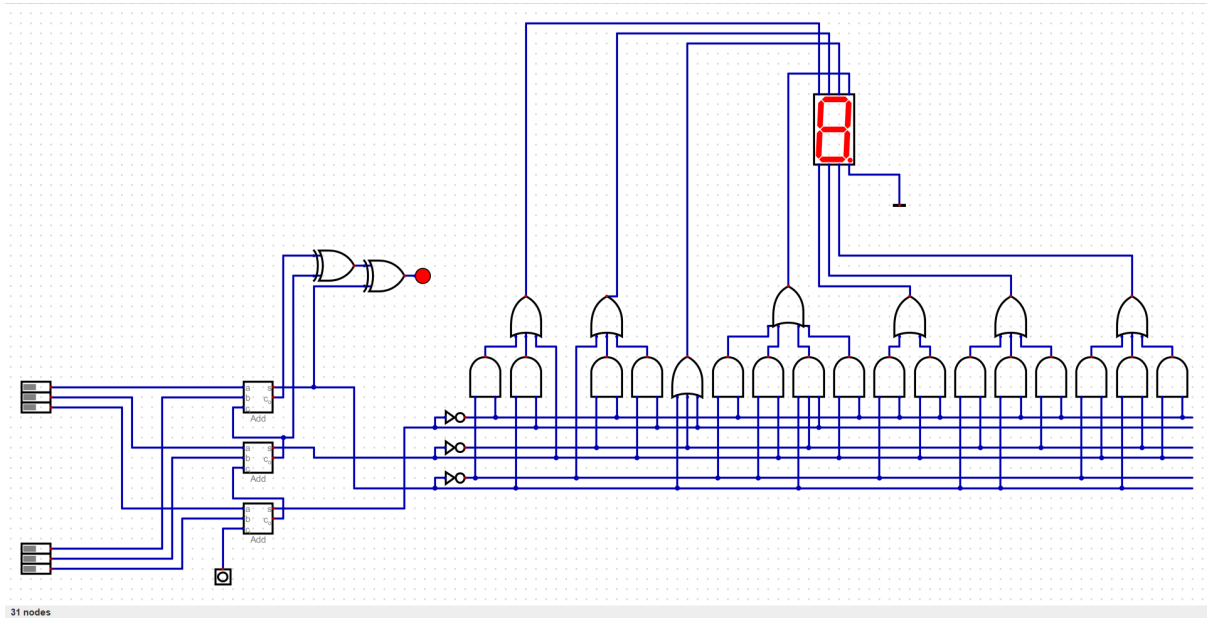


# PRE-LAB #2 Report

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## Circuit Design

### Step 1: Adders

- Created the adders using the related lecture slides

### Step 2: First XOR Gate

- First XOR Gate is used for getting the XOR of the carries at the end of the adder operation. This way, information regarding the occurrence of an overflow can be obtained.

### Step 3: Second XOR Gate

- In the second XOR Gate, the second input of the XOR Gate depends on the sign of the most significant bit. If the most significant bit is 1, then it can be concluded that the input number is a negative number.

- From the result of this XOR Gate, it can be understood that the condition where the MSB is 1 and therefore there is an overflow.
- LED is added to the output of this second XOR Gate. When the output is 1, the LED is on; when the output is 0, the LED is off.

#### **Step 4: Decoder**

- The synthesis tool is utilized to create the decoder based on a truth table. The truth table is used to decide the results of each output, whether they should be 1 or 0, depending on the inputs. The decoder is obtained by creating a circuit from this truth table.

#### **Step 5: Combining the Circuits**

- The output of the first part of the circuit (Adders and XOR Gates) is linked to the second part of the circuit which contains the decoder generated from the truth table.
- The outputs of the decoder are linked to the inputs of the seven-segment display, and the decimal point input part of the seven-segment display is connected to the ground.