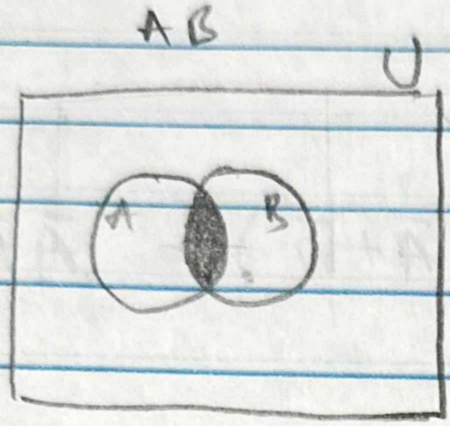
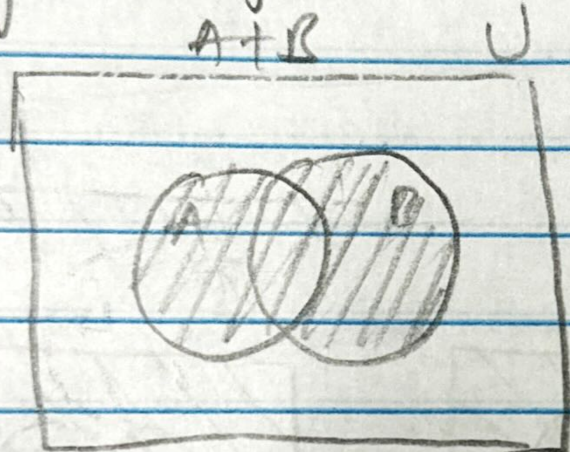
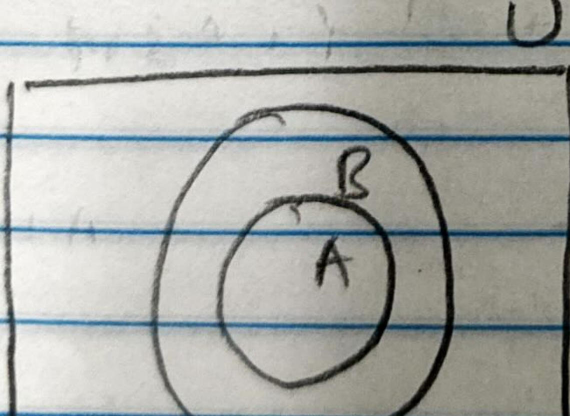
7) Logical conjuction - AB



8) Logical Disjunction - A+B



10) $A \Rightarrow B$



11) $\overline{C(A+B)} = \overline{(CA + CB)}$

$= \overline{CA} + \overline{CB}$

$\bar{C} + \bar{A} + \bar{C} + \bar{B}$

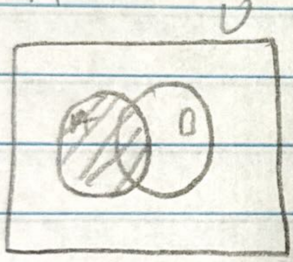
$= \bar{C}(\bar{A}+\bar{B})$ $\quad (\bar{A}+\bar{B}) = \bar{A}\bar{B}$

$= \bar{C}(\bar{A}\bar{B})$

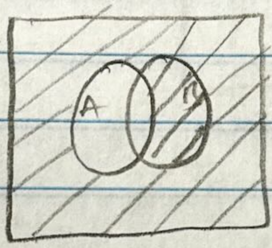
$\therefore \overline{C(A+B)} = \bar{C}(\bar{A}\bar{B})$

