

### New method of testing logical correctness

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Logic is a major discipline within Philosophy. It is a vital part of human thinking. It teaches how to think correctly; how to conclude logically. All of us try to conduct our reasoning in a logical way. We do this task through certain types of inferences. Broadly, the term logic may correctly be applied to the systematic study of any kind of inference. These inferences are expressed through arguments. Every possible inference is an argument. Formal logic shows us how to evaluate these inferences in a deductive pattern and how to verify the formal correctness or validity. Logicians show different techniques to gain the validity of an argument. The Following method is a new technique to test the logical correctness.

#### Inference Rules

P-T	~P-T	P∧Q-T	P∧Q-F	P∨Q-T	P∨Q-F
~P-F	P-F	P-T Q-T	P-F Q-T	P-F Q-T	P-F Q-F
P→Q-T	P→Q-F	P↔Q-T	P↔Q-F		
P-F Q-F	P-T Q-F	P-T Q-T	P-F Q-T		

To apply this method to an argument we begin by assuming that the argument is valid. If any step leads to a contradiction, then the argument is invalid.

Consider the following symbolized argument.

$$\sim A \rightarrow (B \vee C)$$

$$\sim B$$

$$\therefore (C \rightarrow A)$$

We begin as before by writing the symbolized argument on a single line, placing a conjunction symbol between every premise. Because, there is an inter connection with each premise. Also the implication symbol is placed between last premise and the conclusion of the argument. (instead of the three dot symbol). This is because, in the deductive method we believe that the conclusion logically implied by its premises. If so we said that the argument is logically correct.

$$\{[\sim A \rightarrow (B \vee C)] \wedge \sim B\} \rightarrow (C \rightarrow A)$$

We can now obtain the truth values after using the above Inference rules.

$$\{[\sim A \rightarrow (B \vee C)] \wedge \sim B\} \rightarrow (C \rightarrow A)$$

$$T \quad F \quad F \quad F \quad F \quad T \quad T \quad F \quad F$$

(Contradiction occurs) argument invalid

In the above string **C** shows the different truth values at the same time. It cannot be permitted. This leads to a contradiction. We write that the argument is invalid (The inconsistent truth values are bold in the string)

#### Eg. Natural language arguments

- If Lizzie was the murderer, then she owns an axe. Lizzie does not own an axe. Therefore, Lizzie was not the murderer.
- If there is fire here, then there is oxygen here. There is no oxygen here. Therefore, there is fire here.

$$\begin{array}{l}
 1. \quad P \rightarrow Q \quad \{ (P \rightarrow Q) \wedge \sim Q \} \rightarrow \sim P \\
 \quad \sim Q \quad \quad \quad T \quad F \quad T \quad F \quad F \quad T \quad F \\
 \quad \therefore \sim P \quad \quad \quad 6 \quad 4 \quad 7 \quad 2 \quad 5 \quad 1 \quad 3 \quad (\text{No contradiction}) \text{ argument valid}
 \end{array}$$

$$\begin{array}{l}
 2. \quad P \rightarrow Q \quad \{ (P \rightarrow Q) \wedge \sim Q \} \rightarrow P \\
 \quad \sim Q \quad \quad \quad T \quad F \quad F \quad F \quad F \quad T \quad F \\
 \quad \therefore P \quad \quad \quad 6 \quad 4 \quad 7 \quad 2 \quad 5 \quad 1 \quad 3 \quad (\text{Contradiction occurs}) \text{ argument invalid}
 \end{array}$$

**Key words:** Logic, Philosophy, Argument, Natural language, Premises

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