PHL245   Jan 7th   Notes on iPad. This is for review.
Lecture 1

Review for term #1

~~P only if Q : Q → P~~
~~BE if~~

P if Q : Q → P
P only if Q : P → Q
Whenever P, Q : P → Q
P provided Q : Q → P
P on the condition that Q : Q → P
P only on the condition that Q : P → Q
Q is necessary for P : P → Q
Q is sufficient for P : Q → P

and, but, as well as, although ... however, yet, also, in addition
to, moreover, even though , ...   ∧

or, unless, either/or, else, otherwise, ...   ∨

iff, it's necessary & sufficient, either--or, ...when and only when,
exactly on condition that, --just in case.--, is equivalent to,
exactly when,   ↔

neither..nor   ~(P∨Q) , ~P∧~Q
not both   ~(P∧Q) , ~P∨~Q
exclusive or, exactly one of two.   ~(P↔Q)
                          (P↔~Q), (~P↔Q), ((P∨Q)∧~~~(P∧Q))

• Parsing sentences.

Derived rule.

Negation of Conditional nc or NC

$$\frac{\sim(\phi \to \psi)}{\phi \wedge \sim\psi} \qquad \frac{\phi \wedge \sim\psi}{\sim(\phi \to \psi)}$$

Conditional as disjunction
cd or CD

$$\frac{\phi \to \psi}{\sim\phi \vee \psi} \qquad \frac{\sim\phi \vee \psi}{\phi \to \psi}$$

$$\frac{\sim\phi \to \psi}{\phi \vee \psi} \qquad \frac{\phi \vee \psi}{\sim\phi \to \psi}$$

Separation of cases
sc or SC

$$\frac{\begin{array}{c}\phi \vee \psi \\ \phi \to \chi \\ \psi \to \chi\end{array}}{\chi} \qquad \frac{\begin{array}{c}\phi \to \chi \\ \sim\phi \to \chi\end{array}}{\chi}$$

DeMorgan's dm or DM

$$\sim(\phi \vee \psi) \longleftrightarrow \sim\phi \wedge \sim\psi$$
$$\sim(\sim\phi \vee \sim\psi) \longleftrightarrow \phi \wedge \psi$$
$$\sim(\phi \wedge \psi) \longleftrightarrow \sim\phi \vee \sim\psi$$
$$\sim(\sim\phi \wedge \sim\psi) \longleftrightarrow \phi \vee \psi$$

Negation of Biconditional
nb or NB

$$\frac{\sim(\phi \leftrightarrow \psi)}{\phi \leftrightarrow \sim\psi} \qquad \frac{\phi \leftrightarrow \sim\psi}{\sim(\phi \leftrightarrow \psi)}$$

Basic rules:

Modus Ponens (MP)

$$\phi \to \psi$$
$$\frac{\phi}{\psi}$$

Modus Tollens (MT)

$$\phi \to \psi$$
$$\frac{\sim\psi}{\sim\phi}$$

Double Negation (DN)

$$\frac{\phi}{\sim\sim\phi} \qquad \frac{\sim\sim\phi}{\phi}$$

Repetition (R)

$$\frac{\phi}{\phi}$$

Simplification (CS/SL/SR)

$$\frac{\phi \wedge \psi}{\phi} \qquad \frac{\phi \wedge \psi}{\psi}$$

Adjunction (Adj)

$$\phi$$
$$\frac{\psi}{\phi \wedge \psi}$$

Addition (ADD)

$$\frac{\phi}{\phi \vee \psi} \qquad \frac{\psi}{\phi \vee \psi}$$

Modus Tollens Ponens (MTP)

$$\phi \vee \psi$$
$$\frac{\sim\phi}{\psi} \qquad \qquad \frac{\phi \vee \psi}{\frac{\sim\psi}{\phi}}$$

Biconditional-Conditional (BC)

$$\frac{\phi \leftrightarrow \psi}{\phi \to \psi} \qquad \frac{\phi \leftrightarrow \psi}{\psi \to \phi}$$

(CB)

$$\phi \to \psi$$
$$\frac{\psi \to \phi}{\phi \leftrightarrow \psi}$$