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

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

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)

Iff + args are: And + args are: Forall + args are: generalized: Theorema‘Language‘RNG$arsListLengthis1generalized : Theorema‘Language‘SIMPRNG$ arsListLength is 1 generalized: Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowle$ $argsare : P + argsare : generalized : Theorema‘Language‘VAR$ arsListLength is 1 generalized: Theorema‘Knowledge‘VARxTM –interjection– Q + args are: generalized: Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowledge‘VARxTM-- -interjection - -Forall + argsare : generalized : Theorema‘Language‘RNG$ arsListLength is 1 generalized: Theorema‘Language‘SIMPRNG$arsListLengthis1generalized : Theorema‘Language‘VAR$ arsListLength is 1 generalized: Theorema‘Knowledge‘VARyTM (discarded) Implies + args are: P + args are: generalized: Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowledge‘VARyTM-- -interjection - -Q + argsare : generalized : Theorema‘Language‘VAR$ arsListLength is 1 generalized: Theorema‘Knowledge‘VARyTM –interjection– Forall + args are: generalized: Theorema‘Language‘RNG$arsListLengthis1generalized : Theorema‘Language‘SIMPRNG$ arsListLength is 1 generalized: Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowle$ $argsare : generalized : Theorema‘Language‘VAR$ arsListLength is 1 generalized: Theorema‘Knowledge‘VARxTM

Cell reached CellGroupData reached List of cells reached Cell reached Cell reached Cell reached Cell reached Cell reached Cell reached Cell reached Cell reached Cell reached Cell reached CellGroupData reached List of cells reached

2 Computing

CellGroupData reached List of cells reached Cell reached

2.0.1 Global Declaration

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

2.1 [?]

Forall + args are: generalized: Theorema‘Language‘RNG$arsListLengthis2generalized : Theorema‘Languag$ arsListLength is 1 generalized: Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowle$ $Theorema‘Language‘SIMPRNG$ arsListLength is 1 generalized: Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowledge‘VARbTM(discarded)Iff$ $argsare : generalized : Theorema‘Language‘Annotated$TM[Theorema‘Language‘Less$TM, Theorema‘Lang$ arsListLength is 1 generalized: Theorema‘Knowledge‘VARaTM, generalized: Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowledge‘VAR$bTM− $-interjection - -Exists + argsare : generalized : Theorema‘Language‘RNG$ arsListLength is 1 generalized: Theorema‘Language‘STEPRNG$arsListLengthis4generalized : Theorema‘Language‘VAR$ arsListLength is 1 generalized: Theorema‘Knowledge‘VARiTM, generalized: 1, BracketingBar + args are: generalized: Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowledge‘VAR$aTM, generalized : 1$(discarded)And + argsare : Less + argsare : Subscript + argsare : generalized : Theorema‘Language‘VAR$ arsListLength is 1 generalized: Theorema‘Knowledge‘VARaTM –interjection– generalized: Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowledge‘VAR$iTM− $-interjection - -Subscript + argsare : generalized : Theorema‘Language‘VAR$ arsListLength is 1 generalized: Theorema‘Knowledge‘VARbTM –interjection– generalized: Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowledge‘VAR$iTM− $-interjection - -Forall + argsare : generalized : Theorema‘Language‘RNG$ arsListLength is 1 generalized: Theorema‘Language‘STEPRNG$arsListLengthis4generalized : Theorema‘Language‘VAR$ arsListLength is 1 generalized: Theorema‘Knowledge‘VARjTM, generalized: 1, Subtract + args are: generalized: Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowledge‘VAR$iTM− $-interjection - -generalized : 1, generalized : 1$(discarded)Equal + argsare : Subscript + argsare : generalized : Theorema‘Language‘VAR$ arsListLength is 1 generalized: Theorema‘Knowledge‘VARaTM –interjection– generalized: Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowledge‘VAR$jTM− $-interjection - -Subscript + argsare : generalized : Theorema‘Language‘VAR$ arsListLength is 1 generalized: Theorema‘Knowledge‘VARbTM –interjection– generalized: Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowledge‘VARjTM

■Cell reached CellGroupData reached List of cells reached Cell reached Cell reached CellGroupData reached List of cells reached Cell reached Cell reached CellGroupData reached List of cells reached Cell reached CellGroupData reached List of cells reached Cell reached

2.1.1 Global Declaration

$\underset{K}{\forall}$

2.1.2 Global Declaration

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

2.1.3 Global Declaration

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

2.2 [?]

