Logic Design – Homework 5

(1) Design the following combinational circuits.

(a) Takes 3-bit input and outputs the 3-bit complement of the input.
(b) 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.
(c) 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.
(d) Takes a BCD number as an input and outputs 3 times of the input in BCD form.
(e) Takes 3-bit input and outputs its square.
(f) Takes 4-bit input and outputs the 2's complement of the input.
(g) Takes BCD input and outputs 1 if the top led of the 7-segment display is on.
(h) Takes 4-bit input and outputs 1 if the input is not BCD.
(i) Takes 3-bit input and determines the number of 1's in it.

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

F = W(X+Y+Z)+XYZ
F= ab'c'+ b(c'+d')
F =X+Y (Z+ X+Z)