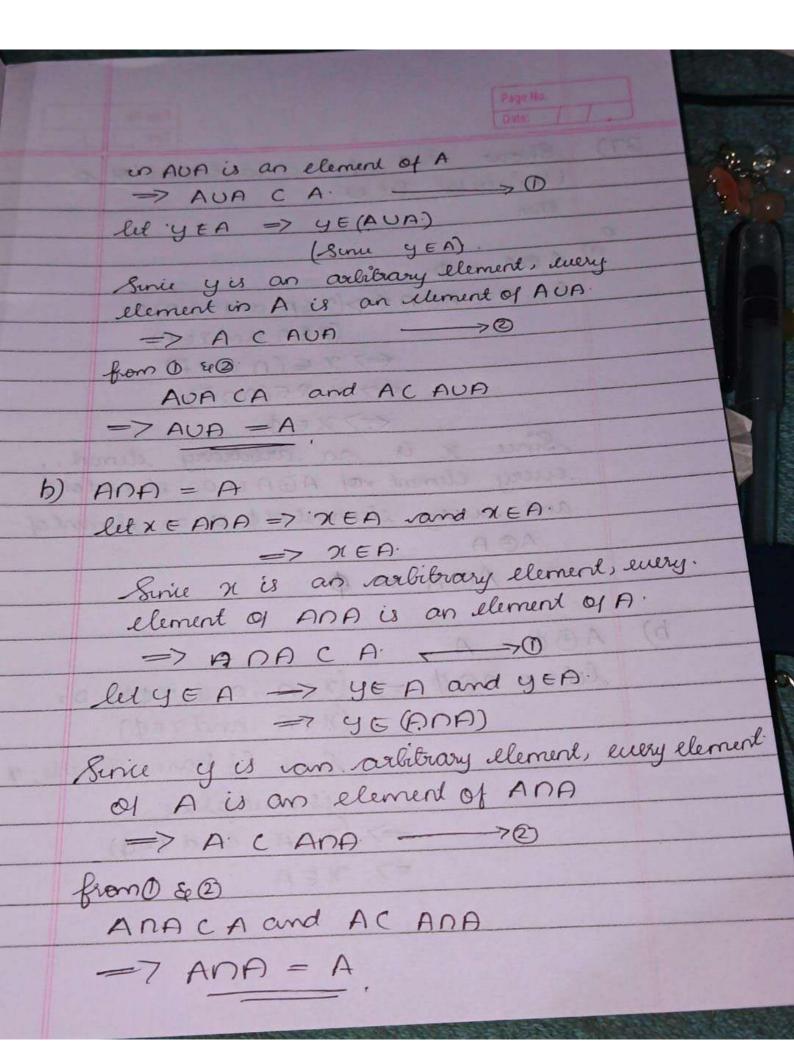


DANO = O. le XEARD -> DE and NED Service of does not have any element => XE . -680 Since x is an arbitrary element, every element of And is an element of o. => And C . ->0 let 4E \$ => 4E \$. Since there is no element in o. => yE (Any). Since y is an arbitrary element, every. element of \$ is an element of Ang. -> 0 C APO. ->0 from and and a. Anyco and o cano $=7AD\phi = \phi$ 3. Idempotent law a) AUA = ALELYE AUA => XEA OX XEA =>XEA. Since of is an arbitrary element, every element



4). Complementation claw. $(\overline{A}) = A$ let x ∈ (A')' => x ∉ A' => X E A. (Since x u not in A) Suice v is an arbitrary element. every element of (A) is an element of A => (A) c A. -> 0. let y E A =7 y & A 1 MARIE A 2 MARIE => 4E(A')' 35 / (A) A) 3A Pinie gu an arbitrary clement every element of (A) A a son elemento((A) -> A c(A) ->0 from 1 42.

5. Commutature law

(a) AUB = BUA

led XE AUB => NEA OR NEB

=7 XEB OR NEA

=> XE (BUA)

since x is an arbitrary element . every element in AUB is an elemental BUA

=> AUB C BUP -- 0.

let yEBUA => YEB & YEA

=> YEA ON YEB

=7 YE (AUB) since y'a an arbitrary element. every element in BUA'U an relement of AUB. I COURT AUB.

=> BUACAUB. ->0

from 0 40.

AUB C BUA and BUA CAUB.

