Karnaugh Maps

- What was the idea in doing simplification? Well, one of the ideas was to try to apply the unification theorem (AB + AB’ = A).
- What we’re looking for then are terms that differ only in one variable.
- This can be difficult to do when there are many terms and many variables. Let’s try to see if we there is a graphical method that makes it easier.

Implicants

- An on-set member of any combinable group basically a product term e.g. A’BC,A,BC
- Prime Implicant: cannot combine with other to eliminate a literal
- Each corresponds to Prod term in min S-o-P
- Essential Prime Implicant: If it is the *only* PI covering a particular minterm

Example of Implicants

- Implicants
- Six Prime Implicants: A’B’D, BC’, AC, A’C’D, AB, B’CD
- Essential PI: AC,BC’
- F=A’B’D+BC’+AC

CD \ AB	00	01	11	10
00	0	1	1	0
01	1	1	1	0
11	1	0	1	1
10	0	0	1	1

Detecting XOR on K-maps for 2 vars

A xor B

B \ A	0	1
0	0	1
1	1	0

So, what we are looking for are diagonals

Detecting XOR on K-maps for 3 vars

A xor B:
Have alternate columns of 1’s

C \ AB	**00**	**01**	**11**	**10**
0	0	1	0	1
1	0	1	0	1

A xor C:
Have diagonal groups of 1’s

C \ AB	**00**	**01**	**11**	**10**
0	0	0	1	1
1	1	1	0	0

Detecting XOR on K-maps for 4 vars

A xor B:
Have alternate columns of 1’s

C D \ A B	**0 0**	**0 1**	**1 1**	**1 0**
0 0	0	1	0	1
0 1	0	1	0	1
1 1	0	1	0	1
1 0	0	1	0	1

A xor C:
Have diagonal groups of 1’s

CD \ AB	**00**	**01**	**11**	**10**
00	0	0	1	1
01	0	0	1	1
11	1	1	0	0
10	1	1	0	0

Kmaps Example

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