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

Review for term #1

~~P only if Q Q → P~~
~~P 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, ... ∧ In that case

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

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

Conditional as disjunction cdj or CDJ

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

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

Separation of cases sc or SC

$$\frac{\phi\vee\psi \quad \phi\rightarrow\chi \quad \psi\rightarrow\chi}{\chi} \qquad \frac{\phi\rightarrow\chi \quad \sim\phi\rightarrow\chi}{\chi}$$

DeMorgan's dm or DM

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

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)

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

Modus Tollens (MT)

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

Double Negation (DN)

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

Repetition (R)

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

Simplification (S/SL/SR)

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

Adjunction (Adj)

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

Addition (ADD)

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

Modus Tollens Ponens (MTP)

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

Biconditional-Conditional (BC)

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

(CB)

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

$(P \vee Q) \rightarrow \sim W \quad \sim P \wedge (\sim S \rightarrow W) \quad T \rightarrow \sim(Q \wedge \sim W) \quad \therefore (P \vee Q) \rightarrow \sim(S \leftrightarrow T)$

Show $(P \vee Q) \rightarrow \sim(S \leftrightarrow T)$

$P \vee Q$ ass cd

Show $\sim(S \leftrightarrow T)$

$S \leftrightarrow T$ ass id