Forall + args are: generalized: Theorema‘Language‘RNG$arsListLengthis3generalized : Theorema‘Languag$
arsListLength is 1 generalized: Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowle$
$Theorema‘Language‘SIMPRNG$ arsListLength is 1 generalized:
Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowledge‘VAR$m1$TM, generalized :$
$Theorema‘Language‘SIMPRNG$ arsListLength is 1 generalized:
Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowledge‘VAR$m2$TM(discarded)Eq$
$argsare : generalized : Theorema‘Language‘DomainOperation$TM[Theorema‘Knowledge‘Mon$TM[Theore$
Theorema‘Language‘Times$TM]arsListLengthis2generalized : Theorema‘Language‘VAR$
arsListLength is 1 generalized: Theorema‘Knowledge‘VAR$m1$TM, generalized: Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowledge‘VAR$m2$TM-$
$-interjection - -Tuple + argsare : generalized :$
$Theorema‘Language‘DomainOperation$TM[Theorema‘Language‘VAR[$Theorema‘Knowledge‘VAR$KTM],
arsListLength is 2 Subscript + args are: generalized:
Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowledge‘VAR$m1$TM-$
$-interjection - -generalized : 1, Subscript + argsare :$
$generalized : Theorema‘Language‘VAR$ arsListLength is 1 generalized: Theorema‘Knowledge‘VARm2TM –interjection– generalized: 1 –interjection– TupleOf + args are: generalized:
Theorema‘Language‘RNG$arsListLengthis1generalized : Theorema‘Language‘STEPRNG$
arsListLength is 4 generalized: Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowle$
$1, BracketingBar + argsare : Subscript + argsare :$
$generalized : Theorema‘Language‘VAR$ arsListLength is 1 generalized: Theorema‘Knowledge‘VARm1TM –interjection– generalized: 2, generalized: 1 (discarded) generalized:
Theorema‘Language‘DomainOperation$TM[Theorema‘Language‘IntegerInterval$TM[1,
Infinity, True, False], Theorema‘Language‘Plus$TM]arsListLengthis2Subscript + argsare : Subscript + arg$
arsListLength is 1 generalized: Theorema‘Knowledge‘VARm1TM –interjection– generalized: 2 –interjection– generalized:
Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowledge‘VARi$TM, Subscript+
$argsare : Subscript + argsare : generalized : Theorema‘Language‘VAR$
arsListLength is 1 generalized: Theorema‘Knowledge‘VARm2TM –interjection– generalized: 2 –interjection– generalized:
Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowledge‘VARiTM$

2.3 [?]

Forall + args are: generalized: Theorema‘Language‘RNG$arsListLengthis3generalized : Theorema‘Languag$
arsListLength is 1 generalized: Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowle$
$Theorema‘Language‘SIMPRNG$ arsListLength is 1 generalized:
Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowledge‘VAR$m1$TM, generalized :$
$Theorema‘Language‘SIMPRNG$ arsListLength is 1 generalized:
Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowledge‘VAR$m2$TM(discarded)If$
$argsare : generalized : Theorema‘Language‘DomainOperation$TM[Theorema‘Knowledge‘Mon$TM[Theore$
Theorema‘Language‘Less$TM]arsListLengthis2generalized : Theorema‘Language‘VAR$
arsListLength is 1 generalized: Theorema‘Knowledge‘VAR$m1$TM, generalized: Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowledge‘VAR$m2$TM-$
$-interjection--generalized : Theorema‘Language‘Annotated$TM[Theorema‘Language‘Less$TM, Theorem$
arsListLength is 1 generalized: Theorema‘Knowledge‘VAR$m1$TM
–interjection– generalized: 2, Subscript + args are: generalized:
Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowledge‘VAR$m2$TM-$
$-interjection - -generalized : 2$

■Cell reached CellGroupData reached List of cells reached Cell reached Cell reached CellGroupData reached List of cells reached Cell reached Cell reached CellGroupData reached List of cells reached Cell reached Cell reached CellGroupData reached List of cells reached Cell reached Cell reached CellGroupData reached List of cells reached

3 Set Theory

CellGroupData reached List of cells reached Cell reached

3.0.1 Global Declaration

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

3.1 [?]

Forall + args are: generalized: Theorema‘Language‘RNG$arsListLengthis2generalized : Theorema‘Languag$ arsListLength is 1 generalized: Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowle$ $Theorema‘Language‘SIMPRNG$ arsListLength is 1 generalized: Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowledge‘VARyTM(discarded)Equ$ $argsare : SubsetEqual + argsare : generalized : Theorema‘Language‘VAR$ arsListLength is 1 generalized: Theorema‘Knowledge‘VARxTM –interjection– generalized: Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowledge‘VARyTM−$ $-interjection - -Forall + argsare : generalized : Theorema‘Language‘RNG$ arsListLength is 1 generalized: Theorema‘Language‘SIMPRNG$arsListLengthis1generalized : Theorema‘Language‘VAR$ arsListLength is 1 generalized: Theorema‘Knowledge‘VARzTM (discarded) Implies + args are: Element + args are: generalized: Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowledge‘VARzTM−$ $-interjection - -generalized : Theorema‘Language‘VAR$ arsListLength is 1 generalized: Theorema‘Knowledge‘VARxTM –interjection– Element + args are: generalized: Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowledge‘VARzTM−$ $-interjection - -generalized : Theorema‘Language‘VAR$ arsListLength is 1 generalized: Theorema‘Knowledge‘VARyTM

■Cell reached

3.2 Proposition (transitivity of $\subseteq$)

Forall + args are: generalized: Theorema‘Language‘RNG$arsListLengthis3generalized : Theorema‘Languag$ arsListLength is 1 generalized: Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowle$ $Theorema‘Language‘SIMPRNG$ arsListLength is 1 generalized: Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowledge‘VARbTM, generalized :$ $Theorema‘Language‘SIMPRNG$ arsListLength is 1 generalized: Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowledge‘VARcTM(discarded)Impl$ $argsare : And + argsare : SubsetEqual + argsare : generalized : Theorema‘Language‘VAR$ arsListLength is 1 generalized: Theorema‘Knowledge‘VARaTM –interjection– generalized: Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowledge‘VARbTM-$ $-interjection - -SubsetEqual + argsare : generalized : Theorema‘Language‘VAR$ arsListLength is 1 generalized: Theorema‘Knowledge‘VARbTM –interjection– generalized: Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowledge‘VARcTM-$ $-interjection - -SubsetEqual + argsare : generalized : Theorema‘Language‘VAR$ arsListLength is 1 generalized: Theorema‘Knowledge‘VARaTM –interjection– generalized: Theorema‘Language‘VAR$arsListLengthis1generalized : Theorema‘Knowledge‘VARcTM$

Cell reached CellGroupData reached List of cells reached Cell reached Cell reached CellGroupData reached List of cells reached Cell reached Cell reached