EE 231 – Homework 3
Due September 17, 2010

1. Find the truth table for the following functions:

   (a) $F = y'z' + y'z + xz'$

   (b) $F = xy + x'z'$

2. Implement the Boolean function

$$F = yz + y'z' + z'z$$

   (a) with AND, OR and inverter gates,

   (b) with NAND and inverter gates,

   (c) with NOR and inverter gates.

3. Obtain the truth table of the following functions, and express each function as a sum-of-minterms and a product-of-maxterms:

   (a) $(x + yz)(z + xz)$

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

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

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

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

   (a) $F(x, y, z) = \Sigma(1, 3, 6)$

   (b) $F(A, B, C, D) = \Pi(0, 2, 4, 7, 9, 13)$

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

   (a) $(BC + D)(C + AD')$

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

7. Simplify the following Boolean functions using three-variable maps:

   (a) $F(x, y, z) = \Sigma(0, 3, 4, 5, 6, 7)$

   (b) $F(x, y, z) = \Pi(3, 5, 7)$

   (c) $F(x, y, z) = \Sigma(0, 2, 5, 7)$

8. Simplify the followin Boolean expressions using three-variable maps:

   (a) $F(x, y, z) = x'y'z' + yz + x'y'z$

   (b) $F(x, y, z) = xy + y'z' + x'y'z$

   (c) $F(x, y, z) = x'y + y'z + x'z'$

   (d) $F(x, y, z) = xyz + xy'z' + x'yz'$

9. Simplify the following Boolean functions, using Karnaugh maps:

   (a) $F(A, B, C, D) = \Sigma(1, 5, 6, 7, 11, 12, 13, 15)$

   (b) $F(w, x, y, z) = \Sigma(0, 1, 2, 4, 5, 8, 9, 10, 11, 13)$

   (c) $F(w, x, y, z) = \Pi(0, 2, 3, 8, 10)$