

## Logic Design Homework 1

1. Convert the given positive decimal numbers to binary:

23	99	35
56	72	61

2. Convert the given positive binary numbers to decimal:

11 1011	1000 1001
111 0111	10111010

3. Convert the given binary numbers to hexadecimal and hexadecimal numbers to binary:

111001	11011010	0x f16
10100101101101111100	111111100110	0x e5

4. Convert the given 2's complement binary numbers to decimal. Show all 8 bits in 2's complement including the sign bit:

1110 1000	1001 1111	0101 1010
1000 0110	0111 0011	1100 1001
0010 1110	1011 1010	1111 1000

5. Convert the given decimal numbers to signed binary numbers, using the 2's complement sign convention:

-29	-99	47
-59	68	-78
-37	108	-77

6. Perform the designated mathematical operation for the given 2's complement binary numbers and write also decimal values of your binary answers below them:

1111 0111	0101 1000	0001 1111	1100 0000
<u>+0110 1000</u>	<u>- 0011 1010</u>	<u>- 0101 0101</u>	<u>- 1000 0111</u>

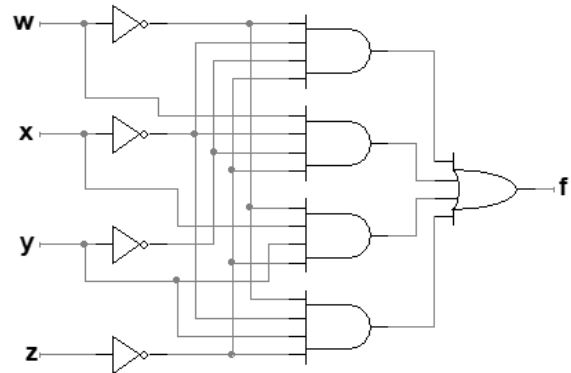
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7. The logic function  $f$  is given in SOP form. Complete the truth table and draw the corresponding logic circuit.

$$f = \bar{x}y\bar{z} + x\bar{y}z + xyz$$

$x$	$y$	$z$	$f$
0	0	0	
0	0	1	
0	1	0	
0	1	1	
1	0	0	
1	0	1	
1	1	0	
1	1	1	

8. Logic circuit is given below. Write its Boolean expression and simplify without using Karnaugh map. Draw the circuit of simplified Boolean expression.



9. Simplify the given Boolean expression without using Karnaugh map. Draw its circuit.

$$f = \bar{w}\bar{x}yz + wxyz + \bar{w}\bar{x}\bar{y}z + wxy\bar{z}$$

10. Write the Boolean expression in SOP from the truth table given below, then draw the circuit. Simplify the expression to a simpler SOP without using Karnaugh map and draw the new circuit.

$x$	$y$	$z$	$f$
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1