

Introduction to Logical Reasoning

Workshop on Identifying Valid Argument Forms

David Emmanuel Gray

Northwestern University in Qatar
Carnegie Mellon University in Qatar

Part I, Problem 1 Solution

1. $X \rightarrow Y.$

$\therefore X \rightarrow (X \& Y).$

2. $X \rightarrow (X \& Y).$ 1; Abs.

Part I, Problem 2 Solution

1. $(A \& B) \rightarrow C.$

2. $\sim C.$

$\therefore \sim(A \& B).$

3. $\sim(A \& B).$ 1, 2; M.T.

Part I, Problem 3 Solution

1. $(W \vee X) \rightarrow \sim(W \rightarrow X).$

2. $W \vee X.$

$\therefore \sim(W \rightarrow X).$

3. $\sim(W \rightarrow X).$

1, 2; M.P.

Part I, Problem 4 Solution

1. $\sim(M \rightarrow \sim N) \vee (Q \& R).$

2. $\sim\sim(M \rightarrow \sim N).$

$\therefore Q \& R.$

3. $Q \& R.$

1, 2; D.S.

Part I, Problem 5 Solution

1. $[(W \vee \sim X) \rightarrow D] \& (H \vee R).$

$\therefore (W \vee \sim X) \rightarrow D.$

2. $(W \vee \sim X) \rightarrow D.$

1; Simp.

Part I, Problem 6 Solution

$$1. \frac{(E \rightarrow F) \rightarrow G.}{\therefore (E \rightarrow F) \rightarrow [(E \rightarrow F) \& G].}$$

$$2. (E \rightarrow F) \rightarrow [(E \rightarrow F) \& G]. \quad 1; \text{Abs.}$$

Part 2, Problem 1 Solution

1. $(A \vee B) \rightarrow C$.
 2. $(C \vee B) \rightarrow [A \rightarrow (D \vee E)]$.
 3. $A \& D$.
-
- $\therefore D \vee E$.

- | | |
|---------------------------------|-------------------|
| 4. A . | <u>3; Simp.</u> |
| 5. $A \vee B$. | <u>4; Add.</u> |
| 6. C . | <u>1, 5; M.P.</u> |
| 7. $C \vee B$. | <u>6; Add.</u> |
| 8. $A \rightarrow (D \vee E)$. | <u>2, 7; M.P.</u> |
| 9. $D \vee E$. | <u>8, 4; M.P.</u> |

Part 2, Problem 2 Solution

1. $W \rightarrow X$.

2. $(W \rightarrow Y) \rightarrow (Z \vee X)$.

3. $(W \& X) \rightarrow Y$.

4. $\sim Z$.

$\therefore X$.

5. $W \rightarrow (W \& X)$.

1; Abs.

6. $W \rightarrow Y$.

5, 3; H.S.

7. $Z \vee X$.

2, 6; M.P.

8. X .

7, 4; D.S.

Next Class...

We will now start to look at proofs with no steps given, and that require more than one step to solve.