

Lecture 10. Logical Operators — Biconditional Operator (双条件运算符)

Biconditional Operator (双条件运算符)，通常用符号" \leftrightarrow "表示，是一个用于表示两个命题之间相互等价的逻辑运算符

Truth Table		
p	q	$p \leftrightarrow q$
T	T	T
T	F	F
F	T	F
F	F	T

How "p if and only if q" make sense?

"p if and only if q" composed of two statements -
"p if q" and "p only if q".

"p only if q" = if p then q **and** "p if q" = if q then p

$$(p \rightarrow q) \wedge (q \rightarrow p) \equiv p \leftrightarrow q$$

Representations:

1. p is necessary and sufficient for q and vice versa (p 对于 q 来说是充分必要的，反之亦然)
2. if p then q, and conversely (如果 p 则 q，反之亦然)
3. p iff q (p 当且仅当 q)

Homework Problem:

Write each of the following propositions in of the form "p if and only if q"

- (1) If you read newspaper everyday, you will be informed and conversely.
- (2) It rains if it is a weekend day, and it is a weekend day if it rains.
- (3) The trains run late on exactly those days when I take it.
- (4) For you to get an A in this course, it is necessary and sufficient that you learn how to solve discrete mathematics problems.

1. You will be informed and conversely if and only if you read newspaper everyday.
2. It rains if and only if it is a weekend day.

3. The trains run late if and only if I take it.
4. You can get an A in this course if and only if you learn how to solve discrete mathematics problems.