Logic Design - Homework 6

(1) Design the following combinational circuits. DO NOT draw the circuit diagrams.

(a) Takes 3-bit input and outputs 1 when the number of 1's in the input number is smaller than the number of 0's.
(b) Takes 3-bit input such that when the input is 0,1,2,3 then the output is plus 1 and in other cases minus 1 of the input.
(c) Takes 3-bit input and outputs the 3-bit complement of the input.
(d) Takes 4-bit input and outputs the 2's complement of the input.
(e) Takes BCD input and outputs 1 if the bottom led of the 7-segment display is on.
(f) Takes 4-bit input and outputs 1 if the input is not BCD.
(g) Takes a BCD number as an input and outputs 3 times of the input in BCD form.
(h) Takes 3-bit input and determines the number of 1's in it.
(i) Takes 3-bit input and outputs its square.

(2) Implement the following circuits with only
(a) 2-input NAND gates and inverters.
(b) 2-input NOR gates and inverters.

F(W,X,Y,Z) = W(X+Y+Z) + XYZ
F(A,B,C,D) = AB'C' + B(C'+D')
F(W,X,Y,Z) = X + Y(W+X+Z)