MAT 2440

Handout Section 1.1 and 1.2

The *negation* of a proposition p is denoted by $\neg p$ and has this truth table:

p	$\neg p$
T	F
F	T

p	q	$p \wedge q$
T	T	T
T	F	F
F	T	F
F	F	F

The *conjunction* of propositions p and q is denoted by $p \wedge q$ and has this truth table:

The *disjunction* of propositions p and q is denoted by $p \vee q$ and has this truth table:

p	q	$p \vee q$
T	T	T
T	F	T
F	T	T
F	F	F

p	q	$p \oplus q$
T	T	F
T	F	T
F	T	T
F	F	F

"Exclusive or"

If p and q are propositions, then p →q is a *conditional statement* or *implication* which is read as "if p, then q " and has this truth table:

In p →q , p is the *hypothesis* (*antecedent* or *premise*) and q is the *conclusion* (or *consequence*).

p	q	p →q
T	T	T
T	F	F
F	T	T
F	F	T

From p →q we can form new conditional statements .

- q →p is the **converse** of p →q
- ¬q → ¬ p is the **contrapositive** of p →q
- ¬ p → ¬ q is the **inverse** of p →q

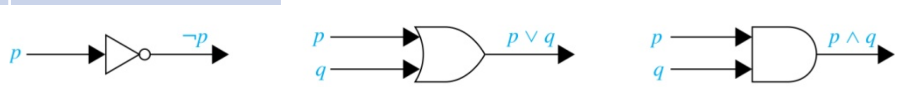
If p and q are propositions, then we can form the *biconditional* proposition p ↔q , read as "p if and only if q ." The biconditional p ↔q denotes the proposition with this truth table:

p	q	p ↔q
T	T	T
T	F	F
F	T	F
F	F	T

Operator	Precedence
¬	1
∧ ∨	2 3
→ ↔	4 5

Two propositions are *equivalent* if they always have the same truth value.

A list of propositions is *consistent* if it is possible to assign truth values to the proposition variables so that each proposition is true



Inverter OR gate AND gate