Homework 3

1) Simplify the following Boolean functions by finding all the prime implicants and essential prime implicants and applying the selection rule. After you have simplified the functions, represent them using the logic basis mentioned below. Also, draw the combinational logic circuits corresponding to the functions in the corresponding logic basis using logic gates.

a) $F(W,X,Y,Z) = \sum m(0,1,4,5,7,8,9,12,14,15)$
(logic basis AND-OR-NOT and draw it using only AND,OR, NOT gates)

b) $F(W,X,Y,Z) = \sum m(1,5,6,7,11,12,13,15)$
(logic basis NAND and draw it using only NAND gates)

c) $F(W,X,Y,Z) = \sum m(0,2,3,4,5,7,8,10,11,12,13,15)$
(logic basis NOR and draw it using only NOR gates)

2) Do the same as in Task 1. Now we have functions with ***don't care*** conditions ***d*** that you have to take into account when simplifying the functions.

a) $F(A,B,C,D) = \sum m(0,3,5,7,11,13)$, $d(A,B,C,D) = \sum m(4,6,14,15)$
(logic basis AND-OR-NOT and draw it using only AND,OR, NOT gates)

b) $F(A,B,C,D) = \sum m(0,6,8,13,14)$, $d(A,B,C,D) = \sum m(2,4,7,10,12)$
(logic basis NAND and draw it using only NAND gates)

c) $F(A,B,C,D) = \sum m(0,1,2,4,5)$, $d(A,B,C,D) = \sum m(3,6,7)$
(logic basis NOR and draw it using only NOR gates)

Note: Show how you obtained the results and don't only give the final answer!!!