Material implication may refer to:

a. Material conditional, a logical connective

b. Material implication (rule of inference), a rule of replacement for some propositional logic

a. The material conditional (also known as material implication, material consequence, or simply implication, implies, or conditional) is a logical connective (or a binary operator) that is often symbolized by a forward arrow "∀". The material conditional is used to form statements of the form $p \to q$ (termed a *conditional statement*) which is read as "if *p* then *q*". Unlike the English construction "if...then...", the material conditional statement $p \to q$ does not specify a causal relationship between *p* and *q*. It is merely to be understood to mean "if *p* is true, then *q* is also true" such that the statement $p \to q$ is false only when *p* is true and *q* is false. The material conditional only states that *q* is true when (but not necessarily only when) *p* is true, and makes no claim that *p* causes *q*.

The material conditional is also symbolized using:

1. $p \supset q$ (Although this symbol may be used for the superset symbol in set theory.);

2.$p \Rightarrow q$ (Although this symbol is often used for logical consequence (*i.e.*, logical implication) rather than for material conditional.)

3.C*pq* (using Łukasiewicz notation)

With respect to the material conditionals above:

- *p* is termed the antecedent of the conditional, and
- *q* is termed the consequent of the conditional.

Conditional statements may be nested such that either or both of the antecedent or the consequent may themselves be conditional statements. In the example "$(p \rightarrow q) \rightarrow (r \rightarrow s)$", meaning "if the truth of *p* implies the truth of *q*, then the truth of *r* implies the truth of *s*), both the antecedent and the consequent are conditional statements.

In classical logic $p \rightarrow q$ is logically equivalent toand by De Morgan's Law logically equivalent to Whereas, in minimal logic (and therefore also intuitionistic logic) only logically entails; and in intuitionistic logic (but not minimal logic) entails

b. In propositional logic,material implication is a valid rule of replacement that allows for a conditional statement to be replaced by a disjunction in which the antecedent is negated. The rule states that *P* implies *Q* is logically equivalent to not-*P or Q* and can replace each other in logical proofs.

Where "" is a metalogical symbol representing "can be replaced in a proof with."

The material implication rule may be written in sequent notation:

Where is a metalogical symbol meaning thatis a syntactic consequence of in some logical system; or in rule form:

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whe! $P\%Q$ at wherever an instance of "$P\forall Q$" appears on a line of a proof, it can be replaced with ""; or as the statement of a truth-functional tautology or theorem of propositional logic:

$(P\forall Q)\forall$

Where P and Q are propositions expressed in some formal system.