

# Notes 1

A statement (proposition) is a sentence that is true or false but not both.

excluded middle, no third possibility

“Fussy logic” extends to sentences that need not be propositions. (beyond this course)

statement variable, statement form

Logical connectives (operators): not( $\sim$ ), and ( $\wedge$ ), or( $\vee$ )

Truth table

Logical equivalent ( $\equiv$ )

Tautology, Contradiction, satisfiable

Properties of operators

De Morgan’s law:

$$\sim(p \wedge q) \equiv \sim p \vee \sim q$$

$$\sim(p \vee q) \equiv \sim p \wedge \sim q$$

Conditional

operator ( $\rightarrow$ )

vacuously true

$$p \rightarrow q \equiv \sim p \vee q$$

negation

contrapositive, converse, inverse

Biconditional (if and only if) (iff)

operator ( $\leftrightarrow$ )

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

Order of operations

$\sim$

$\wedge, \vee$

$\rightarrow, \leftrightarrow$

Necessary condition

Sufficient condition

Necessary and sufficient condition