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

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

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

1.1 Proposition (First Test, 2014)

$\forall_{(x)} P(x) \vee Q(x) \wedge \forall_{(y)} Theorema`Language`Implies$TM[Theorema`Knowledge`P$TM[Theorema`Language`V$
Theorema`Knowledge`Q$TM[Theorema`Language`VAR$[Theorema`Knowledge`VARyTM]]]
$\leftrightarrow \forall_{(x)} Q(x)$

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2 Computing

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2.0.1 Global Declaration

$$\underset{\substack{a,b\\a=b}}{\forall}$$

2.1 [?]

$\forall_{Theorema`Language`RNG}$[Theorema`Language`SIMPRNG[$Theorema`Language`VAR$[Theorema`Knowledge`V
Theorema`Language`SIMPRNG[$Theorema`Language`VAR$[Theorema`Knowledge`VARbTM]]]
Theorema`Language`IffDefTM[$Theorema`Language`Annotated$TM[Theorema`Language`Less$TM, Theorem$
Theorema`Language`VAR[$Theorema`Knowledge`VAR$bTM]], $Theorema`Language`Exists$TM[Theorema`L
Theorema`Language`SubscriptTM[$Theorema`Language`VAR$[Theorema`Knowledge`VARbTM],
Theorema`Language`VAR[$Theorema`Knowledge`VAR$iTM]]], $Theorema`Language`Forall$TM[Theorema`L
Theorema`Language`VAR[$Theorema`Knowledge`VAR$jTM]], $Theorema`Language`Subscript$TM[Theorema

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2.1.1 Global Declaration

$$\underset{K}{\forall}$$

2.1.2 Global Declaration

Mon[K]:=$\underset{M}{\Delta}$

2.1.3 Global Declaration

$$\underset{m1,m2}{\forall}$$

2.2 [?]

$\forall_{Theorema`Language`RNG}$[Theorema`Language`SIMPRNG[*Theorema`Language`VAR*[Theorema`Knowledge`V
Theorema`Language`SIMPRNG[*Theorema`Language`VAR*[Theorema`Knowledge`VAR*m*1TM]],
Theorema`Language`SIMPRNG[*Theorema`Language`VAR*[Theorema`Knowledge`VAR*m*2TM]]]
Theorema`Language`EqualDef*TM*[*Theorema`Language`DomainOperation*TM[Theorema`Knowledge`Mon*T*
Theorema`Language`Times*TM*][*Theorema`Language`VAR*[Theorema`Knowledge`VAR*m*1TM],
Theorema`Language`VAR[*Theorema`Knowledge`VAR*m2*TM*]], *Theorema`Language`Tuple*TM[Theorema`
Theorema`Language`Times*TM*][*Theorema`Language`Subscript*TM[Theorema`Language`VAR[*Theorema`K*
2]], 1]], True, Theorema`Language`DomainOperation*TM*[*Theorema`Language`IntegerInterval*TM[1,
Infinity, True, False], Theorema`Language`Plus*TM*][*Theorema`Language`Subscript*TM[Theorema`Language
2], Theorema`Language`VAR[*Theorema`Knowledge`VAR*i*TM*]], *Theorema`Language`Subscript*TM[Theore
2], Theorema`Language`VAR[*Theorema`Knowledge`VAR*i*TM*]]]]]]

2.3 [?]

$\forall_{Theorema`Language`RNG}$[Theorema`Language`SIMPRNG[*Theorema`Language`VAR*[Theorema`Knowledge`V
Theorema`Language`SIMPRNG[*Theorema`Language`VAR*[Theorema`Knowledge`VAR*m*1TM]],
Theorema`Language`SIMPRNG[*Theorema`Language`VAR*[Theorema`Knowledge`VAR*m*2TM]]]
Theorema`Language`IffDef*TM*[*Theorema`Language`DomainOperation*TM[Theorema`Knowledge`Mon*TM*
Theorema`Language`Less*TM*][*Theorema`Language`VAR*[Theorema`Knowledge`VAR*m*1TM],
Theorema`Language`VAR[*Theorema`Knowledge`VAR*m2*TM*]], *Theorema`Language`Annotated*TM[Theore

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3 Set Theory

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3.0.1 Global Declaration

$\underset{x,y}{\forall}$

3.1 [?]

$\forall_{Theorema`Language`RNG}$[Theorema‘Language‘SIMPRNG[$Theorema`Language`VAR$[Theorema‘Knowledge‘V
Theorema‘Language‘SIMPRNG[$Theorema`Language`VAR$[Theorema‘Knowledge‘VARyTM]]]
Theorema‘Language‘EqualDefTM[$Theorema`Language`SubsetEqual$TM[Theorema‘Language‘VAR[$Theore$
Theorema‘Language‘ForallTM[$Theorema`Language`RNG$[Theorema‘Language‘SIMPRNG[$Theorema`Lan$
True, Theorema‘Language‘ImpliesTM[$Theorema`Language`Element$TM[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[$Theorema`Language`And$TM[Theorema‘Language‘SubsetEqualTM[$Theor$
Theorema‘Language‘VAR[$Theorema`Knowledge`VARbTM$]],$Theorema`Language`SubsetEqual$TM[Theor
Theorema‘Language‘SubsetEqualTM[$Theorema`Language`VAR$[Theorema‘Knowledge‘VARaTM],
Theorema‘Language‘VAR[$Theorema`Knowledge`VARcTM$]]]

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