=> AUD = BUA

(b) ANB = BNA.

a dre soldstag stem let x E ANB => X E A and X EB

=7 NEB and XEA

=/ NE (BOB). Since of is an arbitrary element. every element ANB & air element of BAA

=> ANB C BAIA

WYE (BOD) -> YEB and YEA => YEA and YEB

Since y is an arbitrary element every elementsof. (BAA) is an illement of AAB.

=> BOACANB -> @

from O & D. ANBC BNA and BAACANB => ANB = BNA () AND C= MON SP

) Associative lans

a) AU(BUC) = (AUB) UC

let X E AU(BUC) => X E A OR X E (BUC)

=7 XEA OU NEBOU NEC.

=> NED OF NEW ON NEC

=7 X E(A UN) OR XEC

=7 xt(AUN) UC.

since is an arbitrary element; every element of AU(BUC) is an element of (AUB) UC.

=> AUBUC) C (AUB) UC . -> D.

let y E AUB) UC => (FE (AUB) OR & EC

=7 YEA ON YEB ON YEC

Surie y'll am arbdray element, every element of (AUB) UC

```
element of AU(BUC).
   > (AUB) UC C AU(BUC) = TO
   from 040 =>
     (AUB) UC C AU(BUC) and AU(BUC) C (AUB) UC.
    => (AUB)UC = AU(BUC).
   An(Bnc) = (Ang)nc
(b)
   let X E A M(BMC) => NE A and XE (BMC)
                => XEA and YEB and XEC
                =7 NEADD and C
   Since x is an arbitrary element. All elementain
  An(BAC) is a element of (AMB) AC.
    =>. An (BAC) & (ANB) AC ->0
   lefue (ANB) n( => XE (ANB) and NEC
            =7 HEA and MED and MEC
               =7 SEA and (GR XE, IBAC)
  CORDO A DE DELO
              27 NE AN(BOC)
   Since y'is an sarbitrary element. all the elements in
   (ANB) no is an element of An (BNE).
   => (ANB) nc · C AN(BNC) ->0
  (AMB) ne. c AM (BMC) and AMBMC) e (AMB) no
  => (ANB) n( = AN(BNC)
```

7 Distributure Law a) An(Buc) = (AnB) U CANC) led X E ANCBUR) > X EA and X E(BUC) => XEA and YEB ON DIEC. => NEA and NED OR NEA and TEC =7 XE(ANB) OR ME(ANC) => XE(ANB) U(ANC). Since x is an arbitrary element. every element of An(Buc) is an element of (ANB) u (AND) -> An (BUC) C (ANB) U (AND) -> 0 tel ye (ANB) U (ANC) => GE Dando) =7 YE(AND) OR YE (AND) =7 YEA and YEB OR YEA and YEC. =7 YEA and YE BOX YEC => YEA and YE (BUC) -> YE An (BUC) Since If is an arbitrary element. It every element of ADOBBUT (AND) U (ANC) is an eliment of AN(BUC). => (ANB) U (ANC) C AN(BUC) -> 0 an(Bul) c (AMB) u(AME) and (AMB) u(AME) & AM(BUL) > An(BUC) = (An B) U(Anc)

b) AU(BOO) = (AUB) O (ADC). let X = AU(BOL) => NEA OR XE(BOD) =7xEA ON NEB and NEC. => X ER OR XEB and HEROZ NEC => NE (AUB) and NE (AUC) => x E (AUB) n (AUC). Since x is an arbitrary element, every element of AU(BOC) is an element of (AUB) or (AUC). => AU(BNC) C (AUB) N(AUC) ->0 let y E (AUD) n(AUC) => g E (AUB) and g(E (AUC). =7 Y E'AN YEB and YEA OU YEC => GEA and yEB ON YEC 27 YEA and YE (BUC) =7 YE An(nuc). Since you an arbitrary element, every element of (AUB) D (AUC) is con element of AU(BR). => (AUB) n (AUC) c AU(Bnc). -> 0

from 0 20

=> AU(Bnc) ((AUB) n (AUC) and (AUB) n (AUC) c AU(one)

=> AU(BOC) = (AUB) N(AUC)

8 De Margan's Law

a) AUB = A AB

let X E AUB = 2 & AUB

=> X & A & X & B.

=7x E A and YEB

Since x'es an ashtras element. every element of AUB

u an element of A NB.

=> AUB C ADB ->0

led Y E FIRB => Y E AT and YEB.

=> g & A OX YEB

=7. Y & AUB)

=7 YE (AUB) &

Since y is an arbitrary element. every element of

FIRE is an element of For.

