1. Given the binary equation:

$A\bar{B}C + \bar{A}BC + ABC = Z$

(a) Draw the schematic for the equation with A, B & C as the only inputs. Use only 2-input AND or OR gates and inverters. This is a non-minimal circuit.

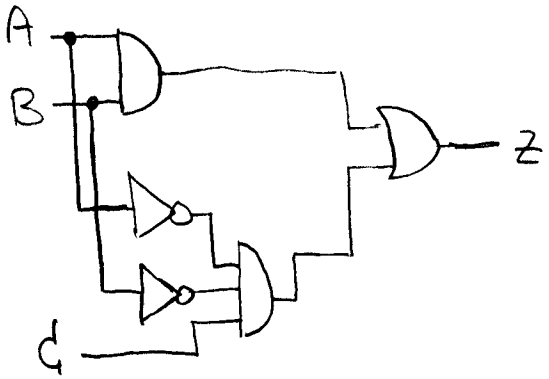
(b) Draw the truth table for the equation.

(c) Reduce the equation with a K-map, and implement the circuit with gates again. This will be the minimal implementation.

2. Do the same steps as in #1 for the equation:

$AB + BC + CA + B\bar{C} + \bar{A}B = Z$

Write the boolean equation for the following circuit. Is it minimal? If not, minimize.



4. Using K-maps, minimize the following equations:

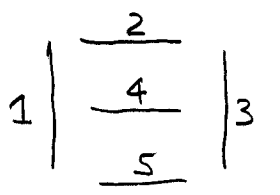
a) $F = ABC + BD\bar{A} + AC + DCA + BAD + B\bar{A}C + BC\bar{A}D$

b) $G = A\bar{D} + A\bar{C} + \bar{A}CD$

5. You have been asked to design a digital system to detect even and odd numbers. The input is a 4-bit binary number and the output must drive the following liquid crystal display. If the input is an even number (zero is even) then segments 1, 2, 4 and 5 must be asserted to display the letter "E". If the input is an odd number, segments 1, 2, 3 and 5 must be asserted to display the letter "O".

binary input	decimal input	E or O
0000	0	E
0001	1	O
0010	2	E
0011	3	O
0100	4	E
0101	5	O
0110	6	E
0111	7	O
1000	8	E
⋮	⋮	⋮
1111	15	O

SEGMENTS



6. Show how to make a 2 input "OR" gate from 2 input NAND gates.

7. Show how to make an inverter from a 2 input XOR gate.