Logiweb codex of base

Up Help

base, $[* \bowtie *]$, “ ∗ ”, , ∗ then ∗, ∗[∗]∗, **Preassociative** ∗; ∗, **Postassociative** ∗; ∗, [∗], ∗, priority ∗ end, ∗, ∗, $(*)^{\mathbf{t}}$, string(∗) + ∗, string(∗) ++ ∗, bracket ∗ end bracket, big bracket ∗ end bracket, math ∗ end math, **flush left** [∗], x, y, z, $[* \xrightarrow{*} *]$, pyk, tex, name, prio, T, if(∗, ∗, ∗), $[* \overset{*}{\Rightarrow} *]$, val, claim, ∗, !∗, ”∗, #∗, $∗, %∗, &∗, ’∗, (∗,)∗, ∗∗, +∗, ,∗, -∗, .∗, /∗, 0∗, 1∗, 2∗, 3∗, 4∗, 5∗, 6∗, 7∗, 8∗, 9∗, :∗, ;∗, <∗, =∗, >∗, ?∗, @∗, A∗, B∗, C∗, D∗, E∗, F∗, G∗, H∗, I∗, J∗, K∗, L∗, M∗, N∗, O∗, P∗, Q∗, R∗, S∗, T∗, U∗, V∗, W∗, X∗, Y∗, Z∗, [∗, \∗,]∗, ˆ∗, _∗, ‘∗, a∗, b∗, c∗, d∗, e∗, f∗, g∗, h∗, i∗, j∗, k∗, l∗, m∗, n∗, o∗, p∗, q∗, r∗, s∗, t∗, u∗, v∗, w∗, x∗, y∗, z∗, {∗, |∗, }∗, ˜∗, ⊥, f(∗), $(*)^{\mathrm{I}}$, F, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, $(*)^{\mathrm{M}}$, If(∗, ∗, ∗), array{∗} ∗ end array, l, c, r, empty, $\langle * \mid * := * \rangle$, $\mathcal{M}(*)$, $\tilde{\mathcal{U}}(*)$, $\mathcal{U}(*)$, $\mathcal{U}^{\mathrm{M}}(*)$, **apply**(∗, ∗), $\mathbf{apply}_1(*,*)$, identifier(∗), $\mathrm{identifier}_1(*,*)$, array-plus(∗, ∗), array-remove(∗, ∗, ∗), array-put(∗, ∗, ∗, ∗), array-add(∗, ∗, ∗, ∗, ∗), bit(∗, ∗), $\mathrm{bit}_1(*,*)$, rack, "vector", "bibliography", "dictionary", "body", "codex", "expansion", "code", "cache", "diagnose", "pyk", "tex", "texname", "value", "message", "macro", "definition", "unpack", "claim", "priority", "lambda", "apply", "true", "if", "quote", "proclaim", "define", "introduce", "hide", "pre", "post", $\mathcal{E}(*,*,*)$, $\mathcal{E}_2(*,*,*,*,*)$, $\mathcal{E}_3(*,*,*,*)$, $\mathcal{E}_4(*,*,*,*)$, **lookup**(∗, ∗, ∗), **abstract**(∗, ∗, ∗, ∗), $\lceil * \rceil$, $\mathcal{M}(*,*,*)$, $\mathcal{M}_2(*,*,*,*)$, $\mathcal{M}^*(*,*,*)$, macro, s_0, **zip**(∗, ∗), $\mathbf{assoc}_1(*,*,*)$, $(*)^{\mathbf{P}}$, self, $[* \doteq *]$, $[* \doteq *]$, $[* \doteq *]$, $[* \overset{\mathrm{pyk}}{=} *]$, $[* \overset{\mathrm{tex}}{=} *]$, $[* \overset{\mathrm{name}}{=} *]$, **Priority