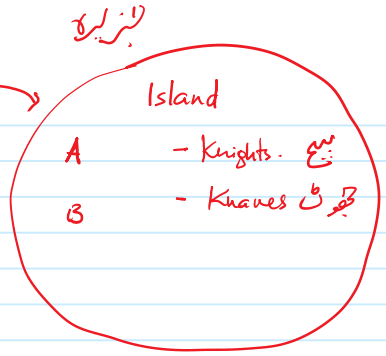
Lecture 4:-

Ex 13 / P 13 :-

A says "B is a knight".

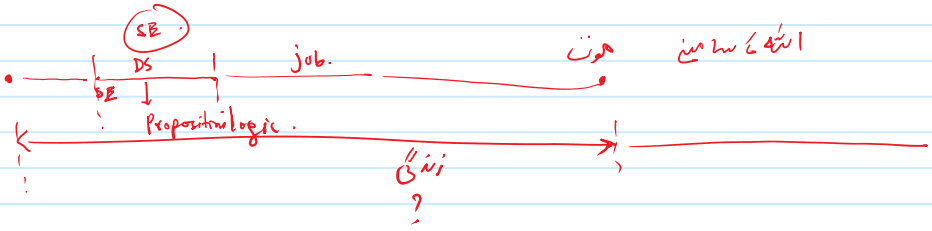
B says "The two of us are of opposite type".

Determine the type of A & B.



$2^{\text{Variables}}$.

$2^2 = 4$.



Propositional logic.
- Systems Specification (lec3)
Puzzles. lec 4.
Searching.

Let p: A is a Knight $\quad \neg p$: A is a Knave.
q: B is a Knight $\quad \neg q$: B is a Knave.

A says "B is a knight". q

B says "The two of us are of opposite type".

A is Knight and B is a Knave (OR)
A is Knave and B is a Knight

$(p \wedge \neg q) \vee (\neg p \wedge q)$.

	A	B
→	Knight,	Knight.
→	Knight,	Knaves
→	Knaves,	Knight.
→	Knaves,	Knaves.

p: A is a Knight $\quad \neg p$: A is a Knave.
q: B is a Knight $\quad \neg q$: B is a Knave.

Let us suppose "A is a Knight" & "B is a Knight."

$p = T \quad \neg p = F$
$q = T \quad \neg q = F$

① $q = T$

② $(p \wedge \neg q) \vee (\neg p \wedge q) . = T$

① $T = T$.

② $(T \wedge F) \vee (F \wedge T) = T$
$F \vee F = T$ Case does not hold.
$F \neq T$.

p: A is a Knight ¬p: A is a Knave.
q: B is a Knight ¬q: B is a Knave.

Let us Suppose "A is a Knight" & "B is a Knave."
p = T ¬p = F
q = F ¬q = T

① $q = T$
② $(P \wedge \neg q) \vee (\neg P \wedge q) := F$

① $F \neq T$ Case does not hold.

p: A is a Knight ¬p: A is a Knave.
q: B is a Knight ¬q: B is a Knave.

Let us Suppose "A is a Knave" & "B is a Knight."
p = F ¬p = T
q = T ¬q = F

① $q = F$
② $(P \wedge \neg q) \vee (\neg P \wedge q) := T$

① $T \neq F$ does not hold.

p: A is a Knight ¬p: A is a Knave.
q: B is a Knight ¬q: B is a Knave.

Let us Suppose "A is a Knave." & "B is a Knave."
p = F ¬p = T
q = F ¬q = T.

① $q = F$
② $(P \wedge \neg q) \vee (\neg P \wedge q) := F$

① $F = F$ ✓
② $(F \wedge T) \vee (T \wedge F) = F$
$F \vee F = F$ holds.
$F = F$

Therefore A = Knave B = Knave.

Ex 55-59 HW.
P-20

No Case Hold. → Inconclusive.
one Case Hold → Fix type for A & B.
multiple Cases Hold.

	A	B	
→	Knight,	Knight.	X
→	Knight,	Knaves	✓
or ✓	Knaves,	Knight.	✓
or ✓	Knaves,	Knaves	✓

A = Knight B = ?

→ [Knight, Knaves] ✓
or ∨ Knaves, Knight. ✓
or ∨ Knaves, Knaves ✓

"atleast one of us is a Knave" iff

$(P \wedge \neg q) \vee (\neg P \wedge q) \vee (\neg P \wedge \neg q)$.

"The two of us are both Knight".

Quiz #2 1- FEB- 2023.

A Says" B is not a Knight" p ≡ A is a Knight ¬P ≡
B Say" I am a Knight". q ≡ B is a Knight ¬q ≡

Suppose A is a Knave & B is a Knight.

① ⇒		P ≡	¬P ≡
② ⇒		q ≡	¬q ≡

Case Holds ?