ECE451 Homework #4

2.17: (Boolean Simplification) Simplify the following functions using the theorems of Boolean algebra. Write the particular law or theorem you are using in each step. For each function, by how many literals did you reduce its representation?

a. $f(X,Y) = XY + XY'$
b. $f(X,Y) = (X + Y)(X + Y')$
c. $f(X,Y,Z) = Y'Z + X'YZ + XYZ$
d. $f(X,Y,Z) = (X + Y)(X' + Y + Z)(X' + Y + Z')$
e. $f(W,X,Y,Z) = X + XYZ + X'YZ + X'Y + WX + WX'$

2.18: (Boolean Simplification) Consider the function:

$f(A,B,C,D) = (AD + A'C)[B'(C + BD')]$

a. Draw its schematic using AND, OR and NOT gates.
b. Using Boolean algebra, put the function into its minimized form and draw the resulting schematic.

2.19: (Canonical Forms) Consider the function:

$f(A,B,C,D) = \sum m(0,1,7,8,9,10,15)$.

a. Write this as a Boolean expression in canonical minterm form.
b. Rewrite the expression in canonical maxterm form.
c. Write the complement of *f* in "little *m*" notation and as a canonical minterm expression.
d. Write the complement of *f* in "big *M*" notation and as a canonical maxterm expression.

2.26: (Boolean Simplification) Determine the minimized realization of the following function in the sum-of-products form:

a. $f(W,X,Y,Z) = \sum m(0,2,8,9) + \sum d(1,3)$
b. $f(W,X,Y,Z) = \sum m(1,7,11,13) + \sum d(0,5,10,15)$
c. $f(A,B,C,D) = \sum m(1,2,11,13,14,15) + \sum d(0,3,6,10)$
d. $f(A,B,C,D) = \prod M(2,5,6,8,9,10) * \prod D(4,11,12)$