table**[∗], $\tilde{\mathcal{M}}_1$, $\tilde{\mathcal{M}}_2(*)$, $\tilde{\mathcal{M}}_3(*)$, $\tilde{\mathcal{M}}_4(*,*,*,*)$, $\tilde{\mathcal{M}}(*,*,*)$, $\tilde{\mathcal{Q}}(*,*,*)$, $\tilde{\mathcal{Q}}_2(*,*,*)$, $\tilde{\mathcal{Q}}_3(*,*,*,*)$, $\tilde{\mathcal{Q}}^*(*,*,*)$, (∗), **aspect**(∗, ∗), **aspect**(∗, ∗, ∗), ⟨∗⟩, $\mathbf{tuple}_1(*)$, $\mathbf{tuple}_2(*)$, $\mathrm{let}_2(*,*)$, $\mathrm{let}_1(*,*)$, $[* \overset{\mathrm{claim}}{=} *]$, checker, **check**(∗, ∗), $\mathbf{check}_2(*,*,*)$, $\mathbf{check}_3(*,*,*)$, $\mathbf{check}^*(*,*)$, $\mathbf{check}^*_2(*,*,*)$, $[*]^{\cdot}$, $[*]^{-}$, $[*]^{\circ}$, msg, $[* \overset{\mathrm{msg}}{=} *]$, <stmt>, stmt, $[* \overset{\mathrm{stmt}}{=} *]$, HeadNil′, HeadPair′, Transitivity′, ⫫, Contra′, T'_{E}, L_1, $\underline{*}$, $\mathcal{A}$, $\mathcal{B}$, $\mathcal{C}$, $\mathcal{D}$, $\mathcal{E}$, $\mathcal{F}$, $\mathcal{G}$, $\mathcal{H}$, $\mathcal{I}$, $\mathcal{J}$, $\mathcal{K}$, $\mathcal{L}$, $\mathcal{M}$, $\mathcal{N}$, $\mathcal{O}$, $\mathcal{P}$, $\mathcal{Q}$, $\mathcal{R}$, $\mathcal{S}$, $\mathcal{T}$, $\mathcal{U}$, $\mathcal{V}$, $\mathcal{W}$, $\mathcal{X}$, $\mathcal{Y}$, $\mathcal{Z}$, $\langle * \mid * := * \rangle$, $\langle {}^{*} * \mid * := * \rangle$, $\emptyset$, Remainder, $(*)^{\mathbf{v}}$, intro(∗, ∗, ∗, ∗), intro(∗, ∗, ∗), error(∗, ∗), $\mathrm{error}_2(*,*)$, proof(∗, ∗, ∗), $\mathrm{proof}_2(*,*)$, $\mathcal{S}(*,*)$, $\mathcal{S}^{\mathrm{I}}(*,*)$, $\mathcal{S}^{\triangleright}(*,*)$, $\mathcal{S}^{\triangleright}_1(*,*,*)$, $\mathcal{S}^{\mathrm{E}}(*,*)$, $\mathcal{S}^{\mathrm{E}}_1(*,*,*)$, $\mathcal{S}^{+}(*,*)$, $\mathcal{S}^{+}_1(*,*,*)$, $\mathcal{S}^{-}(*,*)$, $\mathcal{S}^{-}_1(*,*,*)$, $\mathcal{S}^{*}(*,*)$, $\mathcal{S}^{*}_1(*,*,*)$, $\mathcal{S}^{*}_2(*,*,*,*)$, $\mathcal{S}^{@}(*,*)$, $\mathcal{S}^{@}_1(*,*,*)$, $\mathcal{S}^{\vdash}(*,*)$, $\mathcal{S}^{\vdash}_1(*,*,*,*)$, $\mathcal{S}^{\Vdash}(*,*)$, $\mathcal{S}^{\Vdash}_1(*,*,*,*)$, $\mathcal{S}^{\mathrm{i.e.}}(*,*)$, $\mathcal{S}^{\mathrm{i.e.}}_1(*,*,*,*)$, $\mathcal{S}^{\mathrm{i.e.