CSE241 Feb 20, 2017

Midterm Exam: 3/13/2017

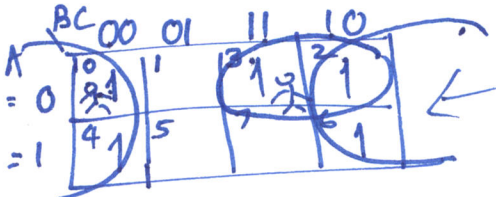
Lecture recordings are available on Ublearns.

~~Lab 1~~
Please demo Lab 1 to TAs in recitation to get your grade: Deadline: 3/3/2017
(However demo it before the deadline)

1. $f(A,B,C) = \Sigma(0,2,3,4,6)$

Simplify to minimum number of terms and min number of literals.

Step 1: draw empty K-map
3-variable map



~~Step 2: Step 2~~. Label the map

Step 3: fill-in the minterms of the problem to be minimized.

Step 4: Cover the 1's with (i) minimal # of "rectangular adjacent" groups
(ii) as large a group as possible

Feb 20, 2017

Group of 4 1's using wrap-around

Have I covered all the 1's? No

Is there a group of 2 1's? Yes
with overlap ...

Steps:
1 group of 4 1's
1 group of 2 1's
write the terms for these groups

group 1 term → C'

A changes, B changes and C = 0 for all 1's in the group

group 2 → $A'B$

A = 0 B = 1
C changes

simplified expression is

$$f(A, B, C) = C' + A'B$$

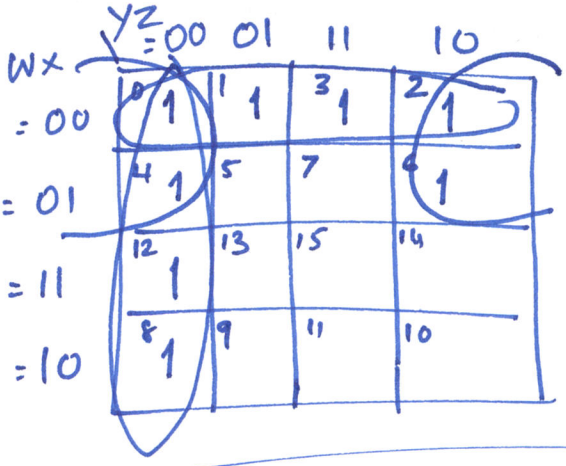
We started with 5 terms, 3 literals each
5 x 3 = 15

We simplified it to 2 terms of 3 literals

15	→ 3
5	→ 2

4 - variable problem. Feb 20, 2017

$f(w,x,y,z) = \Sigma(0,1,2,3,4,6,8,12)$



Is there group of 16 1's? No

Is there a group of 8 1's? rectangular adjacent No

Is there a group of 4 1's?

3 groups of 4 1's

all 1's — covered.

group 1: $y=0$ $z=0$ are constant/common

$y'z'$

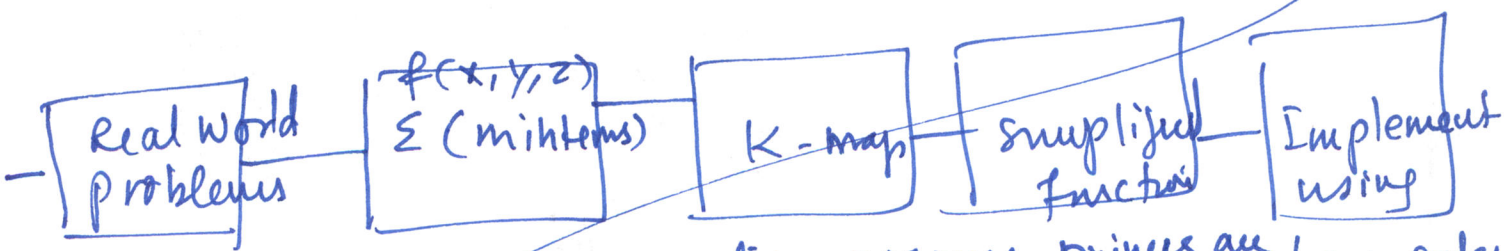
group 2: $w=0$ $x=0$ are constant

$w'x'$

group 3: $w=0$ $z=0$ are constant

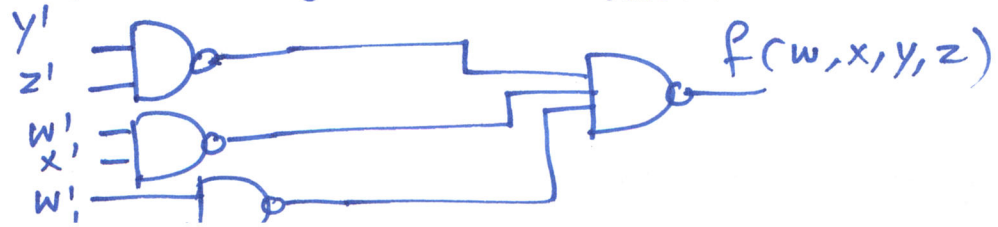
$w'z'$

Simplified: $f(w,x,y,z) = y'z' + w'x' + w'z'$

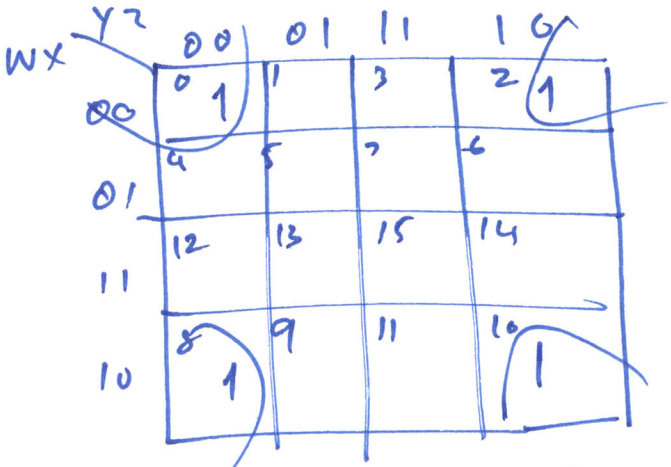


Ex: 7-Segment LED Driver

NAND gates. assume primes are available. logic gates



3. $f(w,x,y,z) = \Sigma(0,2,8,10)$ Feb 20, 2017

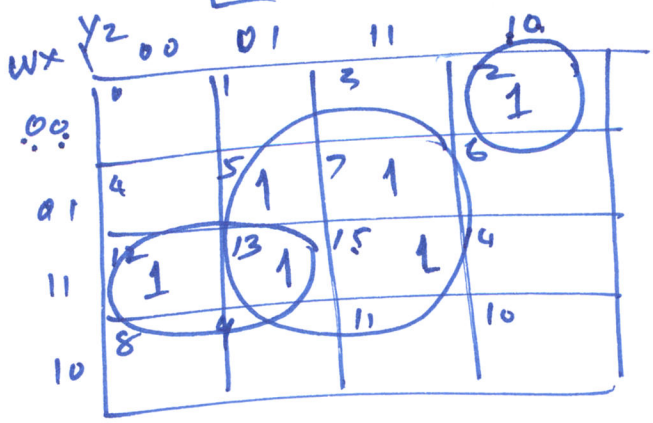


$f(w,x,y,z) = x'z'$

$x = 0$

$(f'.1)' = f+0 = f$

4.



$f(w,x,y,z) \equiv (2,5,7,13,15,12)$

Don't forget singletons.

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