* Boolean laws

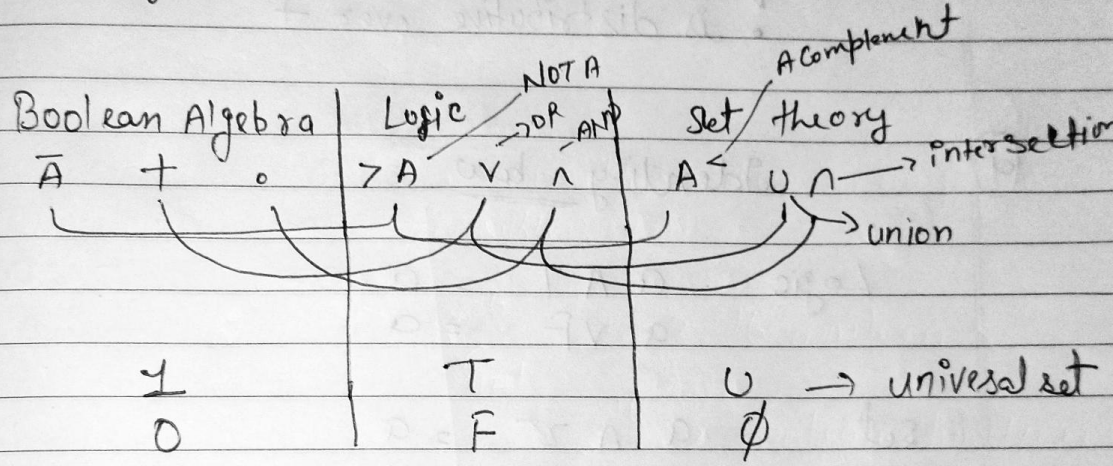
L-15

① Commutative law

Logic $a \vee b = b \vee a$
$a \wedge b = b \wedge a$

Set theory $a \cup b = b \cup a$
$a \cap b = b \cap a$

Boolean Algebra $a + b = b + a$ → (OR)
$a \cdot b = b \cdot a$



② Associative law

Logic = $a \vee (b \vee c) = (a \vee b) \vee c$
$a \wedge (b \wedge c) = (a \wedge b) \wedge c$

Set theory = $a \cup (b \cup c) = (a \cup b) \cup c$
$a \cap (b \cap c) = (a \cap b) \cap c$

Boolean Algebra = $a + (b + c) = (a + b) + c$
$a \cdot (b \cdot c) = (a \cdot b) \cdot c$

③ Distributive law

Logic - $a \wedge (b \vee c) = (a \wedge b) \vee (a \wedge c)$
$a \vee (b \wedge c) = (a \vee b) \wedge (a \vee b)$

Set theory - $a \cap (b \cup c) = (a \cap b) \cup (a \cap c)$
$a \cup (b \cap c) = (a \cup b) \cap (a \cup b)$

Boolean Algebra - $a \cdot (b+c) = a \cdot b + a \cdot c$
$a + (b \cdot c) = (a+b) \cdot (a+c)$
+ is distributive ~~over~~, over ·
· is distributive over +

④ Identity law

Logic
$a \wedge T = a$
$a \vee F = a$

Set theory
$a \cap \cup = a$
$a \cup \phi = a$

Boolean Algebra
$a \cdot 1 = a$
$a + 0 = a$

MY CHOICE
Date:
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5 Complement law

Logic	$a \vee \neg a = T$ $a \wedge \neg a = F$
set theory	$a \cup a^c = U$ $a \cap a^c = \emptyset$
~~Boolean~~ Boolean Algebra	$a + \bar{a} = 1$ $a \cdot \bar{a} = 0$

6 Idempotent law

Logic	$a \vee a = a$ $a \wedge a = a$
set theory	$a \cup a = a$ $a \cap a = a$
Boolean Algebra	$a + a = a$ $a \cdot a = a$

(6) double Complement

Logic	$\neg(\neg a) = a$
set theory	$(a^c)^c = a$
Boolean Algebra	$\bar{\bar{A}} = a$

(7) Demorgan's law

Logic $\neg(a \vee b \vee c \cdots) = \neg a \wedge \neg b \wedge \neg c \cdots$ $\neg(a \wedge b \wedge c \cdots) = \neg a \vee \neg b \vee \neg c \cdots$	boolean $\overline{a+b+c} \cdots$ Algebra $\overline{a \cdot b \cdot c} \cdots$

Set. $(a \cup b \cup c \cdots)^{c} = a^{c} \cap b^{c} \cap c^{c}$
$(a \cap b \cap c \cdots)^{c} = a^{c} \cup b^{c} \cup c^{c} \cdots$

Trick to ~~zember~~ remember ⇒ change the sign
break the line

$\overline{a+b} \iff \bar{a} \cdot \bar{b}$

(8) Domination law

logic	$a \vee T$	$= T$	boolean	$a+1$	$= 1$
	$a \wedge F$	$= F$	Algebra	$a \cdot 0$	$= 0$
Set theory	$a \cup U$	$= U$			
	$a \cap \phi$	$= \phi$			

(9) Absorbtion law