

## Theorema 2.0: A First Tour

NB reached List of cells reached CellGroupData reached List of cells reached  
NullCell reached

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

CellGroupData reached List of cells reached

### 1 Proving

We want to prove

$$(\forall_x (P[x] \vee Q[x])) \wedge (\forall_y (P[y] \Rightarrow Q[y])) \Leftrightarrow (\forall_x Q[x]).$$

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

#### 1.1 Proposition (First Test, 2014)

Theorema‘Language‘IffTM[Theorema‘Language‘AndTM[Theorema‘Language‘ForallTM[Theorema‘Language‘True, Theorema‘Language‘OrTM[Theorema‘Knowledge‘PTM[Theorema‘Language‘VAR[Theorema‘Knowledge‘QTM[Theorema‘Language‘VAR[Theorema‘Knowledge‘VARyTM]]]], Theorema‘Language‘ForallTM[Theorema‘Language‘RNG[Theorema‘Language‘SIMPRNG[Theorema‘Language‘True, Theorema‘Knowledge‘QTM[Theorema‘Language‘VAR[Theorema‘Knowledge‘VARxTM]]]]]

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## 2 Computing

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### 2.0.1 Global Declaration

$$\forall a, b$$

## 2.1 [?]

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Theorema'Language'	SIMPRNG	[Theorema'Language'VAR[Theorema'Knowledge'VAR <b>b</b> TM]]],
Theorema'Language'	Equal	T <i>M</i> [Theorema'Language'BracketingBarTM[Theorema'Language'VAR[ <i>Theorem</i>
Theorema'Language'	SubScript	T <i>M</i> [Theorema'Knowledge' <i>lex</i> TM]][Theorema'Language'VAR[Theorema'K
Theorema'Language'	Exists	T <i>M</i> [Theorema'Language'RNG[Theorema'Language'STEPRNG[Theorema'Lan
1,	Theorema'Language'BracketingBar	T <i>M</i> [Theorema'Language'VAR[Theorema'Knowledge'VAR <a>i</a> TM]],
1]],	True,	Theorema'Language'AndT <i>M</i> [Theorema'Language'LessTM[Theorema'Language'SubscriptT <i>M</i> [Th
Theorema'Language'	VAR	[Theorema'Knowledge'VAR <i>i</i> TM]], Theorema'Language'SubscriptTM[Theorema
Theorema'Language'	Forall	T <i>M</i> [Theorema'Language'RNG[Theorema'Language'STEPRNG[Theorema'Lan
1,	Theorema'Language'Subtract	T <i>M</i> [Theorema'Language'VAR[Theorema'Knowledge'VAR <i>i</i> TM],
1],	1]],	True,
Theorema'Language'	Equal	T <i>M</i> [Theorema'Language'SubscriptTM[Theorema'Language'VAR[T
Theorema'Language'	Subscript	T <i>M</i> [Theorema'Language'VAR[Theorema'Knowledge'VAR <b>b</b> TM],
Theorema'Language'	VAR	[Theorema'Knowledge'VARjTM]     ]

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Data reached List of cells reached Cell reached

### 2.1.1 Global Declaration

$$\bigvee_K$$

### 2.1.2 Global Declaration

$$\text{Mon}[\mathbf{K}] := \Delta_M$$

### 2.1.3 Global Declaration

$$\bigvee_{m1.m2}$$

Theorema'Language'EqualDefTM[Theorema'Language'DomainOperationTM[Theorema'Knowledge'MTM  
Theorema'Language'TupleTM[Theorema'Language'DomainOperationTM[Theorema'Language'KTM, The  
1], Theorema'Language'SubscriptTM[Theorema'Knowledge'm2TM, 1]],  
Theorema'Language'TupleOfTM[Theorema'Language'RNG[Theorema'Language'STEPRNG[Theorema'L  
1, Theorema'Language'BracketingBarTM[Theorema'Language'SubscriptTM[Theorema'Knowledge'm1TM  
Theorema'Language'SubscriptTM[Theorema'Language'SubscriptTM[Theorema'Knowledge'm2TM, 2], The

Theorema'Language'IffDefTM[Theorema'Language'DomainOperationTM[Theorema'Knowledge'MTM, Theorema'Language'AnnotatedTM[Theorema'Language'LessTM, Theorema'Language'SubScriptTM[Theorema'Knowledge'lexTM]]][Theorema'Language'SubscriptTM[Theorema'Knowledge'm2TM, 2]]

### 3 Set Theory

### 3.0.1 Global Declaration

### 3.1 [?]

$$\begin{aligned} & \text{Theorema'Language'ForallTM}[Theorema'Language'RNG[Theorema'Language'SIMPRNG[Theorema'Language'VAR[Theorema'Knowledge'VARyTM]]], \\ & \text{Theorema'Language'SIMPRNG}[Theorema'Language'VAR[Theorema'Knowledge'VARyTM]]], \\ & \text{True, Theorema'Language'EqualDefTM}[Theorema'Language'SubsetEqualTM[Theorema'Language'VAR[Theorema'Language'ForallTM}[Theorema'Language'RNG[Theorema'Language'SIMPRNG[Theorema'Language'VAR[Theorema'Knowledge'VARzTM]], \\ & \text{Theorema'Language'ImpliesTM}[Theorema'Language'ElementTM[Theorema'Language'VAR[Theorema'Language'ElementTM}[Theorema'Language'VAR[Theorema'Knowledge'VARzTM]], \\ & \text{Theorema'Language'ElementTM}[Theorema'Language'VAR[Theorema'Knowledge'VARzTM]], \\ & \text{Theorema'Language'VAR}[Theorema'Knowledge'VARyTM]]]]]] \end{aligned}$$

3

### 3.2 Proposition (transitivity of $\subseteq$ )

$\text{Theorema'Language'ForallTM}[\text{Theorema'Language'RING}[\text{Theorema'Language'SIMPRNG}[\text{Theorema'Language'VAR}[\text{Theorema'Knowledge'VARbTM}]],$   
 $\text{Theorema'Language'SIMPRNG}[\text{Theorema'Language'VAR}[\text{Theorema'Knowledge'VARcTM}]]],$   
 $\text{Theorema'Language'SIMPRNG}[\text{Theorema'Language'VAR}[\text{Theorema'Knowledge'VARcTM}]]],$   
 $\text{True}, \text{Theorema'Language'ImpliesTM}[\text{Theorema'Language'AndTM}[\text{Theorema'Language'SubsetEqualTM}[\text{Theorema'Language'VAR}[\text{Theorema'Knowledge'VARbTM}]],$   
 $\text{Theorema'Language'SubsetEqualTM}[\text{Theorema'Language'VAR}[\text{Theorema'Knowledge'VARaTM}]],$   
 $\text{Theorema'Language'VAR}[\text{Theorema'Knowledge'VARcTM}]]]]]$

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reached CellGroupData reached List of cells reached Cell reached Cell reached