=> ĀNĪB E ĀUB ->0

from O & D ...

GOO. AND C FUB and AUB CAND

=> FOM AUB = FOB

) ANB = A UB

let XE ADB => X & ADB

=> X & A and X & B

=> XEA OR XEB

>> x (AT UB) ne x'is an artitrary plement. every element of PUB is an

ANB C AUD -0 luye A UD => YEA OR YEB -> y & A and y & B => 4 € (A D IS) =7 4 E (ADB) Since y is an arbitrary element levely element of. FUB is an element of PIDB. => FUT C FIRE -O from O se O. ANB C AUB gand AUB C ANB william me a p isme. => ANB = AUB Alisouption hains

AU(ADB) = A let x & AULANB) => XEA OR NE (AND) =>XEA OR XEA and B). =7 NEA

Since x is an arbitrary element lucry element of A AU(ADB) um elementos A => AU(APB) CA -00 MAD (AUA) CAN

lety EA => ME AU(ANB).

Since y is an arbitrary element. every element of Air Andenied of AU(AND) =7 A C AU(ANB) -->0

ABB CONTON

from O &O AU(ANB) C A and AC AU(AND) =7 AULAND = A

(b) An(AUB) = A

let XE AN (AUB) => NE A and NE (AUB)

=7 NEA and NEA OR NEB)

months postables, not age man

BU - WORTH THE ST

=7 XEA and XEA ON XEA and XEB

=> XEA. Surie & is an arbitrary element lucry element of.

An(AUB) is an element of A.

=> Ancaus) c A. -0 was a supplement

lel yE A => YEA.

=> YEA and YEARD (AND A M

JULY => YEAN (AULY) since y'is an arbitrary element eutry element of

AU an element of An(AUB).

=> AC AN(AUB) ->> O

from (1) & O

An (AUB) (A and AL An (AUB)

>> An(AUB) =A

a) AUA = U

let X & AUA -> XEA OR XEA!

=> U the universal sit

Since it is an arbitrary element. every element on AUF is an element of U.

→ AUFICU __O

let YEU => YEA OR YEA

-> YE(AUA).

Suice y'is an arbitrary element. every element in

=> A U C (AUA) -> 2

from 0 800 -

B AUĀ CU and UC (A,UĀ)

AUĀ = U

ANA = .

