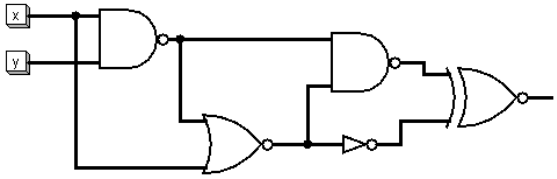
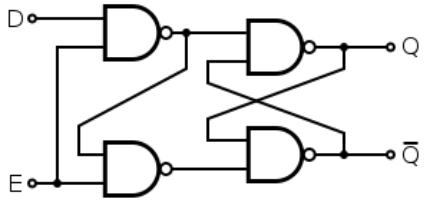
CPSC 359
Digital Logic Practice Questions

1. Design a combinational circuit that inputs a 3-bit binary number and outputs 1 when the number is even.
2. Draw a 4-variable *k*-map and simplify the following Boolean function:
   $F(w,x,y,z) = \Sigma(3,2,7,10,11)$
3. Consider the following Boolean function, where the input is a 4-bit number wxyz, :
   F = 1 if the number has at least two consecutive 1s or 0s; it is 0 otherwise
   For instance, F(0100) = F(1111)= 1, but F(0101) = F(1010) = 0.
   a. Create a truth table that represents F.
   b. Express F as a Boolean sum of products
   c. Simplify F and draw the circuit
   d. Repeat the problem for a 4-bit input. How about 5-bits? Is there a smarter construction that works with any n-bit input?
4. What is the corresponding function for the following circuit?



5. Fill in the table below to determine the value for Q in the following sequential circuit:



Choose values for Q from {0, 1, U, ?}, where U means that Q does not change (unchanged) and "?" means that the value of Q is undefined.

D	E	Q
0	1	
1	0	
0	0	
1	1	

6. Design an FSM for a problem of your choice. Generate a truth table that corresponds to the FSM. Draw the resulting synchronous sequential circuit.