HW3

1. (10%) Simplify the following Boolean functions or expression, using three-variable maps:
   (a) $F(x, y, z) = \sum(0, 2, 4, 5, 6)$
   (b) $F(x, y, z) = xy' + x'yz + yz'$

2. (20%) Simplify the following Boolean functions by first finding the essential prime implicants (Please indicate the essential prime implicants and prime implicants):
   (a) $F(w, x, y, z) = \sum(0, 1, 2, 4, 5, 6, 8, 10, 11, 14)$
   (b) $F(w, x, y, z) = wz' + xy + y'z + wx'z$

3. (10%) Simplify the following expressions in (a) sum of products and (b) product of sums:
   $$F(x, y, z) = xy' + y'z + xz' + xzy$$

4. (20%) Simplify the following Boolean function F, together with the don't-care conditions d, and then express the simplified function in sum of products:
   (a) $F(x, y, z) = \sum(0, 1, 2, 4), d(x, y, z) = \sum(3, 6)$
   (b) $F(A, B, C, D) = \sum(1, 3, 5, 7, 9, 15), d(A, B, C, D) = \sum(4, 11, 12)$

5. (10%) Simplify the following expression, and implement it with two-level NAND gates:
   $$F(A, B, C) = (A' + B' + C)(B + C')(A' + C)$$

6. (10%) Simplify the following expression, and implement it with two-level NOR gates:
   $$F(w, x, y, z) = wz' + xy + y'z + wx'z$$

7. (20%) Simplify the following Boolean function F, using the two-level forms (a) AND-OR-Inverter, (b) OR-AND-Inverter logic diagrams
   $$F(x, y, z) = \sum(0, 2, 4, 5, 6)$$

