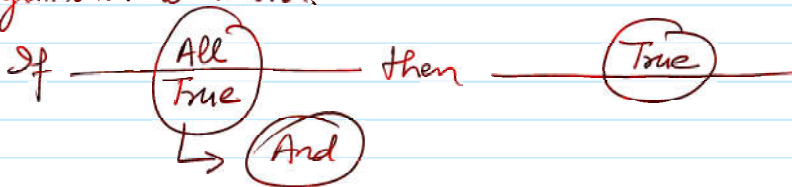


Argument! → Sequence of Statements. — Called Premises  
that end with a statement → Conclusion.

Argument! → By an Argument means Sequence of Statements  
(Called Premises) that end with a Statement Called Conclusion

Valid Argument! → A Valid argument means that the Conclusion or final statement must follow from the truth of the preceding statements or premises of the argument.

"If all the premises are True then the Conclusion is also true." then we say the argument is Valid.



Note! → The Argument forms with the premises  $p_1, p_2, p_3, \dots, p_n$  and Conclusion  $q$  is Valid. If the Conditional Statement

$(p_1 \wedge p_2 \wedge p_3 \dots \wedge p_n) \rightarrow q$  is always True i.e. is a Tautology.

The statement  $(X \leftrightarrow \neg Y) \vee Y$  is false when

- (A) T, T (B) T, F (C) F, T (D) F, F ✓
- (A)  $(T \leftrightarrow F) \vee T$  (B)  $(T \leftrightarrow T) \vee F$  (C)  $(F \leftrightarrow F) \vee T$  (D)  $(F \leftrightarrow T) \vee F$
- FVT = T TVF T VT T FVF F

(Ex) "If it rains, I drive to University", "It rains"  
∴ I drive to University

Sol! →  $p_1$ : It rains  $p_2$ : I drive to Uni.

$S_1$ :  $p_1 \rightarrow p_2$   $S_2$ :  $p_1$  Conclusion  $q$ :  $p_2$

$[(S_1 \wedge S_2) \rightarrow q]$  is a Tautology → Valid Argument.

| $p_1$ | $p_2$ | $S_1: p_1 \rightarrow p_2$ | $S_2: p_1$ | $S_1 \wedge S_2$ | $q: p_2$ | $S_1 \wedge S_2 \rightarrow q$ |
|-------|-------|----------------------------|------------|------------------|----------|--------------------------------|
| T     | T     | T✓                         | T✓         | T—               | T—       | T                              |
| T     | F     | F—                         | T—         | F—               | F—       | T                              |
| F     | T     | T—                         | F—         | F—               | T—       | T                              |
| F     | F     | T                          | F—         | F—               | F—       | T                              |

Tautology

$\therefore (S_1 \wedge S_2) \rightarrow q$  is a Tautology

$\therefore$  the Argument is Valid.

Rules of Inference  $\rightarrow$  Some simple Valid arguments <sup>forms</sup> are called Rules of Inference.

These are the Building Blocks to Construct More Complex Valid Arguments

① Modus Ponens (Law of Detachment)

Premises:  $p, p \rightarrow q$

Conclusion:  $q$

$$\begin{array}{c} p \\ p \rightarrow q \\ \hline \therefore q \end{array}$$

$\therefore (p \wedge (p \rightarrow q)) \rightarrow q$  is a Tautology

② Modus Tollens (Law of denying).

Premise:  $\sim q, p \rightarrow q$

Conclusion:  $\sim p$

$$\begin{array}{c} \textcircled{\sim q} \\ p \rightarrow \textcircled{q} \\ \hline \therefore \sim p \end{array}$$

$$\begin{array}{c} \textcircled{OR} \\ \textcircled{q} \\ p \rightarrow \textcircled{\sim q} \\ \hline \sim p \end{array}$$