①

Sept 20, 2017

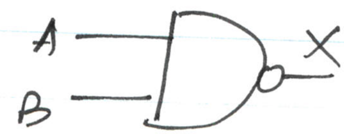
Logic gate :

NAND

$X = (A \cdot B)'$

Truth Table

input A	input B	output X
0	0	1
0	1	1
1	0	1
1	1	0



Repeat this explanation for all the gates.

October 11, 2017 Wednesday

Minterm vs. Maxterm

A	B	C	f(A,B,C)
0	0	0	1 (true)
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

express this function as (i) sum of minterms

Alternatively as (ii) product of maxterms

1's $\Sigma(m_0, m_1, m_4, m_6, m_7)$

$= A'B'C' + A'B'C + AB'C' + ABC' + A \cdot B C$

0's $\Pi(M_2, M_3, M_5) = \cancel{(A' + B + C')} \cdot$

$(A + B' + C) \cdot (A + B' + C') \cdot (A' + B + C') \cancel{(A' + B + C) \cdot (A + B' + C)}$

2

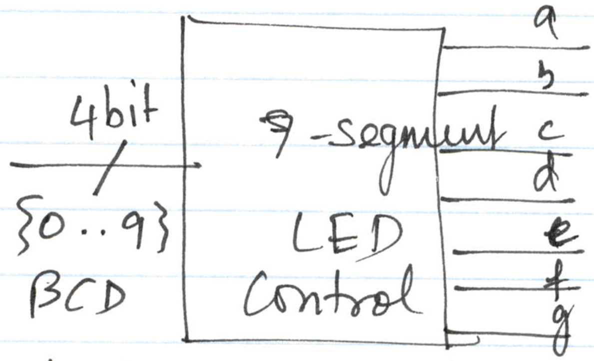
$\cancel{A + BA'} = \cancel{A}$ Sept 20

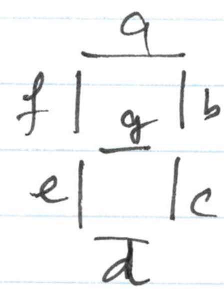
$A + BA' = (A+B)\cdot\cancel{(A+A')}$ → 1

3 literals

$= A + B$

2 literals





don't care $\sum(m_{10}, m_{11}, m_{12}, m_{13}, m_{14}, m_{15})$

BCD	W	X	Y	Z	a	b	c	d	e	f	g
0	0	0	0	0	1	1	1	1	1	1	0
1	0	0	0	1	0	1	1	0	0	0	0
2	0	0	1	0	1	1	0	1	1	0	1
3	0	0	1	1	1	1	1	1	0	0	1
4	0	1	0	0	0	1	1	0	0	1	1
5	0	1	0	1	1	0	1	1	0	1	1
6	0	1	1	0	1	0	1	1	1	1	1
7	0	1	1	1	1	1	1	0	0	0	0
8	1	0	0	0	1	1	1	1	1	1	1
9	1	0	0	1	1	1	1	[illegible]	0	1	1

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$a(W,X,Y,Z) = \Sigma(0,2,3,5,6,7,8,9)$
don't cares $\Sigma(10,11,12,13,14,15)$

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

Is there a group of 8 1's?
Yes g1, g2
Have I covered all the 1's?
Is there a group of 4 1's?
Yes g3 + g4

yes.

g1: Y g2: W g3: XZ g4: X'Z'

$a(W,X,Y,Z) = g1+g2+g3+g4 = \underline{Y+W+XZ+X'Z'}$

$e(W,X,Y,Z) = \Sigma(0,2,6,8)$
don't care $\Sigma(10,11,12,13,14,15,16)$

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

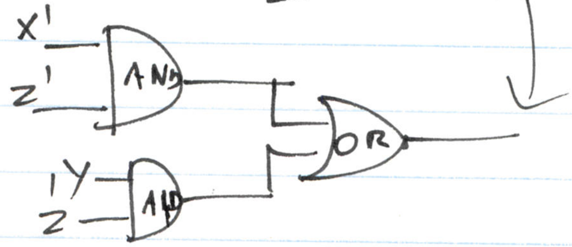
1 group of 4 1's. g1
1 group of 4 1's g2

$e(W,\cancel{X},Y,Z) = g1+g2$
$= \underline{X'Z' + YZ'}$

"Standard" SOP sum of product
$Z'(X'+Y)$ non standard

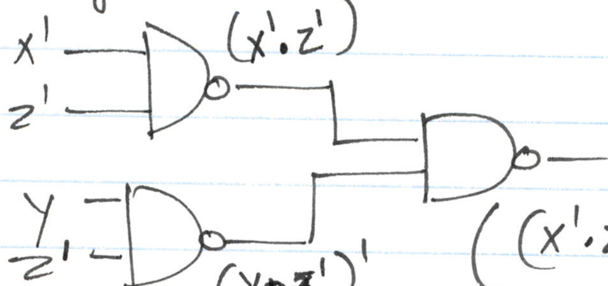
Sept 20, 2016

$e(w,x,y,z)$ ~~x'y+~~ $x'z' + Yz'$



equiv alent

NAND only SOP



$$((x'\cdot z')' \cdot (Y\cdot z')')'$$

$= ?$

De Morgan's laws

$$(x\cdot z)' = x' + z'$$

$$(x+z)' = x'\cdot z'$$

$$(x'\cdot z') + (Y\cdot z')$$

$$= x'z' + Yz'$$

$$((x'\cdot z')' \cdot (Y\cdot z')')'$$

$$x'z' + Yz'$$