}}_2(*,*,*,*,*,*)$, $\mathcal{S}^{\forall}(*,*)$, $\mathcal{S}^{\forall}_1(*,*,*,*)$, $\mathcal{S}^{\cdot}(*,*)$, $\mathcal{S}^{\cdot}_1(*,*,*)$, $\mathcal{S}^{\cdot}_2(*,*,*,*)$, $\mathcal{T}(*)$, claims(∗, ∗, ∗), $\mathrm{claims}_2(*,*,*)$, <proof>, proof, [**Lemma** ∗: ∗], [**Proof of** ∗: ∗], [∗ **lemma** ∗: ∗], [∗ **antilemma** ∗: ∗], [∗ **rule** ∗: ∗], [∗ **antirule** ∗: ∗], verifier, $\mathcal{V}_1(*)$, $\mathcal{V}_2(*,*)$, $\mathcal{V}_3(*,*,*,*)$, $\mathcal{V}_4(*,*)$, $\mathcal{V}_5(*,*,*,*)$, $\mathcal{V}_6(*,*,*,*)$, $\mathcal{V}_7(*,*,*,*)$, Cut(∗, ∗), $\mathrm{Head}_{\oplus}(*)$, $\mathrm{Tail}_{\oplus}(*)$, $\mathrm{rule}_1(*,*)$, rule(∗, ∗), Rule tactic, Plus(∗, ∗), [**Theory** ∗],

$\mathrm{theory}_2(*,*)$, $\mathrm{theory}_3(*,*)$, $\mathrm{theory}_4(*,*,*)$, HeadNil″, HeadPair″, Transitivity″, Contra″, HeadNil, HeadPair, Transitivity, Contra, $\mathrm{T_E}$, ragged right, ragged right expansion , $\mathrm{parm}(*,*,*)$, $\mathrm{parm}^*(*,*,*)$, $\mathrm{inst}(*,*)$, $\mathrm{inst}^*(*,*)$, $\mathrm{occur}(*,*,*)$, $\mathrm{occur}^*(*,*,*)$, $\mathrm{unify}(*=*,*)$, $\mathrm{unify}^*(*=*,*)$, $\mathrm{unify}_2(*=*,*)$, $\mathrm{L_a}$, $\mathrm{L_b}$, $\mathrm{L_c}$, $\mathrm{L_d}$, $\mathrm{L_e}$, $\mathrm{L_f}$, $\mathrm{L_g}$, $\mathrm{L_h}$, $\mathrm{L_i}$, $\mathrm{L_j}$, $\mathrm{L_k}$, $\mathrm{L_l}$, $\mathrm{L_m}$, $\mathrm{L_n}$, $\mathrm{L_o}$, $\mathrm{L_p}$, $\mathrm{L_q}$, $\mathrm{L_r}$, $\mathrm{L_s}$, $\mathrm{L_t}$, $\mathrm{L_u}$, $\mathrm{L_v}$, $\mathrm{L_w}$, $\mathrm{L_x}$, $\mathrm{L_y}$, $\mathrm{L_z}$, $\mathrm{L_A}$, $\mathrm{L_B}$, $\mathrm{L_C}$, $\mathrm{L_D}$, $\mathrm{L_E}$, $\mathrm{L_F}$, $\mathrm{L_G}$, $\mathrm{L_H}$, $\mathrm{L_I}$, $\mathrm{L_J}$, $\mathrm{L_K}$, $\mathrm{L_L}$, $\mathrm{L_M}$, $\mathrm{L_N}$, $\mathrm{L_O}$, $\mathrm{L_P}$, $\mathrm{L_Q}$, $\mathrm{L_R}$, $\mathrm{L_S}$, $\mathrm{L_T}$, $\mathrm{L_U}$, $\mathrm{L_V}$, $\mathrm{L_W}$, $\mathrm{L_X}$, $\mathrm{L_Y}$, $\mathrm{L_Z}$, $\mathrm{L_?