

Hypothesis conclusion

The only way to make the conditional statement $p \rightarrow q$ false is to _____

The **hypothesis** of $p \rightarrow q$ is _____ The **antecedent** of $p \rightarrow q$ is _____

The **conclusion** of $p \rightarrow q$ is _____ The **consequent** of $p \rightarrow q$ is _____

Converse inverse contrapositive

The **converse** of $p \rightarrow q$ is _____

The **inverse** of $p \rightarrow q$ is _____

The **contrapositive** of $p \rightarrow q$ is _____

Logical operators english synonyms

Common ways to express logical operators in English:

Negation $\neg p$ can be said in English as

- Not p .
- It's not the case that p .
- p is false.

Conjunction $p \wedge q$ can be said in English as

- p and q .
- Both p and q are true.
- p but q .

Exclusive or $p \oplus q$ can be said in English as

- p or q , but not both.
- Exactly one of p and q is true.

Disjunction $p \vee q$ can be said in English as

- p or q , or both.
- p or q (inclusive).
- At least one of p and q is true.

Conditional $p \rightarrow q$ can be said in English as

- | | |
|-------------------------------|-------------------------------|
| • if p , then q . | • q follows from p . |
| • p is sufficient for q . | • p is sufficient for q . |
| • q when p . | • q is necessary for p . |
| • q whenever p . | • p only if q . |
| • p implies q . | |

Biconditional

- p if and only if q .
- p iff q .
- If p then q , and conversely.
- p is necessary and sufficient for q .

Definitions functions prereqs

Term	Notation	Example(s)	We say in English ...
sequence	x_1, \dots, x_n		A sequence x_1 to x_n
summation	$\sum_{i=1}^n x_i$ or $\sum_{i=1}^n x_i$		The sum of the terms of the sequence x_1 to x_n
piecewise definition	rule	$f(x) = \begin{cases} \text{rule 1 for } x & \text{when COND 1} \\ \text{rule 2 for } x & \text{when COND 2} \end{cases}$	Define f of x to be the result of applying rule 1 to x when condition COND 1 is true and the result of applying rule 2 to x when condition COND 2 is true. This can be generalized to having more than two conditions (or cases).
function application		$f(7)$	f of 7 or f applied to 7 or the image of 7 under f
		$f(z)$	f of z or f applied to z or the image of z under f
		$f(g(z))$	f of g of z or f applied to the result of g applied to z
absolute value		$ -3 $	The absolute value of -3
square root		$\sqrt{9}$	The non-negative square root of 9

Pro-tip: the meaning of two vertical lines $| \quad |$ depends on the data-types of what's between the lines. For example, when placed around a number, the two vertical lines represent absolute value. We've seen a single vertical line $|$ used as part of set builder definitions to represent "such that". Again, this is (one of the many reasons) why is it very important to declare the data-type of variables before we use them.