LEC 10 / week 5 :- Principle of Resolution.

1) order.
2) Sequence.
3) Equivalences.
Proof an Argument.

Clauses. Premise.

→ Disjunction ($\vee$) of literals is called a clause.

→ literal = a Variable or its negation.

$p \rightarrow$ literal
$\neg p \rightarrow$ literal

$\underbrace{\neg p}\vee\underbrace{q}$ = a clause.

$\underbrace{\neg p}\vee\underbrace{q}\vee\underbrace{s}\vee\underbrace{r}$ = a clause.

$p \rightarrow q \neq$ a clause.
$p \wedge q \neq$ a clause.

$P1 \longrightarrow C1$ one or more clauses.
$P2 \rightarrow C2$
$P3 \rightarrow C3$
$\vdots \quad \vdots$
$P_n \rightarrow C_n$
$\therefore C \quad \therefore \neg C$

by repeatedly apply PR if we reach to an empty Clause This means that an argument is Correct.

Step1 :- you will need to obtain clauses.

Step2 :- you will take negation of Conclusion to make a clause.

a clause.

Step3:- Repeatedly apply PR.

P1 → p
P2 → $p \rightarrow q$
C → $\therefore q$

$p \longrightarrow$ C1. x
$\neg p \vee q \longrightarrow$ C2. x
$\neg q \longrightarrow$ C3. x

from C1, C2 $\quad q \rightarrow$ C4 x
from C3, C4 $\quad \square$ ✓ $\rightarrow$ C5

$\square$ = empty Clause. Hence proved

Clauses.

$p \vee q$]. Disjunction.
⇒ you are lucky.

$p \wedge q = p$
$= q$

$\underbrace{p \rightarrow q}$ = $\underbrace{\neg p \vee q}$.

truth table.

Ex11 P65 Step1:- Propositions.
Step2:- Logical Expressions.

P1 → $T \rightarrow (M \vee E)$
P2 → $S \rightarrow \neg E$
P3 → $T \wedge S$
C → $\therefore M$.

$\neg T \vee M \vee E$ — C1 x
$\neg S \vee \neg E$ — C2 x
T — C3 x
S — C4 x
$\neg M$ — C5 x

$p \rightarrow q = \neg p \vee q$

from C1, C2 $\quad \neg T \vee M \vee \neg S$ — C6 x
from C3, C6 $\quad M \vee \neg S$ — C7 x
from C4, C7 $\quad M$ — C8 x
from C5, C8 $\quad \square$ — C9

Hence Proved.

Ex6 62. P1 → $\neg p \wedge q$ $\qquad \neg p$ — C1 x
P2 → $r \rightarrow p$ $\qquad q$ — C2

62. $p_2 \to r \to p$ q — C2

$p_3 \to \neg r \to s$ $\neg r \vee p$ — C3 x

$p_4 \to s \to t$ $r \vee s$ — C4 x

$C \to \therefore t$ $\neg s \vee t$ — C5 x

$\neg t$ — C6 x

from C1, C3 $\neg r$ — C7 x

from C4, C7 s → C8 x

from C5, C8 t → C9 x

from C6, C9 $\square$ → the argument is correct.

observation: It is not compulsory to process all the clauses. if you obtain empty thats enough

Ex7 63: $p_1 \to p \to q$ $\neg p \vee q$ x C1

$p_2 \to \neg p \to r$ $p \vee r$ x C2

$p_3 \to r \to s$ $\neg r \vee s$ x C3

$C \to \therefore \neg q \to s$ $\neg q$ x C4

$\neg s$ — C5

from C1, C2 $q \vee r$ — x C6

from C3, C6 $q \vee s$ — x C7

from C4, C7 s — C8

from C5, C8 $\square$ therefore the argument

$p \to q = \neg p \vee q$

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

is Correct.

Ex9: P1 → L → A $\neg L \vee A$ — C1
63 P2 → E → $\neg I$ $\neg E \vee \neg I$ — C2
P3 → A → E $\neg A \vee E$ — C3
C → ∴ L → $\neg I$ L — C4
I — C5

from C1, C3 $\neg L \vee E$ — C6
from C2, C6 $\neg L \vee \neg I$ — C7.
from C4, C7 $\neg I$ — C8
from C5, C8   □ — C9

therefore the argument is Correct.

Solving Questions.
1) Propositions.
2) Expressions.
3) Clauses.
4) Applying PR (Repeatedly).

Expect a Question in Sessional.

When we try to prove something scientifically.
Strongest
1) Mathematical proof.
→ Argument proof.
– Rules of Inference
→ PR.
2) Experiments.
3) An Example.

weakest.

3) An Example.

prolog :- Principle of Resolutions

Logic. propositional Logic.

predicate Logic.

Implementation.

⇒ Next lecture.

write on Google → Swi-Prolog.

→ Download

→ OS.

when we cover the Next lec.

Lec 1 – Lec 11. (Sessional one).

Prolog ⇒ one Question.

PR ⇒ you can practice all the question.
in the Exercise related to
rules of Inference.

Sessional – 1 :-

1) Knave, Knight
2) System Specification.
3) Quantifiers
4) Rules of Inference/PR
5) prolog.

50 Question.

five Question.

⇒ ≥ 80%.