}$, Reflexivity, $\mathrm{Reflexivity}_1$, Commutativity, $\mathrm{Commutativity}_1$, <tactic>, tactic, $[* \overset{\text{tactic}}{=} *]$, $\mathcal{P}(*,*,*)$, $\mathcal{P}^*(*,*,*)$, $\mathrm{p_0}$, $\mathrm{conclude}_1(*,*)$, $\mathrm{conclude}_2(*,*,*)$, $\mathrm{conclude}_3(*,*,*,*)$, $\mathrm{conclude}_4(*,*)$, $*\text{-}\{*\}$, $*'$, $*[\,*\,]$, $*[*\to*]$, $*[*\Rightarrow*]$, newline $*$, macro newline $*$, $*0$, $*1$, 0b, $*\text{-color}(*)$, $*\text{-color}^*(*)$, $*\,'\,*$, $*\,`\,*$, $*^{\mathrm{H}}$, $*^{\mathrm{T}}$, $*^{\mathrm{U}}$, $*^{\mathrm{h}}$, $*^{\mathrm{t}}$, $*^{\mathrm{s}}$, $*^{\mathrm{c}}$, $*^{\mathrm{d}}$, $*^{\mathrm{a}}$, $*^{\mathrm{C}}$, $*^{\mathrm{M}}$, $*^{\mathrm{B}}$, $*^{\mathrm{r}}$, $*^{\mathrm{i}}$, $*^{\mathrm{d}}$, $*^{\mathrm{R}}$, $*^0$, $*^1$, $*^2$, $*^3$, $*^4$, $*^5$, $*^6$, $*^7$, $*^8$, $*^9$, $*^{\mathrm{E}}$, $*^{\mathcal{V}}$, $*^{\mathcal{C}}$, $*^{\mathcal{C}^*}$, $*\cdot*$, $*\cdot_0*$, $*+*$, $*+_0*$, $*+_1*$, $*-*$, $*-_0*$, $*-_1*$, $*\cup\{*\}$, $*\cup*$, $*\backslash\{*\}$, $*\therefore*$, $*\underline{\therefore}*$, $*::*$, $*\underline{::}*$, $*\underline{+2*}$, $*::*$, $*+2**$, $*,*,*$, $*\overset{\mathrm{B}}{\approx}*$, $*\overset{\mathrm{D}}{\approx}*$, $*\overset{\mathrm{C}}{\approx}*$, $*\overset{\mathrm{P}}{\approx}*$, $*\approx*$, $*=*$, $*\overset{+}{\to}*$, $*\overset{\mathrm{t}}{=}*$, $*\overset{\mathrm{t}^*}{=}*$, $*\overset{\mathrm{r}}{=}*$, $*\in_{\mathrm{t}}*$, $*\subseteq_{\mathrm{T}}*$, $*\overset{\mathrm{T}}{=}*$, $*\overset{\mathrm{s}}{=}*$, $*$ free in $*$, $*$ free in* $*$, $*$ free for $*$ in $*$, $*$ free for* $*$ in $*$, $*\in_{\mathrm{c}}*$, $*<*$, $*<'*$, $*\leq'*$, $\neg*$, $*\wedge*$, $*\ddot{\wedge}*$, $*\tilde{\wedge}*$, $*\wedge_{\mathrm{c}}*$, $*\vee*$, $*\parallel*$, $*\ddot{\vee}*$, $*\ddot{\Rightarrow}*$, $*:*$, $*!*$, $*\begin{cases}*\\*\end{cases}$, $\lambda*.*$, $\Lambda*$, **if** $*$ **then** $*$ **else** $*$, **let** $*=*$ **in** $*$, **let** $*\doteq*$ in $*$, $*^{\mathrm{I}}$, $*^{\triangleright}$, $*^{\mathrm{V}}$, $*^{+}$, $*^{-}$, $*^{*}$, $*@*$, $*\triangleright*$, $*\blacktriangleright*$, $*\gg*$, $*\vdash*$, $*\Vdash*$, $*$ i.e. $*$, $\forall*:*$, $*\oplus*$, $*;*$, $*$ proves $*$, $*$ **proof of** $*:*$, Line $*:*\gg*;*$, Last line $*\gg*\square$, Line $*:$ Premise $\gg*;*$, Line $*:$ Side-condition $\gg*;*$, Arbitrary $\gg*;*$, Local $\gg*=*;*$, $*\&*$, $*\backslash\backslash*$,

