CS-301 Computer Architecture
Assignment 6

Name:_____

1. Write a simplified expression for the Boolean function defined by the following Kmap.

WX \ YZ	00	01	11	10
00	1	1	1	1
01			1	1
11	1	1	1	1
10	1			1

$F(W,X,Y,Z) =$ _____

2. Create the K-map and then simplify the following Boolean function:

$$F(W,X,Y,Z) = \bar{W}\bar{X}\bar{Y}\bar{Z} + \bar{W}\bar{X}Y\bar{Z} + \bar{W}X\bar{Y}Z + \bar{W}XYZ + \bar{W}XY\bar{Z} + W\bar{X}\bar{Y}\bar{Z} + W\bar{X}Y\bar{Z}$$

WX \ YZ	00	01	11	10
00				
01				
11				
10				

$F(W,X,Y,Z) =$ _____

3. Tyrone Shoelace has invested a huge amount of money into the stock market and does not trust just anyone to give him buying and selling information. Before he will buy a certain stock, he must get input from three sources. His first source is Pain Webster, a famous stock broker. His second source is Meg A. Cash, a self-made millionaire in the stock market, and his third source is Madame LaZora, a world-famous psychic. After several months of receiving advice from all three, he has come to the following conclusions:
    a) Buy if Pain and Meg both say yes and psychic say no.
    b) Buy if the psychic says yes.
    c) Don't buy otherwise.

Construct a truth table and find the minimized Boolean function to implement the logic telling Tyrone when to buy.

X	*Y*	*Z*	*F*
0	0	0	
0	0	1	
0	1	0	
0	1	1	
1	0	0	
1	0	1	
1	1	0	
1	1	1	

$F(W, X, Y, Z) =$

4. The truth table for a Boolean function is shown below. Write the Boolean function in sum-of-products form.

X	*Y*	*Z*	*F*
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	0

$F(X, Y, Z) =$

5. Given the Boolean function $F(X, Y, Z) = \bar{X}Y + XY\bar{Z}$.

   a) Derive an algebraic expression for the complement of *F*. Express $\bar{F}$ in sum-of-products form.

$\bar{F}(X, Y, Z) =$

b) Show that $F\bar{F} = 0$ and $F + \bar{F} = 1$. Use either truth tables (one is provided below) or identities (in this case, use the space below to show your work).

X	Y	Z		F		$\bar{F}$	$F\bar{F}$	$F + \bar{F}$
0	0	0						
0	0	1						
0	1	0						
0	1	1						
1	0	0						
1	0	1						
1	1	0						
1	1	1						