

Introduction to Logical Reasoning

Workshop on Identifying Valid Argument Forms

Part I: For each argument, use natural deduction to construct a formal proof of validity.
(Each proof can be done in just *one* step.)

1.
$$\frac{1. \ X \rightarrow Y.}{\therefore X \rightarrow (X \& Y).}$$

2.
$$\frac{\begin{array}{l} 1. \ (A \& B) \rightarrow C. \\ 2. \ \sim C. \end{array}}{\therefore \sim(A \& B).}$$

3.
$$\frac{\begin{array}{l} 1. \ (W \vee X) \rightarrow \sim(W \rightarrow X). \\ 2. \ W \vee X. \end{array}}{\therefore \sim(W \rightarrow X).}$$

4.
$$\frac{\begin{array}{l} 1. \ \sim(M \rightarrow \sim N) \vee (Q \& R). \\ 2. \ \sim\sim(M \rightarrow \sim N). \end{array}}{\therefore Q \& R.}$$

5.
$$\frac{1. \ [(W \vee \sim X) \rightarrow D] \& (H \vee R).}{\therefore (W \vee \sim X) \rightarrow D.}$$

6.
$$\frac{\begin{array}{l} 1. \ (E \rightarrow F) \rightarrow G. \end{array}}{\therefore (E \rightarrow F) \rightarrow [(E \rightarrow F) \& G].}$$

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Part II: Each of the following presents a complete and correct formal proof of validity for an argument. For each proof, state the justification for each of its steps.

1. 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 . _____

5. $A \vee B$. _____

6. C . _____

7. $C \vee B$. _____

8. $A \rightarrow (D \vee E)$. _____

9. $D \vee E$. _____

2. 1. $W \rightarrow X$.
 2. $(W \rightarrow Y) \rightarrow (Z \vee X)$.
 3. $(W \& X) \rightarrow Y$.
 4. $\sim Z$.
 _____ $\therefore X$.

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

6. $W \rightarrow Y$. _____

7. $Z \vee X$. _____

8. X . _____