base

[base $\overset{\text{prio}}{\to}$

Preassociative

[base], [bracket $*$ end bracket], [big bracket $*$ end bracket], [math $*$ end math], [**flush left** $[*]$], [x], [y], [z], $[[*\bowtie*]]$, $[[*\overset{*}{\to}*]]$, [pyk], [tex], [name], [prio], [$*$], [T], [if$(*,*,*)$], $[[*\overset{*}{\Rightarrow}*]]$, [val], [claim], [$\perp$], [f$(*)$], $[(*)^{\mathrm{I}}]$, [F], [0], [1], [2], [3], [4], [5], [6], [7], [8], [9], [0], [1], [2], [3], [4], [5], [6], [7], [8], [9], [a], [b], [c], [d], [e], [f], [g], [h], [i], [j], [k], [l], [m], [n], [o], [p], [q], [r], [s], [t], [u], [v], [w], $[(*)^{\mathrm{M}}]$, [If$(*,*,*)$], [array$\{*\}$ $*$ end array], [l], [c], [r], [empty], $[\langle * \mid *:=*\rangle]$, $[\mathcal{M}(*)]$, $[\tilde{\mathcal{U}}(*)]$, $[\mathcal{U}(*)]$, $[\mathcal{U}^{\mathrm{M}}(*)]$, [**apply**$(*,*)$], [**apply**$_1(*,*)$], [identifier$(*)$], [identifier$_1(*,*)$], [array-plus$(*,*)$], [array-remove$(*,*,*)$], [array-put$(*,*,*,*)$], [array-add$(*,*,*,*,*)$], [bit$(*,*)$], [bit$_1(*,*)$], [rack], ["vector"], ["bibliography"], ["dictionary"], ["body"], ["codex"], ["expansion"], ["code"], ["cache"], ["diagnose"], ["pyk"], ["tex"], ["texname"], ["value"], ["message"], ["macro"], ["definition"], ["unpack"], ["claim"], ["priority"], ["lambda"], ["apply"], ["true"], ["if"], ["quote"], ["proclaim"], ["define"], ["introduce"], ["hide"], ["pre"], ["post"], [$\mathcal{E}(*,*,*)$], [$\mathcal{E}_2(*,*,*,*,*)$], [$\mathcal{E}_3(*,*,*,*)$], [$\mathcal{E}_4(*,*,*,*)$], [**lookup**$(*,*,*)$], [**abstract**$(*,*,*,*)$], [$\lceil * \rceil$], [$\mathcal{M}(*,*,*)$], [$\mathcal{M}_2(*,*,*,*)$], [$\mathcal{M}^*(*,*,*)$], [macro],

