CSE 241 Feb 22, 2017

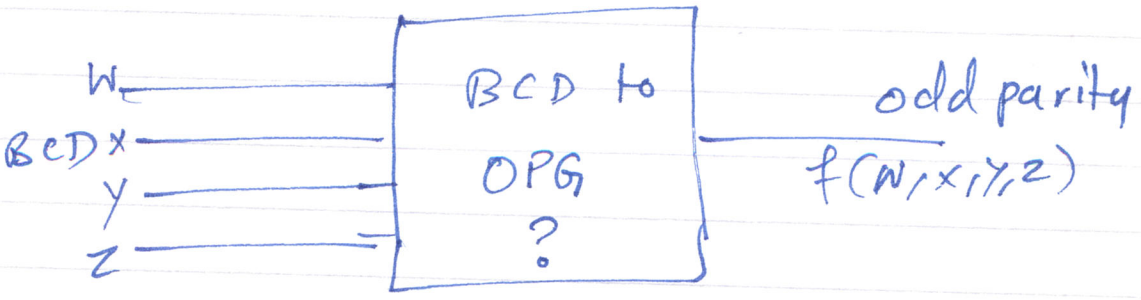
Announcements:

Midterm Exam 3/13/2017.
We'll review for it before the exam.

Lab 1 is posted.

All the lecture recordings available on Ublearns
HW#2 is also assigned: look at the Homeworks Tab.
Reading: We are in ch. 3

BCD - Binary Coded Decimal
Ex: odd Parity Generator



Combinational Circuit
Output is dependent only on the input for a given circuit

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Truth Table

BCD digit	input column W	X	Y	Z	output f_{OPG}
0	0	0	0	0	1 m_0
1	0	0	0	1	0
2	0	0	1	0	0
3	0	0	1	1	1
4	0	1	0	0	0
5	0	1	0	1	1
6	0	1	1	0	1
7	0	1	1	1	0
8	1	0	0	0	0
9	1	0	0	1	1

other combinations are not needed since they will not occur in the input "don't cares"

⇒ 5 bits together shall have odd # of 1's

Step 1: Problem to TT

Step 2: TT → Σ minterms

$f(W,X,Y,Z) = \Sigma(m_0, m_3, m_5, m_6, m_9)$

Step 3: K-map

Version 1: without don't cares

Version 2: with don't cares

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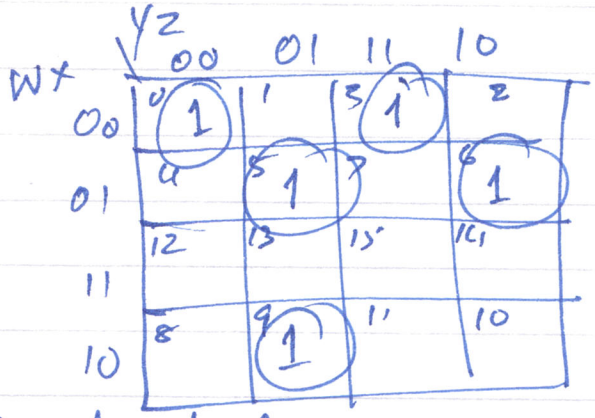
Version 1



map the minterms

Standard form:

$f(w,x,y,z) = w'x'y'z' + w'x'yz + wxy'z + w'xyz' + wx'y'z$

$w'x \cdot yz$

Version 2:

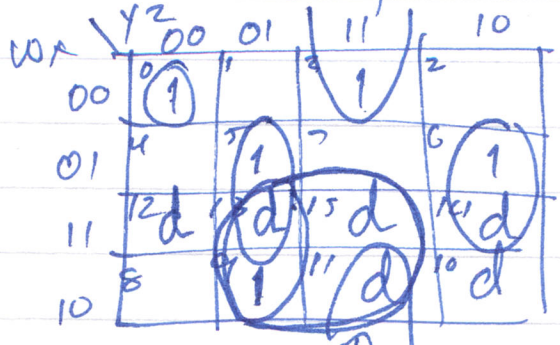
$f(w,x,y,z) = \Sigma(0,3,5,6,9)$

$d(w,x,y,z) = \Sigma(m_{10}, m_{11}, m_{12}, m_{13}, m_{14}, m_{15})$

$= \Sigma(10,11,12,13,14,15)$

These terms and cells are available for simplification IF YOU WANT TO USE THEM

You don't have to cover all of them.



group of 4

$w'x'y'z' + x'yz + xy'z + xyz'$

$wy'z$

wz

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$f(w,x,y,z) = w'x'y'z' + x'yz + xy'z + xyz' + wz$

Assume primes are available.

Use only NAND gates to implement this function.

Assume 5-input, 4-input, 3-input, 2-input NAND$_s$ are available