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## HOMEWORK #2 – Week 2

This homework is worth 10% of your course grade.

**Read each problem carefully. Failure to follow the instructions for a problem will result in a zero score for that problem.**

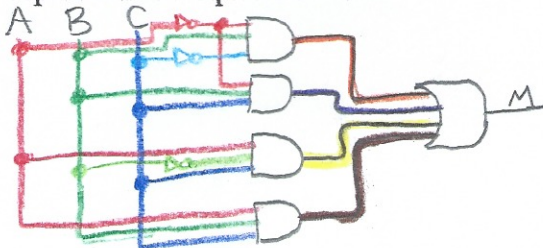
Submit the completed Homework via Assignment in LEO.

1. Construct a truth table for the Boolean equation:

$$M = A'BC' + A'BC + AB'C + ABC$$

A'	B'	C'	A	B	C	M
1	1	1	0	0	0	0
1	1	0	0	0	1	0
1	0	1	0	1	0	1
1	0	0	0	1	1	1
0	1	1	1	0	0	0
0	1	0	1	0	1	1
0	0	1	1	1	0	0
0	0	0	1	1	1	1

2. Draw a simple NOT, AND, OR circuit in sum of products (SOP) form that represents the equation above.



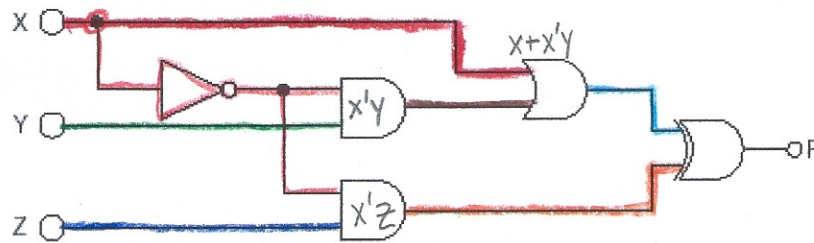
3. The truth table for a Boolean expression is shown below. Write the Boolean expression on SOP form

x	y	z	F
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	0
1	1	1	1

x	0	1
y	0	1
z	0	1
F	1	1

$$F = y'z' + xy' + yz$$

4. Find the truth table that describes the following circuit:



X	Y	Z	X'	X'Y	X'Z	X+X'Y	$(X+X'Y) \otimes X'Z = F$
0	0	0	1	0	0	0	0
0	0	1	1	0	1	0	1
0	1	0	1	1	0	1	1
0	1	1	1	1	1	1	0
1	0	0	0	0	0	1	1
1	0	1	0	0	0	1	1
1	1	0	0	0	0	1	1
1	1	1	0	0	0	1	1

5. a. Describe the function of a decoder circuit;  
 b. identify the types and quantity of gates needed to implement a 3-to-8 decoder;  
 c. either create (or give the location in the text) of a logic diagram of a decoder circuit

a. A decoder circuit takes binary input (multiple input highs) and outputs a single selection. Some common applications include a BCD to Digital Decoder and 7-segment displays, such as found in digital clocks.

b. To implement a 3-to-8 decoder, 3 NOT gates and 8 AND Gates are required.

