

Theorema 2.0: A First Tour

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

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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)

$\forall_{(x)} \text{Theorema'Knowledge'PTM}[\text{Theorema'Language'VAR}[\text{Theorema'Knowledge'VARxTM}]] \vee$
 $\text{Theorema'Knowledge'QTM}[\text{Theorema'Language'VAR}[\text{Theorema'Knowledge'VARxTM}]] \wedge$
 $\forall_{(y)} \text{Theorema'Language'ImpliesTM}[\text{Theorema'Knowledge'PTM}[\text{Theorema'Language'VAR}[\text{Theorema'Knowledge'QTM}[\text{Theorema'Language'VAR}[\text{Theorema'Knowledge'VARyTM}]]]]$
 $\leftrightarrow \forall_{(x)} \text{Theorema'Knowledge'QTM}[\text{Theorema'Language'VAR}[\text{Theorema'Knowledge'VARxTM}]]$

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2 Computing

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2.0.1 Global Declaration

$$\forall_{a,b} a=b$$

2.1 [?]

$$\forall_{Theorema'Language' RNG [Theorema'Language'SIMPRNG [Theorema'Language'VAR [Theorema'Knowledge'VARbTM]]] \\ Theorema'Language'SIMPRNG [Theorema'Language'VAR [Theorema'Knowledge'VARbTM]] \\ Theorema'Language'IffDefTM [Theorema'Language'AnnotatedTM [Theorema'Language'LessTM, Theorem \\ Theorema'Language'VAR [Theorema'Knowledge'VARbTM]], Theorema'Language'ExistsTM [Theorema'L \\ Theorema'Language'SubscriptTM [Theorema'Language'VAR [Theorema'Knowledge'VARbTM], \\ Theorema'Language'VAR [Theorema'Knowledge'VARiTM]]], Theorema'Language'ForallTM [Theorema'L \\ Theorema'Language'VAR [Theorema'Knowledge'VARjTM]], Theorema'Language'SubscriptTM [Theorema'$$

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2.1.1 Global Declaration

$$\forall_K$$

2.1.2 Global Declaration

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

2.1.3 Global Declaration

$$\forall_{m1,m2}$$

2.2 [?]

$\forall_{Theorema'Language' RNG} [Theorema'Language'SIMPRNG [Theorema'Language'VAR [Theorema'Knowledge'VARm1TM],$
 $Theorema'Language'SIMPRNG [Theorema'Language'VAR [Theorema'Knowledge'VARm2TM]],$
 $Theorema'Language'SIMPRNG [Theorema'Language'VAR [Theorema'Knowledge'VARm2TM]],$
 $Theorema'Language'EqualDefTM [Theorema'Language'DomainOperationTM [Theorema'Knowledge'MonTM,$
 $Theorema'Language'TimesTM] [Theorema'Language'VAR [Theorema'Knowledge'VARm1TM],$
 $Theorema'Language'VAR [Theorema'Knowledge'VARm2TM]], Theorema'Language'TupleTM [Theorema'Language'$
 $Theorema'Language'TimesTM] [Theorema'Language'SubscriptTM [Theorema'Language'VAR [Theorema'Knowledge'VARm1TM],$
 $2], 1]], True, Theorema'Language'DomainOperationTM [Theorema'Language'IntegerIntervalTM [1,$
 $Infinity, True, False], Theorema'Language'PlusTM] [Theorema'Language'SubscriptTM [Theorema'Language'VAR [Theorema'Knowledge'VARm1TM],$
 $2], Theorema'Language'VAR [Theorema'Knowledge'VARiTM]], Theorema'Language'SubscriptTM [Theorema'Language'VAR [Theorema'Knowledge'VARiTM]]]]]$

2.3 [?]

$\forall_{Theorema'Language' RNG} [Theorema'Language'SIMPRNG [Theorema'Language'VAR [Theorema'Knowledge'VARm1TM],$
 $Theorema'Language'SIMPRNG [Theorema'Language'VAR [Theorema'Knowledge'VARm2TM]],$
 $Theorema'Language'SIMPRNG [Theorema'Language'VAR [Theorema'Knowledge'VARm2TM]],$
 $Theorema'Language'IffDefTM [Theorema'Language'DomainOperationTM [Theorema'Knowledge'MonTM,$
 $Theorema'Language'LessTM] [Theorema'Language'VAR [Theorema'Knowledge'VARm1TM],$
 $Theorema'Language'VAR [Theorema'Knowledge'VARm2TM]], Theorema'Language'AnnotatedTM [Theorema'Language'AnnotatedTM [Theorema'Knowledge'VARm1TM],$

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3 Set Theory

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3.0.1 Global Declaration

$\forall_{x,y}$

3.1 [?]

$\forall_{Theorema'Language'RNG}[Theorema'Language'SIMPRNG[Theorema'Language'VAR[Theorema'Knowledge'V$
 $Theorema'Language'SIMPRNG[Theorema'Language'VAR[Theorema'Knowledge'VARyTM]]]$
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 $Theorema'Language'ForallTM[Theorema'Language'RNG[Theorema'Language'SIMPRNG[Theorema'Lan$
 $True, Theorema'Language'ImpliesTM[Theorema'Language'ElementTM[Theorema'Language'VAR[Theore$
 $Theorema'Language'ElementTM[Theorema'Language'VAR[Theorema'Knowledge'VARzTM],$
 $Theorema'Language'VAR[Theorema'Knowledge'VARyTM]]]]]$

■ Cell reached

3.2 Proposition (transitivity of \subseteq)

$\forall_{Theorema'Language'RNG}[Theorema'Language'SIMPRNG[Theorema'Language'VAR[Theorema'Knowledge'V$
 $Theorema'Language'SIMPRNG[Theorema'Language'VAR[Theorema'Knowledge'VARbTM]],$
 $Theorema'Language'SIMPRNG[Theorema'Language'VAR[Theorema'Knowledge'VARcTM]]]$
 $Theorema'Language'ImpliesTM[Theorema'Language'AndTM[Theorema'Language'SubsetEqualTM[Theor$
 $Theorema'Language'VAR[Theorema'Knowledge'VARbTM]], Theorema'Language'SubsetEqualTM[Theor$
 $Theorema'Language'SubsetEqualTM[Theorema'Language'VAR[Theorema'Knowledge'VARaTM],$
 $Theorema'Language'VAR[Theorema'Knowledge'VARcTM]]]$

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