Note Title 9/29/2013

p, q, r

p is true
q is false
r is true

$\neg q$

$p \wedge r$

$p \vee r$

$p \vee q \wedge r$

Order of operations : Not, And, Or.

$p \vee (q \wedge r)$

T F T

F

T

$(\neg q) \wedge r$

F T

T

T

$p \vee (\neg r \wedge q)$

$\neg (r \wedge q)$

T F

$\neg$F $\rightsquigarrow$ T

p T
q F
r F
t T

$\neg(p \wedge r) \vee (\neg t \wedge q)$ → Compound proposition.

T F T F
T F
T F V F

T V F

T.

$(p \wedge \neg q) \vee r$

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

Rice cooker

t: temp over threshold
c: cooking complete.
w: warming feature activated.

$t \vee (c \wedge \neg w)$

((CS 10 or CS 12) and CS 20.

CS 10 or (CS 12 and CS 20).

Conditional Operators

Implication $p \to q$ "If p then q".

p hypothesis
q conclusion.

p	q	p → q
T	T	T
T	F	F
⇒ F	T	T
F	F	T

p: Mow lawn.

q: pay $10

$p \to q$.

p: You finish your homework. $p \to q$.
q: You can go to the party

If you finish your homework, then you can go to the party.

You can go to the party if you finish your HW.

Finishing your HW implies that you can go to the party.

Finishing your HW is sufficient for going to the party.

p only if q. $\Rightarrow$

q is necessary for p.
necessary for p.

p: You take your drivers test

q: You get a drivers license.

Taking the drivers test is sufficient for getting a license. $p \to q$.

You will get a license only if you take the test. $q \to p$.

The drivers test (p) is necessary for getting your license. (q)

p is necessary for q. $q \to p$.

The only way q can be true is if p is also true.

p	q	$q \to p$
T	T	T
T	F	T
F	T	F
F	F	T

Warning: $q \to p$ reversed

If $2+2=5$ then today is Wed. True.

If $2+2=5$ then today is Mon True.

If $2+2=4$ then Wed False

If $2+2=4$ then today is Mon True.

$p \to q$ implication.

Converse $q \to p$

Contrapositive $\neg q \to \neg p$.

Inverse $\neg p \to \neg q$.

Biconditional $p \leftrightarrow q$.

p	q	$p \leftrightarrow q$
T	T	T
T	F	F
F	T	F
F	F	T

p if and only if q

p iff q

p is necessary + sufficient for q.

if p then q and conversely.

(NOT, $\wedge$, $\vee$, ~~imp~~ conditionals.)