Name Answers

For each of the following truth tables, write the disjunctive normal of the equation.

Table 1

x	y	$f(x,y)$
1	1	1
1	0	1
0	1	0
0	0	1

$xy \vee x\bar{y} \vee \bar{x}\bar{y}$

$f(x,y)=$

Table 2-3

x	y	z	$f(x,y,z)$
1	1	1	0
1	1	0	1
1	0	1	0
1	0	0	1
0	1	1	1
0	1	0	0
0	0	1	1
0	0	0	1

$xy\bar{z} \vee x\bar{y}\bar{z} \vee \bar{x}yz \vee x\bar{y}z \vee \bar{x}\bar{y}\bar{z}$

$f(x,y,z)=$

Table 4-5

x	y	z	$f(x,y,z)$
1	1	1	1
1	1	0	1
1	0	1	0
1	0	0	1
0	1	1	0
0	1	0	1
0	0	1	0
0	0	0	1

$xyz \vee xy\bar{z} \vee x\bar{y}\bar{z} \vee \bar{x}yz \vee \bar{x}\bar{y}z$

$f(x,y,z)=$

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Table 6-7

W	x	y	Z	$f(w,x,y,z)$
1	1	1	1	0
1	1	1	0	1
1	1	0	1	1
1	1	0	0	1
1	0	1	1	0
1	0	1	0	0
1	0	0	1	1
1	0	0	0	1
0	1	1	1	0
0	1	1	0	0
0	1	0	1	0
0	1	0	0	1
0	0	1	1	1
0	0	1	0	1
0	0	0	1	0
0	0	0	0	0

$wxy\bar{z} \vee wx\bar{y}z \vee wx\bar{y}\bar{z} \vee w\bar{x}\bar{y}z \vee w\bar{x}\bar{y}\bar{z} \vee \bar{w}x\bar{y}\bar{z} \vee \bar{w}\bar{x}yz \vee \bar{w}\bar{x}y\bar{z}$

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

For each of the following Boolean functions, write the expression in disjunctive normal form.

$f(x,y)=(\bar{y})(\bar{x}\vee y)$ $= \bar{x}\bar{y}$

$f(x,y)=x\bar{y}\vee\bar{x}y\vee x\bar{y}$ $= x\bar{y} \vee \bar{x}y$

$f(x,y,z)=(\bar{x}\vee\bar{y})(\bar{x}\vee z)$ $= \bar{x}yz \vee \bar{x}y\bar{z} \vee \bar{x}\bar{y}z \vee \bar{x}\bar{y}\bar{z} \vee x\bar{y}z$

$\bar{x} \vee \bar{y}z$

$f(w,x,y,z)=\overline{w\bar{y}\vee\bar{x}y\vee x\bar{y}z}$ $= \bar{w}xy\bar{z} + \bar{w}xyz + wxy\bar{z} + wxyz + \bar{w}x\bar{y}z + \bar{w}\bar{x}\bar{y}\bar{z} + \bar{w}\bar{x}\bar{y}z$

$xy + \bar{w}xz + \bar{w}\bar{x}\bar{y} + \bar{w}\bar{y}z$

$f(x,y,z)=\overline{x(y\vee\overline{xz})}(y\vee\overline{xz})$ $= wxyz + wxy\bar{z} + \bar{w}xyz + \bar{w}xy\bar{z} + wx\bar{y}z + \bar{w}x\bar{y}z$

$xy + x\bar{z}$

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III. -32 16 8 4 2 1

Write each decimal number in a 6-bit 2s complement representation.	
29 =	011101
13 =	001101
6 =	000110
0 =	000000
-4 =	111100
-19 =	101101
-27 =	100101
-32 =	100000

-16 8 4 2 1

Write each decimal number in a 5-bit 2s complement representation. *What do you bubble on scantron?*		
-15 =	ABCDE	A E 10001
-13 =	ABCDE -16 8 4 2 1	A D E 10011
-6 =	ABCDE	A B D 11010
-1 =	ABCDE	A B C D E 1 1 1 1 1
0 =	ABCDE	Bubble nothing!
4 =	ABCDE	C 00100
11 =	ABCDE	B D E 01011
14 =	ABCDE	B C D 01110

Perform the following 2s complement addition problems using 4-bit arithmetic. What would you bubble if the answer is zero? Would you ever bubble A only?

1 111 1101 +1011 ABCDE 1000 B	1 1010 +1101 ABCDE CDE	0101 +1010 ABCDE BCDE	1 1 1 1001 +0111 ABCDE 0000 ABCDE for zero

Half Adders

Half adder

x	y	c	s
1	1	1	0
1	0	0	1
0	1	0	1
0	0	0	0

Write the Boolean function for c in a half adder: c = x y

Write the Boolean function for s in a half adder: s = x ⊕ y

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Full Adder

Write the Boolean function for c in a full adder: c = $xy \vee xz \vee yz$

Write the Boolean function for s in a full adder: s = $x \oplus y \oplus z$

Full adder

x	y	z	c	s
1	1	1	1	1
1	1	0	1	0
1	0	1	1	0
1	0	0	0	1
0	1	1	1	0
0	1	0	0	1
0	0	1	0	1
0	0	0	0	0

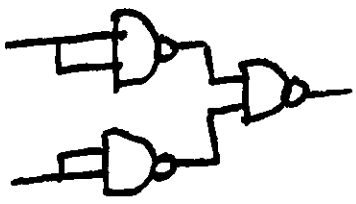
NAND Implementations:

Draw the NAND implementation for each of the following

NOT $\neg x$

AND $(x \wedge y)$

OR $(x \vee y)$



$(xy) \vee (\overline{yz})$ /* Do not forget to simplify */