Map Method Simplification

Monday, February 12, 2024 9:23 AM

Two Variable Map

m0	m1
m2	m3

x \ y	0	1
0	x'y'	x'y
1	xy'	xy

x	y	
0	0	→ m0
0	1	→ m_1
1	0	→ m_2
1	1	→ m_3

x \ yz	00	01	11	10
0	m0	m1	m3	m2
1	m4	m5	m7	m6

	x \ yz	(y'z') 00	(y'z) 01	(yz) 11	(yz') 10
(x')	0	m0	m1	m3	m2
(x)	1	m4	m5	m7	m6

x	y	z	
0	0	0	→ m0
0	0	1	→ m_1
0	1	0	→ m_2
0	1	1	→ m_3
1	0	0	→ m_4
1	0	1	→ m_5
1	1	0	→ m_6
1	1	1	→ m_7

$$xy + xy' = x(y+y') = x \cdot 1 = x$$

Example:

x	y	z	F
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

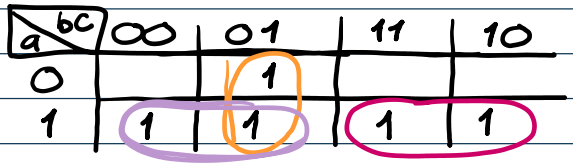
x \ yz	00	01	11	10
0	1			
1	1		1	1

$y'z' + xy + xz'$

$F = y'z' + xy + xz'$ correct but redundant

Example 2:

$a + b'c = \ldots = F\sum(1,4,5,6,7)$

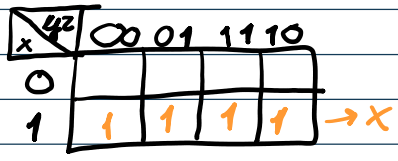


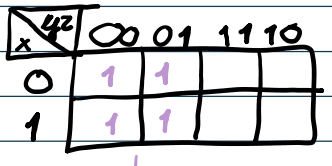
$b'c + ab + ab'$

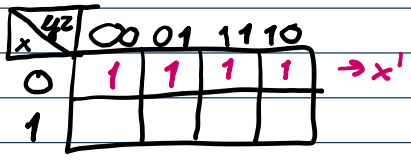
$F = ab' + b'c + ab$

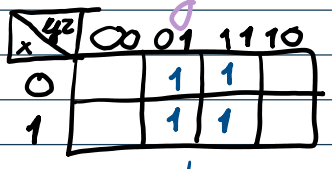
$= b'c + a(b' + b) = b'c + a$

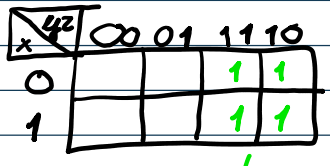
Example 3 (Group of 4):

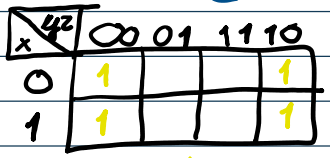


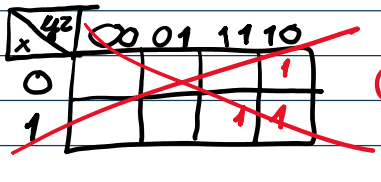




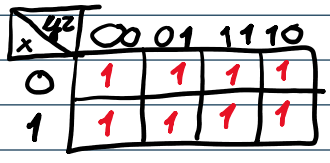








Can't do groups of 3
only rule by power of 2



→ $F = 1$ constant all variables eliminated

Adjacent Squares:

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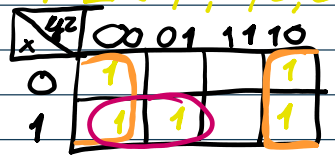
1 square : term with 3 literals (2^0 not literals eliminated)
2 adjacent squares: term with 2 literals (2^1 1 literal eliminated)
4 adjacent squares: term with 1 literal (2^2 2 literals eliminated)
8 adjacent squares: constant function 1 (2^3 3 literals eliminated)

