## Cheatography

## Laws of Boolean Algebra Cheat Sheet

by johnshamoon via cheatography.com/33783/cs/10542/

Identities	
0 + X = X	
$0 \cdot X = 0$	
1 + X = 1	
1 · X = X	
X + X = X	
$X \cdot X = X$	

Negation	
X + ~X = 1	
~0 = 1	
~1 = 0	
~~X = X	
$X \cdot \sim X = 0$	

Laws	
Communative Law	$A\cdotB=B\cdotA$
	A + B = B + A
Associative Law	$A\cdot (B\cdot C)=(A\cdot B)\cdot C$
	A + (B + C) = (A + B) + C
Distributive Law	$A \cdot (B + C) = A \cdot B + A \cdot C$
	$A + B \cdot C = (A+B)(A+C)$

De Morgan's Laws	
~(X · Y)	= ~X + ~Y
~(X + Y)	= ~X · ~Y
$^{\sim}(X\cdot Y\cdot Z)$	= ~X + ~Y + ~Z
$\sim$ (X + Y + Z)	= ~X · ~Y · ~Z

## Theorems

Theorem 1

$$X + X \cdot Y = X$$

Theorem 2

$$X + \sim X \cdot Y = X + Y$$

Theorem 3

$$X \cdot Y + \sim X \cdot Z + Y \cdot Z = X \cdot Y + \sim X \cdot Z$$

Theorem 4

$$X(X + Y) = X$$

Theorem 5

$$X(\sim X + Y) = X \cdot Y$$

Theorem 6

$$(X + Y)(X + \sim Y) = X$$

Theorem 7

$$(X + Y)(\sim X + Z) = X \cdot Z + \sim X \cdot Y$$

Theorem 8

$$(X+Y)(^{\sim}X+Z)(Y+Z)=(X+Y)(^{\sim}X+Z)$$



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Page 1 of 1.

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