Chapter 2, problem 4: (5 pts) Show a truth table for the following function:

b) $G = XY + (X' + Z)(Y + Z')$

Chapter 2, problem 8: (5 pts) Using Boolean Algebra, reduce the following expression to a minimum sum of products form.

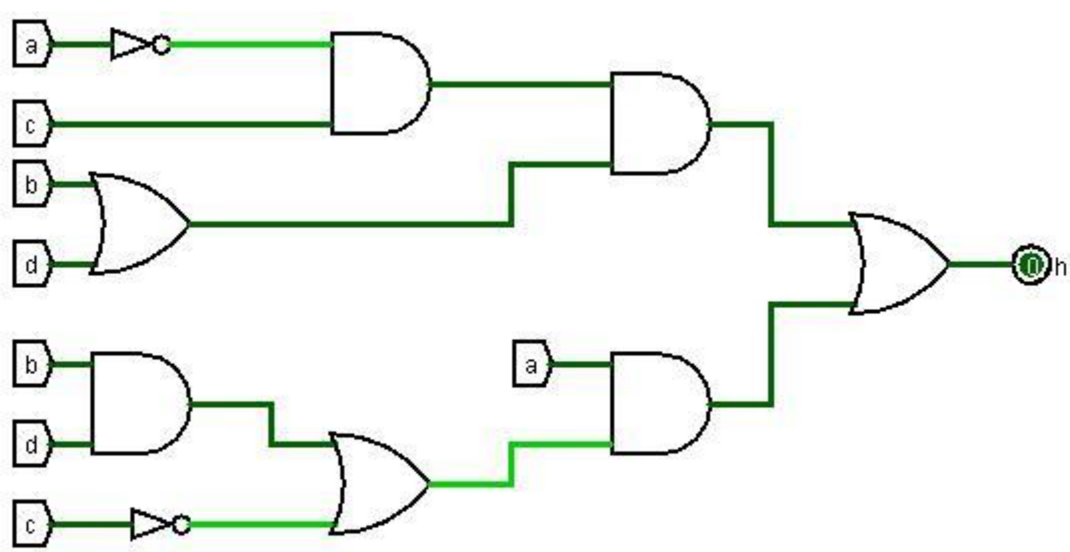
d) $a'b'c' + a'b'c + abc + ab'c$

Chapter 2, problem 10: (5 pts) Show a block diagram of a system using AND, OR, and NOT gates to implement the following function. Assume that variables are available only uncomplemented. Do not manipulate the algebra.

b) $ab + c(a + b)$

Chapter 2, problem 11: (5 pts) For the following circuit,

i. find an algebraic expression
ii. put it in sum of product form.



Chapter 2, problem 14: (6 pts) For the function **g** in the following truth table:

	a	**b**	**c**	**g**
0	0	0	0	1
1	0	0	1	1
2	0	1	0	0
3	0	1	1	0
4	1	0	0	1
5	1	0	1	1
6	1	1	0	1
7	1	1	1	0

a) Show the minterms in numerical form.

b) Show the canonical algebraic expression in sum of products form.

c) Show a minimum SOP expression.

d) Show the minterms of **g’** in numeric form.

e) Show the canonical algebraic expression in product of sums form.

f) Show a minimum POS expression (**g**: 2 terms, 4 literals).

Chapter 2, problem 15: (6 + 6 pts) For each of the following functions:

F = AB' + BC + AC
G = (A + B)(A + C') + AB'

a) Show the truth table.

b) Show the canonical algebraic expression in sum of products form.

c) Show a minimum SOP expression (**F**: 2 terms, 4 literals; **G**: 2 terms, 3 literals).

d) Show the minterms of the complement of each function in numeric form.

e) Show the canonical algebraic expression in product of sums form.

f) Show a minimum POS expression (**F**: 2 terms, 4 literals; **G**: 2terms, 4 literals).

Chapter 2, problem 17: (5 pts) Show that the NOR is functionally complete (aka a combination of NOR gates can replace any other logic gate) by implementing a NOT, a two-input AND, and a two-input OR using only two-input NORs.

Chapter 2, problem 19: (5 pts) Show a block diagram corresponding to each of the expressions below using only NAND gates. Assume all inputs are available both complemented and uncomplemented.

c) $h = z(x'y + w'x') + w(y' + xz')$

Chapter 3, problem 2: (5 pts) For each of the following, find all minimum sum of products expressions:

d) $f(a,b,c,d) = \Sigma m(1,2,3,5,6,7,8,11,13,15)$

Chapter 3, problem 5: (5 pts) For the following, find all minimum sum of products expressions. (If there is more than one solution, the number of solutions is given in parentheses.) Label the solutions f_1, f_2, ...

a) $f(w,x,y,z) = \Sigma m(1,3,6,8,11,14) + \Sigma d(2,4,5,13,15)$ (3 solutions)

Chapter 3, problem 7: (5 pts) For each of the following functions, find all minimum POS expressions:

a) $f(A,B,C,D) = \Sigma m(1,4,5,6,7,9,11,13,15)$

Chapter 3, problem 11: (10 pts) Find a minimum two-level circuit (corresponding to sum of product expressions) using AND and one OR gate per function for each of the following sets of functions.

a) $f(a,b,c,d) = \Sigma m(1,3,5,8,9,10,13,14)$
$g(a,b,c,d) = \Sigma m(4,5,6,7,10,13,14)$ (7 gates, 21 inputs)