Example. Express the Boolean function $F = x + y z$ as a sum of minterms.
Solution:

$\boldsymbol{F} = x + y z = x + (y z)$ AND (multiply) has a higher precedence than OR (add)
$= x(y+y')(z+z') + (x+x')yz$ expand 1^{st} term by ANDing it with $(y + y')(z + z')$, and 2^{nd} term with $(x + x')$
$= x y z + x y z' + x y' z + x y' z' +$ ~~$x y z$~~ $+ x' y z$
$= m_7 + m_6 + m_5 + m_4 + m_3$
$= \Sigma(3, 4, 5, 6, 7)$ **sum of 1-minterms**

Example. Express the Boolean function $F = x + y z$ as a product of maxterms.
Solution: First, we need to convert the function into the product-of-OR terms by using the distributive law as follows:

$\boldsymbol{F} = x + y z = x + (y z)$ AND (multiply) has a higher precedence than OR (add)
$= (x + y) (x + z)$ use distributive law to change to product of OR terms
$= (x + y + z z') (x + y y' + z)$ expand 1^{st} term by ORing it with $z z'$, and 2^{nd} term with $y y'$
$= (x + y + z) (x + y + z')$ ~~$(x + y + z)$~~ $(x + y' + z)$
$= M_0 \bullet M_1 \bullet M_2$
$= \Pi(0, 1, 2)$ **product of 0-maxterms**

Example. Express $F' = (x + y z)'$ as a sum of minterms.
Solution:

$\boldsymbol{F'} = (x + y z)' = (x + (y z))'$ AND (multiply) has a higher precedence than OR (add)
$= x' (y' + z')$ use dual or De Morgan's Law
$= (x' y') + (x' z')$ use distributive law to change to sum of AND terms
$= x' y' (z + z') + x' (y + y') z'$ expand 1^{st} term by ANDing it with $(z + z')$, and 2^{nd} term with $(y + y')$
$= x' y' z + x' y' z' + x' y z' +$ ~~$x' y' z'$~~
$= m_1 + m_0 + m_2$
$= \Sigma(0, 1, 2)$ **sum of 0-minterms**

Example. Express $F' = (x + y z)'$ as a product of maxterms.
Solution:

$\boldsymbol{F'} = (x + y z)' = (x + (y z))'$ AND (multiply) has a higher precedence than OR (add)
$= x' (y' + z')$ use dual or De Morgan's Law
$= (x' + y y' + z z') (x x' + y' + z')$ expand 1^{st} term by ORing it with $y y'$ and $z z'$, and 2^{nd} term with $x x'$
$= (x' + y + z) (x' + y + z') (x' + y' + z) (x' + y' + z') (x + y' + z')$ ~~$(x' + y' + z')$~~
$= M_4 \bullet M_6 \bullet M_5 \bullet M_7 \bullet M_3$
$= \Pi(3, 4, 5, 6, 7)$ **product of 1-maxterms**

F and F' are shown in the following truth table:

x	y	z	Minterms	Maxterms	F	F'
0	0	0	m_0=$x' y' z'$	M_0=$x + y + z$	0	1
0	0	1	m_1=$x' y' z$	M_1=$x + y + z'$	0	1
0	1	0	m_2=$x' y z'$	M_2=$x + y' + z$	0	1
0	1	1	m_3=$x' y z$	M_3=$x + y' + z'$	1	0
1	0	0	m_4=$x y' z'$	M_4=$x' + y + z$	1	0
1	0	1	m_5=$x y' z$	M_5=$x' + y + z'$	1	0
1	1	0	m_6=$x y z'$	M_6=$x' + y' + z$	1	0
1	1	1	m_7=$x y z$	M_7=$x' + y' + z'$	1	0