Lec # 9. Rules of Inference.

→ Proofs.

→ An Argument.

p_1
p_2
⋮
$\therefore C$

Rules of Inference.

Eg 8 63) 1) to define propositions. 2) to obtain Expressions. } skipping in Exam you will do it.

$T \rightarrow (M \vee E)$ — ① X
$S \rightarrow \neg E$ — ② X
$T \wedge S$ — ③ X
$\therefore M.$

from ③ T — ④ X by (S)
from ③ S — ⑤ X by (S)

from ④,① $M \vee E$ by (MP) — ⑥ X
from ⑤,② $\neg E$ by (MP) — ⑦ X
from ⑥,⑦ M.

Since M is the Conclusion therefore the argument is Correct

Observation :- (Order) the statements sometimes needs to be processed in some arbitrary orders.

Ex 9 63)

$L \rightarrow A$ — ① X
$E \rightarrow \neg I$ — ② X
$A \rightarrow E$ — ③ X
$\therefore L \rightarrow \neg I.$

from ① & ③ $L \rightarrow E$ — ④ X by (HS)
from ②,④ $L \rightarrow \neg I$ — ⑤ by (HS)

Observation :- (Sequence). Sometime the Sequence of Combining the premises may not be present.

from (2,4) $L \to \neg I$ — (5) by (HS)

which is equal to Conclusion Therefore the argument is correct

Eg 63

$P \to q$ — (1) ✗

$\neg p \to r$ — (2) ✗

$r \to s.$ — (3) ✗

$\therefore \neg q \to s.$

we can use logical equivalences to proof arguments

from (1) $\neg q \to \neg p$ — (4) ✗

from (4,2) $\neg q \to r$ — (5) by (HS).

from (3,5) $\neg q \to s$ — (6) by (HS).

This is equal to Conclusion Therefore the argument is Correct.

1) Order.

2) Sequence.

3) Logical Equivalences.

Principle of Resolution.

↳ Repeatedly apply the

Observation:- (Logical Equ)

Sometimes we may need to use logical equivalences to proof.

1) $\dfrac{p \quad p \to q}{\therefore q}$ (MP)

2) $\dfrac{\neg q \quad p \to q}{\therefore \neg p}$ (MT)

3) $\dfrac{p \to q \quad q \to r}{\therefore p \to r}$ (HS)

4) $\dfrac{p \vee q \quad \neg p}{\therefore q}$ (DS)

5) $\dfrac{p}{\therefore p \vee q}$ (AD)

6) $\dfrac{p \quad q}{\therefore p \wedge q}$ (C)

7) $\dfrac{p \wedge q}{\therefore p}$ (S)

8) $\dfrac{p \vee q \quad \neg p \vee r}{\therefore q \vee r}$ (R)

Part I 15 Questions

pages 64–65. Book.

(61–63) Pages. just Additional Examples.

Sessional 1: one Question from Rules of Inferences

First 15 Questions. from Ex. Rules on Inferences.

→ Knave, Knight.
→ Quantifiers
→ Nested Quantifiers.
→ Rules of Inference
→ System Specification.