

INTRODUCTION TO MATHEMATICS  
HANDOUT §2  
THE CONDITIONAL AND BICONDITIONAL IN WORDS  
(SOME OF THE VARIATIONS)  
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**Conditional**       $P \Rightarrow Q$  ,  $P \rightarrow Q$  ,  $Q \Leftarrow P$  , or  $Q \leftarrow P$

If P, then Q.  
Q, if P  
P hence Q  
Q whence P  
P is a sufficient condition for Q  
Q is a necessary condition for P  
P only if Q  
if not Q, then not P  
P implies Q  
not P, or Q  
etc.

**Biconditional**       $P \Leftrightarrow Q$  or  $P \leftrightarrow Q$

P if and only if Q  
P iff Q  
P is necessary and sufficient for Q  
P and Q are logically equivalent  
If P then Q and if Q then P.  
etc.

Also symbols order:

parentheses	( )
not	$\sim$ , $\neg$ , or $\overline{\quad}$
and - or (left to right)	$\wedge$ $\vee$
conditional	$\Rightarrow$ $\rightarrow$
biconditional	$\Leftrightarrow$ $\leftrightarrow$