

# The Welkin Standard

## Syntax

### Terminals

- Logic
- Undefined notions:
  - Symbols: 0, 1
  - Successor  $S$
  - Implication  $\Rightarrow$
- Table of US-ASCII:

Symbol	Encoding
{	173
}	175

- Empty set:  $\varepsilon$  satisfies  $\neg S(\varepsilon)$
- A **word** is recursively defined.
  - Base case: the empty set  $\varepsilon$  is a word.
  - Recursion: let  $w$  be a word.
    - $w.0$  is a word.
    - $w.1$  is a word.
- Concatenation
  - Base case:  $w.\varepsilon = w$ .
  - Recursion:
    - $w.(u.0) = (w.u).0$
    - $w.(u.1) = (w.u).1$

### Atoms

- Strings are words with delimiters:  $d_1.w.d_2$ , where  $d_1 \not\subset w$  and  $d_2 \not\subset w$ .
- Identifiers are strings without white space.
- Numbers are a subset of strings with an injective function  $q : \text{NUMBER} \rightarrow \mathbb{Q}$ .

### Grammar

- LALR
- Welkin Grammar:

## Semantics

### Equality on Terms

- Two strings are equal if they contain the same strings, in order.
- Two numbers are equal if  $q(a) = q(b)$ .

A **Welkin Information Graph (WIG)** is a structure  $G = (T, H, L)$  with:

- A tree  $T$ ,
- A hypergraph  $H$ ,
- A tree  $L$  isomorphic to  $T$ .

The **encoding**  $E(G)$  of the WIG  $G$  is the unique string where

- All nodes are listed in breadth-first order
- Leaves are terms ending with “#”
- Edges are enumerated, starting from 0. They are included in nodes:

- $s$  means source,
- $c$  means connector,
- $t$  means target.