1 Syntax vs. Semantics

Syntax

- Symbols
- Recursive rules to form formulas out of symbols
- Recursive nature of formulas allows proofs by induction
- Complexity if formula is the number of times you need to apply rules to build the formula
- Inductive arguments are by induction on complexity

Semantics

- A collection of mathematical objects & ways to interpreting out wff's as statements about these objects
- If we fix one such object every formula becomes a true or false statement about the object
- Roughly: Every sentence symbol is a statement that is true or false.

2 Uniqueness

Interpretation must be unique.

Example of Ambiguity:

$$P \wedge Q \to R$$

could be explained as

$$(P \wedge Q) \to (R)$$

or

$$(P) \wedge (Q \to R)$$

Unique Readability Every wff is either a sentence symbol or is composite.

Every composite wff is of the form

- $(\neg\psi)$
- $(\phi \circ \psi)$

for wff's ϕ, ψ and $\circ$ is one of $\vee, wedge, \rightarrow, \leftrightarrow$[1].

Theorem 2.0.1 *Every composite wff has a unique primary cinnective & immediate subformulas.*

3 Truth Assignment

Definition 3.0.1 *A truth assignment is function*

$$\Sigma : W_0 \rightarrow \{False, True\}$$

[1] In $(\neg\psi)$, $\neg$ is the primary connective and ψ is the immediate subformula.
In $(\phi \circ \psi)$, $\circ$ is the primary connective and ϕ, ψ are the immediate subformulas.