

Name \_\_\_\_\_

University of Baltimore  
 Math 321: Discrete Structures  
 Chapter 10(D part 2): Boolean algebra

Date \_\_\_\_\_

BECAUSE THIS IS A GRADED ASSIGNMENT, YOU MAY NEITHER GIVE NOR RECEIVE HELP.

Answer each question as indicated. **Think** first, then write. **Show all your work**, and remember to **check** your answers! Place your answers in the spaces provided at the right.

For all questions, let  $f(w, x, y, z) = \overline{w}y + x\overline{z}$  where **w, x, y and z are Boolean variables**.

Note that you'll need to work carefully: following questions depend upon your answers to the prior ones.

1. Find the sum-of-products expansion for  $f$ .

w	x	y	z	
1	1	1	1	
1	1	1	0	
1	1	0	1	
1	1	0	0	
1	0	1	1	
1	0	1	0	
1	0	0	1	
1	0	0	0	
0	1	1	1	
0	1	1	0	
0	1	0	1	
0	1	0	0	
0	0	1	1	
0	0	1	0	
0	0	0	1	
0	0	0	0	

$f(w, x, y, z) =$

2. Use K-maps to find the minimization of your function.

	yz	y $\overline{z}$	$\overline{y}z$	$\overline{y}\overline{z}$
wx				
w $\overline{x}$				
$\overline{w}x$				
$\overline{w}\overline{x}$				

3. Complete the table of values to show that your minimization is equal to  $f$ .

w	x	y	z	
1	1	1	1	
1	1	1	0	
1	1	0	1	
1	1	0	0	
1	0	1	1	
1	0	1	0	
1	0	0	1	
1	0	0	0	
0	1	1	1	
0	1	1	0	
0	1	0	1	
0	1	0	0	
0	0	1	1	
0	0	1	0	
0	0	0	1	
0	0	0	0	

4. Use logic gates to design the circuit for your minimized function. (Work on back)