Theorema 2.0: A First Tour

Tma2tex-parsing Info/Legend

- Yellow: Represents entry points to parsing.
- Orange: Helper Definitions were defined in the Theorema Notebook interface, but are directly included in the following formula.
- Red: Matches unspecified cells or generic content.
- Blue: Represents lists of specific content.
- Purple: Used for lists of generic cells.
- Green: Represents a CellGroupData Element with a List inside, a relevant content structure typically.

We consider “proving”, “computing”, and “solving” as the three basic mathematical activities.

1 Proving

We want to prove

$$(\underset{x}{\forall}(P[x] \vee Q[x])) \wedge (\underset{y}{\forall}(P[y] \Rightarrow Q[y])) \Leftrightarrow (\underset{x}{\forall} Q[x]).$$

To prove a formula like the above, we need to enter it in the context of a Theorema environment.

Proposition : First Test, 2014

$$((\forall x\ (P[x] \vee Q[x]) \wedge \forall y\ (P[y] \to Q[y])) \iff \forall x\, Q[x])$$

2 Computing

Definition : Lexical Ordering

$$\forall ab\ (LessTM_{lex}\,(a)\,b :\iff \exists\ (a_i < b_i \wedge \forall\, a_j = b_j))$$

Definition : Monomials

$$\forall Km2\ \left(Mon[K]_{TimesTM}\ (m1, m2) := \left(K_{TimesTM}\ (m1_1, m2_1)\ ,_{[,PlusTM](m1_{2i}, m2_{2i})}\right)\right)$$

3 Set Theory

Definition : subset

$$\forall xy\ (x \subseteq y := \forall z\ (zx \to zy))$$

Proposition : transitivity of

$$\forall ac\ ((a \subseteq b \wedge b \subseteq c) \to a \subseteq c)$$