26/10/21 Tuesday

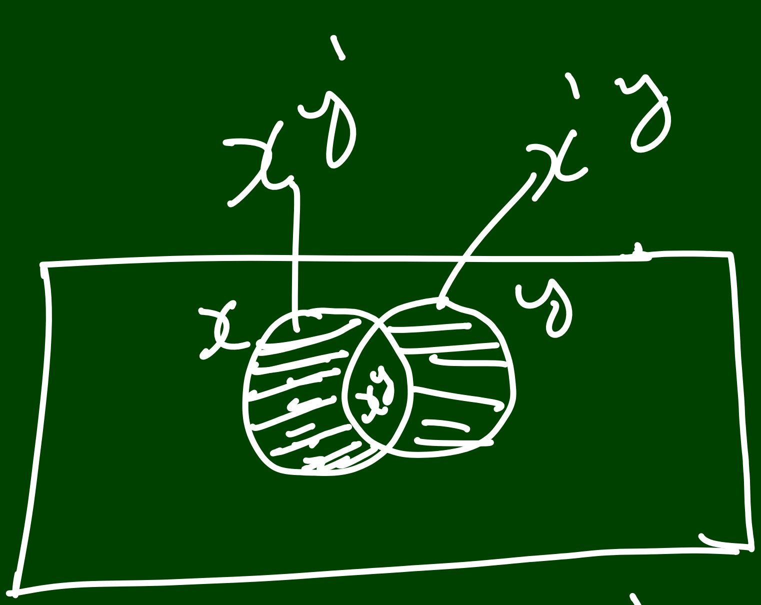
Closure	Idempotent
Identi	Dominance
Commu	Involution
dis	Asso.
Complement	De Morgan's
$\exists x, y$ s.t. $x \neq y$	Absorption

$$(x+y)' = x' \cdot y'$$
$$(x \cdot y)' = x' + y'$$

Generalized De morgan laws

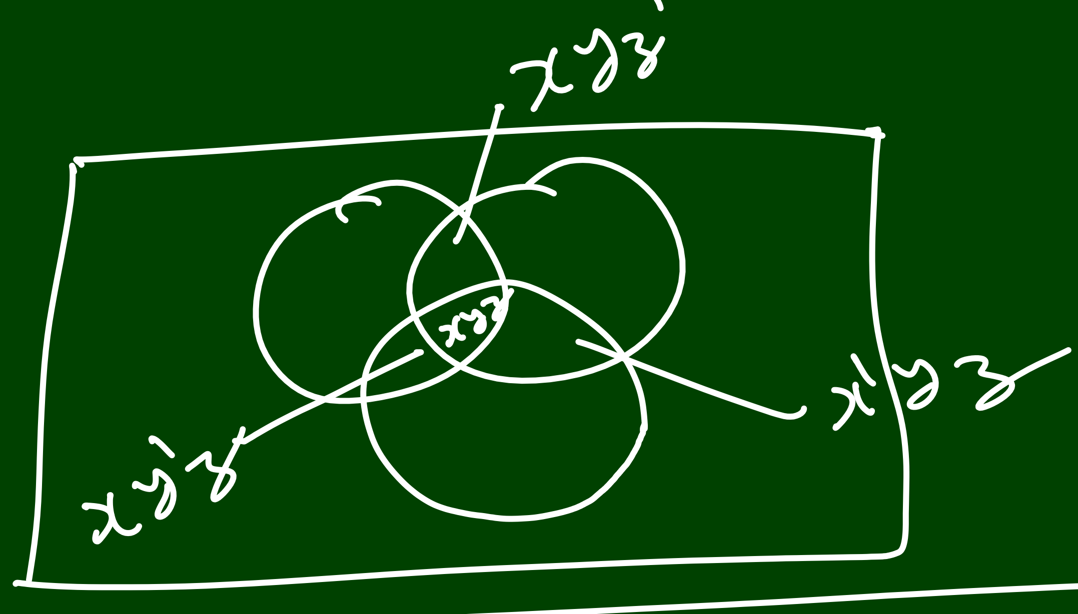
$$(x_1 + x_2 + \dots + x_n)' = x_1' \cdot x_2' \cdot x_3' \dots x_n'$$
$$(x_1 \cdot x_2 \cdot \dots x_n)' = x_1' + x_2' + \dots + x_n'$$

Venn diagram



$\cancel{x}$ $\cancel{x}$

$+$ $\cdot$ $'$



$$(x+y)' + xy$$

( )

1) Parenthesis
2) Complement
3) and $(\cdot)$ or

Boolean Functions :-

Binary Variable → 0 & 1

Boolean function : It is an expression formed by binary variables, the two binary operators And and OR and binary operator NOT, parenthesis and an equal sign.

Ex:- ① $F = xyz'$

② $F = xy + xz'$

①

x	y	z	z'	xy	xyz'
0	0	0	1	0	0
0	0	1	0	0	0
0	1	0	1	0	0
0	1	1	0	0	0
1	0	0	1	0	0
1	0	1	0	0	0
1	1	0	1	1	1
1	1	1	0	1	0

OR x y

AND z' Invert

AND

②

x	y	z	xy	z'	xz'	$\boxed{xy + xz'}$
0	0	0	0	1	0	0
0	0	1	0	0	0	0
0	1	0	0	1	0	0
0	1	1	0	0	0	0
1	0	0	0	1	1	1
1	0	1	0	0	0	0
1	1	0	1	1	1	1
1	1	1	1	0	0	1

Literal → A literal is a primed or unprimed variable

1) $x + x'y = x + (x' \cdot y)$

$= (x + x') \cdot (x + y)$

$= 1 \cdot (x + y)$

$= x + y$

$x + (y \cdot z)$
$= (x + y)$
$\cdot (x + z)$

2) $x \cdot (x' + y) = (x \cdot x') + x \cdot y$

$= 0 + x \cdot y$

$= x \cdot y$

$x \cdot (y + z)$

$x \cdot y + x \cdot z$

$= x \cdot (y + z)$

3) $x'y'z + x'yz + xy'$

$= x'z(y' + y) + xy'$

$= x'z \cdot 1 + xy'$

$= x'z + xy'$

4) $xy + x'z + yz = xy + x'z + yz \cdot 1$

$= xy + x'z + yz(x + x')$

$= xy + x'z + yzx + yzx'$

$= xy \cdot 1 + x'z \cdot 1 + yzx + yzx'$

$= x'z(1 + y) + xy(1 + z)$

$= x'z \cdot 1 + xy \cdot 1$

$= x'z + xy$

5) $(x + y)(x' + z)(y + z)$

$= (y + (x \cdot z)) \cdot (x' + z)$

$y \cdot (x' + z)$
$+ (x \cdot z) \cdot (x' + z)$

$x \cdot y + x'z + yz = x'z + xy$

$(x + y) \cdot (x' + z) \cdot (y + z) = (x' + z)(x + y)$