lecture #7:-

Ex p44:- Do 1-50 p43-45. Exercise.

Q25:- All (your friends) (are perfect)

For all x, x is your friend, x is perfect.

$\forall x$, $P(x)$.

$x \in$ Set of your friends.

$x \in \{$ your friends $\}$.

$P(x)$: x is perfect.

Not everyone is perfect.

It's Not. (For all x, x is person, x is perfect.)

true that

$\neg(\forall x\ P(x))$.

$\exists x \neg P(x)$

$x \in \{$ persons $\}$.

$P(x)$: x is perfect.

Standard form : Quantifier + Subject + Predicate.

Q19:- (a) $\exists x\ P(x)$ $x \in \{1, 2, 3, 4, 5\}$

$= P(1) \vee P(2) \vee P(3) \vee P(4) \vee P(5)$.

(f) $\neg \forall x P(x)$.

$= \exists x \neg P(x)$.

$= \neg P(1) \vee \neg P(2) \vee \neg P(3) \vee \neg P(4) \vee \neg P(5)$.

Q30):- $\exists P(x,3)$ $\quad x, y \in \{1,2,3\}$.

$P(1,3) \vee P(2,3) \vee P(3,3)$.

Q34:- No one can Keep Secret.

It is not the true for all x, x is a person, x can keep secret.

$\neg(\forall x P(x))$ $\quad x \in \{$Persons$\}$.

$P(x) =$ x can Keep Secret.

$= \exists x \neg P(x)$.

Nested Quantifier. $\forall x \forall y P(x,y)$. $\quad x, y \in \{1,2,\cdots N\}$.

$\forall x \exists y P(x,y)$.

Ex2, Ex3. P47 P48 (HW).

Ex4:- P48. let $Q(x,y)$: $x+y=0$.

$\exists y \forall x Q(x,y) = ?$ F

$\forall x \exists y Q(x,y) = ?$ T.

$x, y \in \mathbb{R}$.

5, -5, 2, 0, 5.5

-0.5.

"$\sim$"

Ex5 $Q(x,y,z) = x+y \geq z$

$\forall x \forall y \exists z \; Q(x,y,z) = ?$ T

$\exists z \forall x \forall y \; Q(x,y,z) = ?$ F

$x, y, z \in \mathbb{R}$.

Compound predicates Conversions.

Ex9:- $\forall x \, (C(x) \vee \exists y \, (C(y) \wedge F(x,y)))$.

for all x, x has a Computer OR.

there exist y, y has a Computer and.

x & y are friends.

$C(x)$: x has Computer.

$F(x,y)$: x and y are friend.

any & 5 students in your class?

Ex11:- PS1 "If a person is a female and is a parent then this person is Some Ones mother".

If for all x, x is a person, x is a female and x is a parent then

there exist y, such that x is the mother of y.

$x, y \in$ {person}.

$f(x)$: x is a female.

$P(x)$: " " a parent.

$M(x,y)$: x is a mother of y.

$\forall x \, (f(x) \wedge P(x)) \longrightarrow \exists y \, M(x,y)$.

Everyone has some friend.

for all x, x is a person, there exists y, such that x is a friend of y.

$\forall x \exists y P(x,y)$.

$x, y \in$ { person }.
$F(x,y)$ = x is a friend of y.

Q11: Every Student has asked Professor Gross a Question.

Pss

for all x, x is a Student, x has asked Prof. Gross a Question

$x \in$ { Student }.
$Q(x)$ = x has asked Prof. Gross a Question.

Hw.
P 54-58.
Ex
Q1-50

Q24:-

$P(x,y)$ = $x + y = y$.

$x, y \in \mathbb{R}$.

$\exists x \forall y P(x,y)$ =? T

$\exists_x$ = ایک
$\forall x$ = ہر ایک

Session Questions.

2- System Consistency.
2- Knave Knights.
3- Converse, Inverse, Contra.
4- Arguments. (Lec 8-9-10).
5- Quantifiers. (Nested).

Quiz # 4.

(1) "There is (no) one, who can fool $P(x,y)$ = x can fool y.

1) "There is no one, who can fool everybody."

$F(x,y)$: x can fool y.

$x, y \in \{\text{persons}\}$.

Simplified Expression Required.

2) "No one can fool himself/herself".