12) $\overline{AB} \neq \bar{A}\bar{B}$

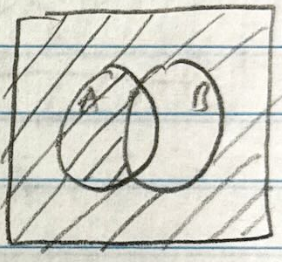
A



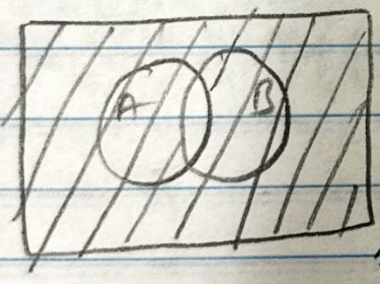
$\bar{A}$



$\bar{B}$



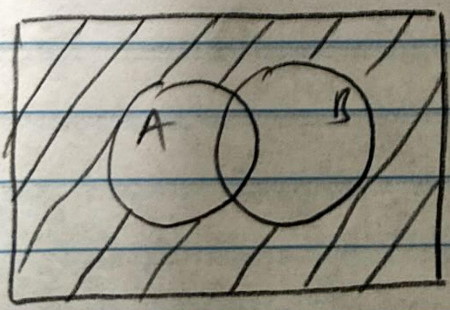
$\overline{AB}$



//

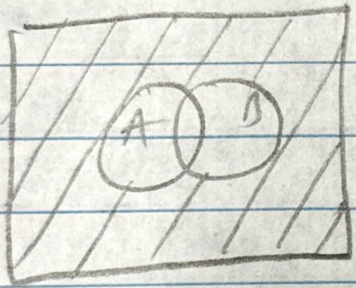
$\bar{A}\,\bar{B} =$

$\therefore \overline{AB} \neq \bar{A}\bar{B}$

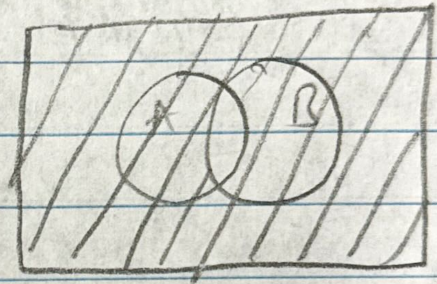


13)

$\overline{A+B}$ $\quad U$



$\bar{A} + \bar{B}$ $\quad U$



$$\therefore \overline{A+B} \neq \bar{A} + \bar{B}$$

14) $$\underbrace{(A \uparrow A)}_{\bar{A}} \uparrow \left(\left(\underbrace{(A \uparrow B) \uparrow (A \uparrow B)}_{AB} \right) \uparrow \left(\underbrace{(A \uparrow B) \uparrow (A \uparrow B)}_{AB} \right) \right) = A$$

$$\Rightarrow \quad \bar{A} \uparrow AB \uparrow AB$$

$$= \quad A$$

15) $\overline{(A \uparrow A) \downarrow (B \uparrow B)} \equiv (\bar{A} \downarrow \bar{A}) \uparrow (\bar{B} \downarrow \bar{B})$

$\overline{\bar{A} \downarrow \bar{B}}$

$= \overline{\overline{\bar{A} + \bar{B}}}$

$= \boxed{AB}$

$\bar{A} \uparrow \bar{B}$

$\Rightarrow \overline{\overline{\bar{A}\bar{B}}}$

$= \boxed{AB}$

$\therefore \overline{(A \uparrow A) \downarrow (B \uparrow B)} \equiv (\bar{A} \downarrow \bar{A}) \uparrow (\bar{B} \downarrow \bar{B})$

16)

A, B	TT	TF	FT	FF
$f_1(A,B)$	T	F	F	F
$f_2(A,B)$	F	T	F	F
$f_3(A,B)$	F	F	T	F
$f_4(A,B)$	F	F	F	T

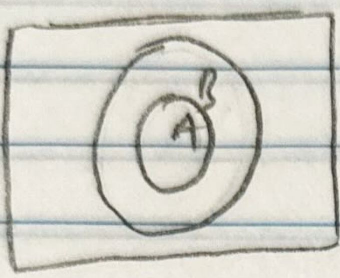
$F_1(A,B) + F_3(A,B) + f_4(A,B) \equiv A \Rightarrow B$

$f_1(T,T) + f_3(T,T) + f_4(T,T) = T$
$f_1(T,F) + f_3(T,F) + f_4(T,F) = F$
$f_1(F,T) + f_3(F,T) + f_4(F,T) = T$
$f_1(F,F) + f_3(F,F) + f_4(F,F) = T$

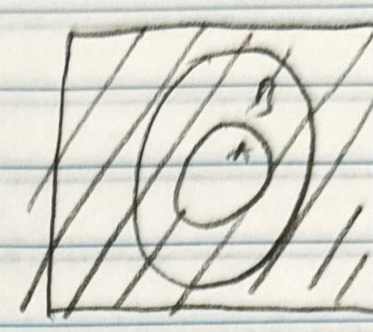
	$A \Rightarrow B$
(T,T)	T
(T,F)	F
(F,T)	T
(F,F)	T

$\therefore F_1(A,B) + F_3(A,B) + f_4(A,B) \equiv A \Rightarrow B$

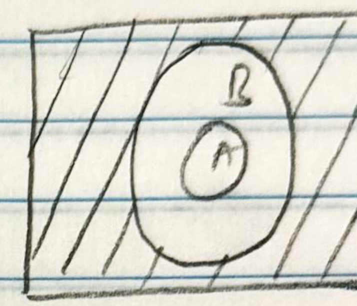
17) $(A \Rightarrow B) \equiv (\bar{B} \Rightarrow \bar{A})$



$\bar{A} =$



$\bar{B} =$



for every True value of A
B is True

But for every false value of A
B is not necessarily false

Similarly,
for every True value of $\bar{B}$
$\bar{A}$ is true
But for every false value of $\bar{B}$
$\bar{A}$ is not necessarily false.

$\therefore \quad A \Rightarrow B \equiv \bar{B} \Rightarrow \bar{A}$