let X E ANĀ => NE A and X & Å

 $\Rightarrow x \in \phi$

since it is an arbitrary element every element in

Ant is soon an element of \$

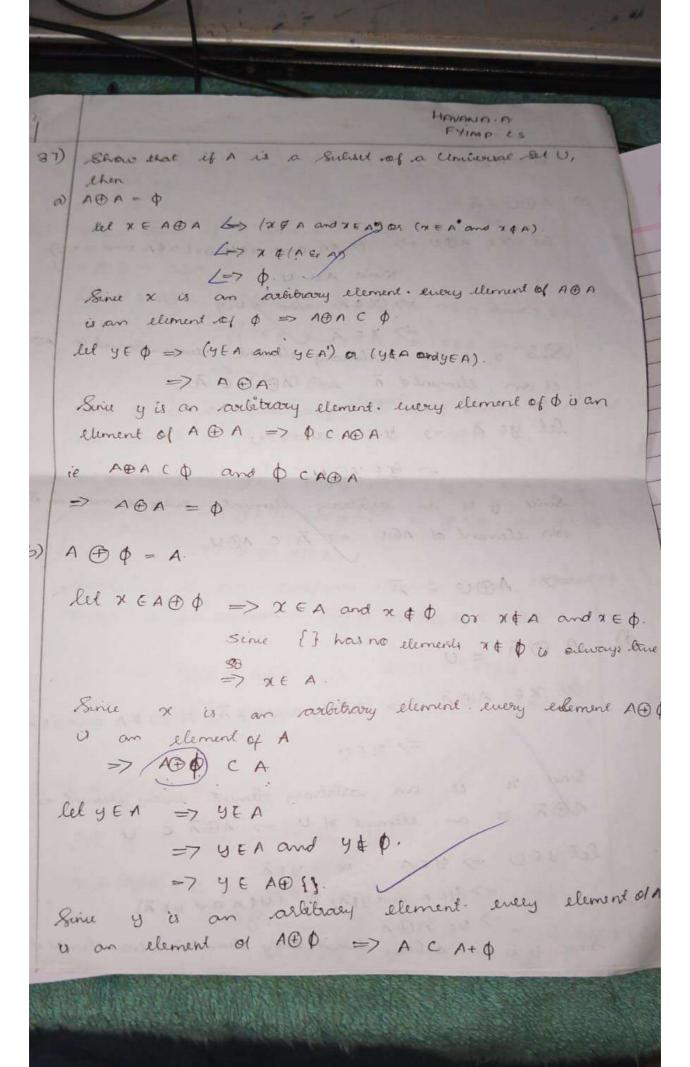
=> AN A C \$ -- -- 10

(FA) lelyEb =7 yEA and XET => YE (A NA) since y'er an arbitrary element eutry element in yEd um element of (Anfi) => \$ c (An A) -> 0 from O & O (AnA) c & and & C(ANA). \Rightarrow Anā = ϕ THE (A CP): AUG Barrande mos 10

(AUA) O U WO U O AUA A

AUF - GUA

b = AGA



ie A O P = A C) A OU = T lel XE A DU => (x EA and x & U) Or (x & A and x & U). 38) Since AC U => (X & A and X(EU) Since x is an arbitrary element every element in AOU cs an element of A => ADUCA let yE A => X & A and NEU -> GE 'A @ N Since y is an arbitrary blement every element in T an element of AOU =>/ A C AOU => ADU = Ā A DA = U led $\chi \in A \oplus \bar{A} \Rightarrow (\chi \in A \text{ and } \chi \notin \bar{A}) \text{ or } (\chi \notin A \text{ and } \chi \in \bar{A})$ => neu Since n is an arbitrary element. every element is ABĀ is an element of U -> ABĀ C U let yEU => YEA OR YEA => (YEA and YEA) OR (YEA and YEA) => YE AGA Since y is an arbitrary element. every element in visan element of A SUCADA =U

38) Shaw that if A and Brave Sets, then,

a) A B B - BBA

let ME AOB => (XEA and NEB) OF XEB and NEA.

=7/xEA and x EB) Of (XEB and N EA)

⇒ XE B ⊕ A

Since x is an arbitrary eliment every element of ABBis an element of B D A. => ABB C BDA.

let $y \in B \oplus A \Rightarrow (g \notin B \text{ and } g \notin A)$ or $g \notin A \oplus A$ and $g \notin B$ =7 $g \notin B \text{ and } g \notin A \oplus A$ =7 $g \notin A \oplus B$.

Since y is an arbitrary element. every element of BBA is som element of ABB => BBA CABB.

=> Since ABBCBBA & BBACABB

=> ABB = BBA.

 $(A \oplus B) \oplus B = A$

let x he an arbitrary element

X ∈ (ABB) ⊕ B => (N ∈ A ⊕ B and N ∈ B) Or (N ∉ A⊕ B and N ∈ B)

→) ((N ∈ A and N ∉ B) or (N ∉ A and N ∈ B) and N ∉ B)

Or (N ∉ A or N ∈ B and N ∈ B)

=> (NEA and N & B) or [N & P and N & B and N & B).

 \Rightarrow $\chi \in A$ and $\chi \notin B$? \Rightarrow $\chi \in A$ Since χ is an arbitrary, lives element in $(A \oplus B) \oplus B$ is an element of $A \Rightarrow (A \oplus B) \oplus B$ CA.

Let $y \in A \Rightarrow y \in A$ and $(y \notin B) \otimes Y \in B$.

=> $(9 \in A \text{ and } y \notin B)$ on $(9 \notin A \text{ and } y \in B \text{ and } y \notin B)$. => $((9 \notin A \text{ and } y \notin B))$ or $(9 \notin A \text{ and } y \notin B) \text{ and } y \notin B)$. Or $(9 \notin A \text{ or } y \notin B \text{ and } y \notin B)$.

=> (Y \in A \over B) and \(\sigma \in B \) or (Y \in A \over B) and \(\sigma \in B \) and \(\sigma \in B \)

=7 y E (A +B) +B

Since & is an arbitrary element. every element in A is an element of (ABB) & B.

=> A C (A⊕ B) ⊕B.

 \Rightarrow $(A \oplus B) \oplus B = A$

39. What can you say about the sets A and B. (B-1)if $A \oplus B = A$? $A \oplus B \Rightarrow (x \in A \text{ and } x \notin B)$ or $(x \notin A \text{ and } x \notin B)$

=> Dif XEA, X&B

A XEA.

=> B can be a null set;