Discrete Math --- Class 10 --- Feb. 17, 2004

Logic

Definitions;

Proposition – Assertion which is unambiguously True (T) or unambiguously false (F)
Compound propositions – built from simpler propositions.

Name	Symbol	What does it assert
and	$\wedge$	p $\wedge$ q asserts that both p and q are true
or	$\vee$	p $\vee$ q asserts either p or q is true or both
not	$\neg$	$\neg$p asserts that p is false
xor	$\oplus$	asserts exactly on of p, q is true
implies	$\rightarrow$	asserts that if p is true then q must be true
If and only if	$\leftrightarrow$	asserts that p and q have the same truth value

Examples

p: 0=1 (F)
q: 3>0 (T)
r: 3<0 (F)

F $p \wedge q$
T $p \vee q$
T $p \oplus q$
T $\neg p$
F $p \vee r$
F $\neg p \oplus q$
F $p \oplus r$
T $q \oplus r$
T $p \rightarrow r$
T $r \rightarrow q$
F $p \leftrightarrow q$
F $q \leftrightarrow r$
F $q \wedge r$
F $p \wedge r$
F $(p \oplus q) \wedge r$
F $(p \wedge q) \wedge r$
F $p \wedge (q \wedge r)$
F $p \leftrightarrow (q \oplus r)$

Order Of Operations - $\neg$ comes first and everything else is tied. You need parenthesis to make your order implict.

→ is false only when p is true and q is false

If **you give me $100,** then I'll **give you an "A"**. Someone giving me $100 but dose not receive an "A" is the only way I could be a liar.

The red segment signifies p and the blue segment signifies q.

Truth Tables

P	Q	p^q
T	T	T
T	F	F
F	T	T
F	F	T

Truth tables show what happens in every possible case