

Module 3, Section 2.3 p.39 Canonical Expressions

9/5/2002
Lecture #6

- A literal is a variable or its complement:
 A, B', D
- A minterm is a product of all the literals of a function that represent 1 or when the function is true
- A minterm canonical form is the sum of products of all minterms. (sum of products)
- A maxterm is a sum of all literals of a function that ~~when zero~~ ~~represent zero~~ ~~the function is false~~, when zero, the function is false.
- A maxterm canonical form is the product of sums of all its maxterms.

Karnaugh maps.

p40 of the textbook

			Product term minterm	minterm symbol	minterm sum term Maxterm	maxterm symbol	Function 2	
x	y	z					F	\bar{F}
0	0	0	$\bar{x}\bar{y}\bar{z}$	m_0	$x+y+z$	M_0	1	0
1	0	1	$\bar{x}\bar{y}z$	m_1	$x+y+\bar{z}$	M_1	0	1
2	0	0	$\bar{x}y\bar{z}$	m_2	$x+\bar{y}+z$	M_2	1	0
3	1	1	$\bar{x}yz$	m_3	$x+\bar{y}+\bar{z}$	M_3	0	1
4	1	0	$x\bar{y}z$	m_4	$\bar{x}+y+\bar{z}$	M_4	0	1
5	1	1	$xy\bar{z}$	m_5	$\bar{x}+y+z$	M_5	1	0
6	1	0	$xy\bar{z}$	m_6	$\bar{x}+\bar{y}+z$	M_6	0	1
7	1	1	xyz	m_7	$\bar{x}+\bar{y}+\bar{z}$	M_7	1	0

Sum of Products:

$$F(x,y,z) = \sum_{i=0,2,5,7} m_i = \bar{x}\bar{y}\bar{z} + \bar{x}y\bar{z} + x\bar{y}z + xyz$$

Product of sums:

start with the complement:

$$\bar{F}(x,y,z) = \sum_{i=1,3,4,6} m_i$$

Apply complements on both sides:

$$F(x,y,z) = \prod_{i=1,3,4,6} \bar{m}_i \quad \leftarrow \text{by De Morgan's theorems.}$$

$$= \prod_{i=1,3,4,6} M_i \quad \leftarrow \text{since } M_i = \bar{m}_i.$$

$$\underline{F}(x, y, z) = (x + y + \bar{z})(x + \bar{y} + \bar{z})(\bar{x} + y + \bar{z})(\bar{x} + \bar{y} + z).$$