Applying the NOT operator to a Boolean function produces the function's complement.

Example:

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

The complement is expressed as $F'(x, y, z)$

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

Let $w = (x + y)$

Then $F'(x, y, z) = (w + z)'$

and $(w + z)' = w'z'$ by DeMorgan's Law

Now $w' = (x + y)' = x'y'$ again by DeMorgan's Law

We can now say that F'(x,y,z)=(x+y+z)'=x'y'z'

In general, when we complement a function, each Boolean variable is complemented and the operators are also complemented – that is – every $+$ is replaced by a $\cdot$ and every $\cdot$ is replaced by a $+$.

3. Using DeMorgan's Law, write an expression for the complement of F if $F(x, y, z) = xy'(x + z)$.

$F(x,y,z)$	$=$	$xy'(x+z)$	
$F'(x,y,z)$	$=$	$(xy'(x+z))'$	
	$=$	$(xy')' + (x+z)'$	DeMorgan's Law – AND Form
	$=$	$x' + y'' + (x+z)'$	DeMorgan's Law – AND Form
	$=$	$x' + y + (x+z)'$	Double Complement Law
	$=$	$x' + y + x'z'$	DeMorgan's Law – OR Form
	$=$	$x' + x'z' + y$	Commutative Law – OR Form
	$=$	$x'(1+z') + y$	Distributive Law – OR Form
	$=$	$x'(1) + y$	Null (or Dominance) Law – OR Form
	$=$	$x' + y$	Identity Law – AND Form