Seung Jun Baek

1. Simplify the following Boolean expressions to a minimum number of literals:

   (a) $xy + xy'$

   (b) $(x + y)(x + y')$

   (c) $xyz + x'y + xyz'$

   (d) $(A + B)'(A' + B')'$

   (e) $ABC + A'B + ABC'$

   (f) $x'yz + xz$

   (g) $(x + y)'(x' + y')$

   (h) $xy + x(wz + wz')$

2. List the truth table of the function:

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

3. Implement the Boolean function

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

   using only OR and inverter gates.

4. Simplify the following Boolean functions T_1 and T_2 to a minimum number of literals: (Table 1)

Table 1: Problem 4

A	B	C	T_1	T_2
0	0	0	1	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	0	1
1	0	1	0	1
1	1	0	0	1
1	1	1	0	1

5. Obtain the truth table of the following function, and express the function in sum-of-minterms and product-of-maxterms form:

$$(b + cd)(c + bd)$$

6. Express the following function as a sum of minterms and as a product of maxterms:

$$F(A, B, C, D) = B'D + A'D + BD$$

7. Convert each of the following to the other canonical form:

   (a) $F(x, y, z) = \Sigma(1, 3, 5)$
   (b) $F(A, B, C, D) = \prod(3, 5, 8, 11)$

8. Convert each of the following expressions into sum of products and product of sums:

   (a) $(u + xw)(x + u'v)$
   (b) $x' + x(x + y')(y + z')$

9. Draw the logic diagram corresponding to the following Boolean expressions without simplifying them:

$$A + CD + (A + D')(C' + D)$$

10. Write Boolean expressions for the outputs of the circuits described by the logic diagrams in Fig. 1.
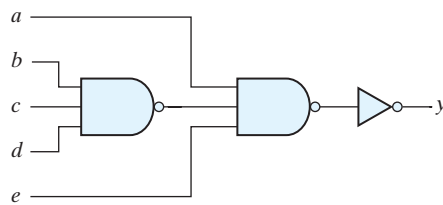

Figure 1: diagram