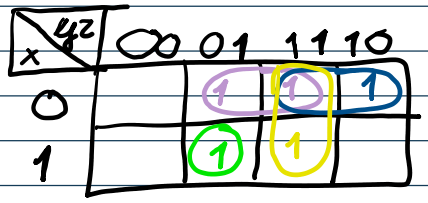
$F\sum(0,2,4,5,6) = z' + xy'$

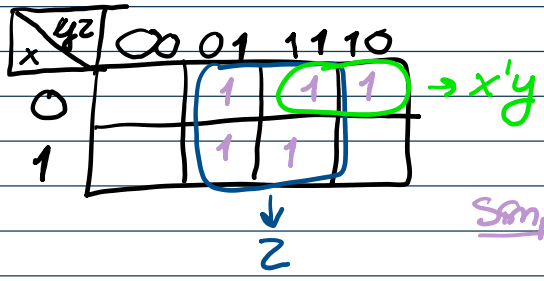


$z' + xy'$

Given:

$F = x'z + x'y + xy'z + yz$



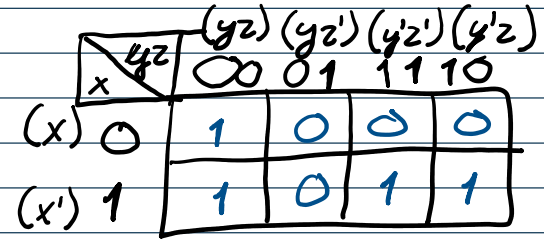


Simplified:

$F = x'y + z$

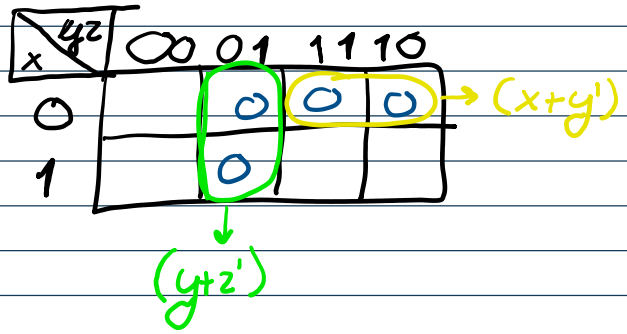
Product of Sums (Maxterms):

x	y	z	F
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

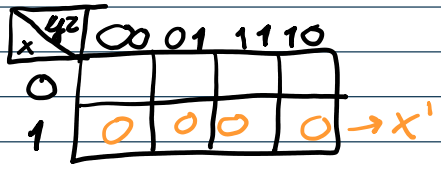


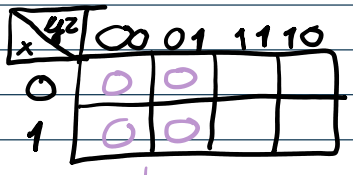
Rule you can apply:

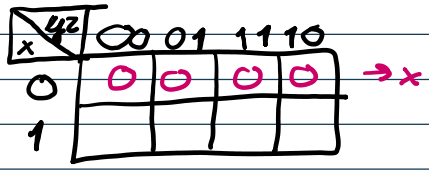
$(x+y)(x+y') = x + yy' = x + 0 = x$

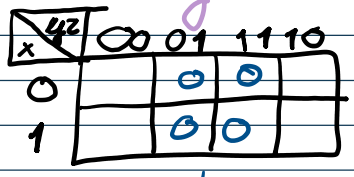


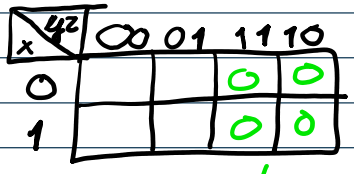
$F = (y+z')(x+y')$

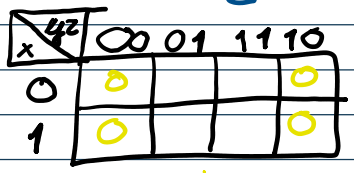


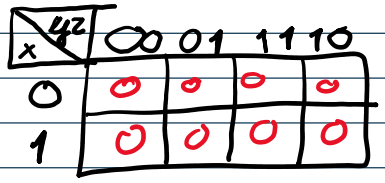












→ $F = 0$ constant all variables eliminated