ASSIGNMENT No. 1

Simplify the following expressions using Boolean algebra.

a. $A + AB$

b. $AB + AB'$

c. $A'BC + AC$

d. $A'B + ABC' + ABC$

Simplify the following expressions using Boolean algebra.

a. $AB + A(CD + CD')$

b. $(BC' + A'D)(AB' + CD')$

Using DeMorgan's theorem, show that:

a. $(A + B)'(A' + B')' = 0$

b. $A + A'B + A'B' = 1$

Simplify the following Boolean functions using three-variable maps.

a. $F(x, y, z) = \Sigma\,(0, 1, 5, 7)$

b. $F(x, y, z) = \Sigma\,(1, 2, 3, 6, 7)$

c. $F(x, y, z) = \Sigma\,(3, 5, 6, 7)$

d. $F(A, B, C) = \Sigma\,(0, 2, 3, 4.6)$

Simplify the following Boolean functions using four-variable maps.

a. $F(A, B, C, D) = \Sigma\,(4, 6, 7, 15)$

b. $F(A, B, C, D) = \Sigma\,(3, 7, 11, 13, 14, 15)$

c. $F(A, B, C, D) = \Sigma\,(0, 1, 2, 4, 5, 7, 11, 15)$

d. $F(A, B, C, D) = \Sigma\,(0, 2, 4, 5, 6, 7, 8, 10, 13, 15)$

Simplify the following expressions in (1) sum-of-products form and (2) product-of-sums form.

a. $x'z' + y'z' + yz' + xy$

b. $AC' + B'D + A'CD + ABCD$

Simplify the following Boolean function in sum-of-products form by means of a four-variable map. Draw the logic diagram with (a) AND-OR gates; (b) NAND gates.

$$F(A, B, C, D) = \sum (0, 2, 8, 9, 10, 11, 14, 15)$$

Simplify the following Boolean function in product-of-sums form by means of a four-variable map. Draw the logic diagram with (a) OR-AND gates; (b) NOR gates.

$$F(w, x, y, z) = \sum (2, 3, 4, 5, 6, 7, 11, 14, 15)$$

Simplify the Boolean function F together with the don't-care conditions d in (1) sum-of-products form and (2) product-of-sums form.

$$F(w, x, y, z) = \sum (0, 1, 2, 3, 7, 8, 10)$$

$$d(w, x, y, z) = \sum (5, 6, 11, 15)$$