- A OR (sum) term which contains all the literals(variables) either in complemented or uncomplemented form is called maxterm. In a n variable function, there will be 2^n maxterms.

Binary Representation	Sequence	Maxterm	Designation
000	0	$a + b + c$	M_0
001	1	$a + b + c'$	M_1
010	2	$a + b' + c$	M_2
011	3	$a + b' + c'$	M_3
100	4	$a' + b + c$	M_4
101	5	$a' + b + c'$	M_5
110	6	$a' + b' + c$	M_6
111	7	$a' + b' + c'$	M_7

- The result of the OR (sum) term must be 0, so If a variable is having value 0 then it is ok, but if not then we complement the variable it to make it 0.

- There is only 1 input sequence for which the output of a Maxterm is 0. Because, it requires all values as zero.

- Then the product of all sum term (maxterm), from a function, and functions will have a value 0, if any of the sum term(maxterm) is 0.

Binary Representation	Sequence	Maxterm	Designation
000	0	$a + b + c$	M_0
001	1	$a + b + c'$	M_1
010	2	$a + b' + c$	M_2
011	3	$a + b' + c'$	M_3
100	4	$a' + b + c$	M_4
101	5	$a' + b + c'$	M_5
110	6	$a' + b' + c$	M_6
111	7	$a' + b' + c'$	M_7

Canonical logic forms

- **Canonical POS form**: - In a product of sum form expression, if each OR term (sum term) consists all the literals(variables) appearing either in complements or uncomplemented form. E.g. (a' + b + c). (a + b' + c'). (a + b + c). Then the form is said to be Canonical POS form.

Binary Representation	Sequence	Maxterm	Designation
000	0	a + b + c	M_0
001	1	a + b + c'	M_1
010	2	a + b' + c	M_2
011	3	a + b' + c'	M_3
100	4	a' + b + c	M_4
101	5	a' + b + c'	M_5
110	6	a' + b' + c	M_6
111	7	a' + b' + c'	M_7

Duality Theorem

This theorem states that the **dual** of the Boolean function is obtained by interchanging the logical AND operator with logical OR operator and zeros with ones. For every Boolean function, there will be a corresponding Dual function.
Let us make the Boolean equations relations that we discussed in the section of Boolean postulates and basic laws into two groups. The following table shows these two groups.

In each row, there are two Boolean equations and they are dual to each other. We can verify all these Boolean equations of Group1 and Group2 by using duality theorem.

Group1	Group2
$x + 0 = x$	$x.1 = x$
$x + 1 = 1$	$x.0 = 0$
$x + x = x$	$x.x = x$
$x + x' = 1$	$x.x' = 0$
$x + y = y + x$	$x.y = y.x$
$x + y+zy+z = x+yx+y + z$	$x.y.zy.z = x.yx.y.z$
$x.y+zy+z = x.y + x.z$	$x + y.zy.z = x+yx+y.x+z$