$[s_0]$, $[\mathbf{zip}(*,*)]$, $[\mathbf{assoc}_1(*,*,*)]$, $[(*)^{\mathbf{p}}]$, [self], $[[* \doteq *]]$, $[[* \doteq *]]$, $[[* \doteq *]]$, $[[* \overset{\text{pyk}}{=} *]]$, $[[* \overset{\text{tex}}{=} *]]$, $[[* \overset{\text{name}}{=} *]]$, [**Priority table**$[*]$], $[\tilde{\mathcal{M}}_1]$, $[\tilde{\mathcal{M}}_2(*)]$, $[\tilde{\mathcal{M}}_3(*)]$, $[\tilde{\mathcal{M}}_4(*,*,*,*)]$, $[\tilde{\mathcal{M}}(*,*,*)]$, $[\tilde{\mathcal{Q}}(*,*,*)]$, $[\tilde{\mathcal{Q}}_2(*,*,*)]$, $[\tilde{\mathcal{Q}}_3(*,*,*,*)]$, $[\tilde{\mathcal{Q}}^*(*,*,*)]$, $[(*)]$, $[\mathbf{aspect}(*,*)]$, $[\mathbf{aspect}(*,*,*)]$, $[\langle * \rangle]$, $[\mathbf{tuple}_1(*)]$, $[\mathbf{tuple}_2(*)]$, $[\mathrm{let}_2(*,*)]$, $[\mathrm{let}_1(*,*)]$, $[[* \overset{\text{claim}}{=} *]]$, [checker], $[\mathbf{check}(*,*)]$, $[\mathbf{check}_2(*,*,*)]$, $[\mathbf{check}_3(*,*,*)]$, $[\mathbf{check}^*(*,*)]$, $[\mathbf{check}_2^*(*,*,*)]$, $[[*]^{\cdot}]$, $[[*]^{-}]$, $[[*]^{\circ}]$, [msg], $[[* \overset{\text{msg}}{=} *]]$, [<stmt>], [stmt], $[[* \overset{\text{stmt}}{=} *]]$, [HeadNil$'$], [HeadPair$'$], [Transitivity$'$], $[\perp\!\!\!\perp]$, [Contra$'$], $[\mathrm{T}'_{\mathrm{E}}]$, $[\mathrm{L}_1]$, $[\underline{*}]$, $[\mathcal{A}]$, $[\mathcal{B}]$, $[\mathcal{C}]$, $[\mathcal{D}]$, $[\mathcal{E}]$, $[\mathcal{F}]$, $[\mathcal{G}]$, $[\mathcal{H}]$, $[\mathcal{I}]$, $[\mathcal{J}]$, $[\mathcal{K}]$, $[\mathcal{L}]$, $[\mathcal{M}]$, $[\mathcal{N}]$, $[\mathcal{O}]$, $[\mathcal{P}]$, $[\mathcal{Q}]$, $[\mathcal{R}]$, $[\mathcal{S}]$, $[\mathcal{T}]$, $[\mathcal{U}]$, $[\mathcal{V}]$, $[\mathcal{W}]$, $[\mathcal{X}]$, $[\mathcal{Y}]$, $[\mathcal{Z}]$, $[\langle * \mid * := * \rangle]$, $[\langle^* * \mid * := * \rangle]$, $[\emptyset]$, [Remainder], $[(*)^{\mathbf{v}}]$, $[\mathrm{intro}(*,*,*,*)]$, $[\mathrm{intro}(*,*,*)]$, $[\mathrm{error}(*,*)]$, $[\mathrm{error}_2(*,*)]$, $[\mathrm{proof}(*,*,*)]$, $[\mathrm{proof}_2(*,*)]$, $[\mathcal{S}(*,*)]$, $[\mathcal{S}^{\mathrm{I}}(*,*)]$, $[\mathcal{S}^{\triangleright}(*,*)]$, $[\mathcal{S}_1^{\triangleright}(*,*,*)]$, $[\mathcal{S}^{\mathrm{E}}(*,*)]$, $[\mathcal{S}_1^{\mathrm{E}}(*,*,*)]$, $[\mathcal{S}^{+}(*,*)]$, $[\mathcal{S}_1^{+}(*,*,*)]$, $[\mathcal{S}^{-}(*,*)]$, $[\mathcal{S}_1^{-}(*,*,*)]$, $[\mathcal{S}^{*}(*,*)]$, $[\mathcal{S}_1^{*}(*,*,*)]$, $[\mathcal{S}_2^{*}(*,*,*,*)]$, $[\mathcal{S}^{@}(*,*)]$, $[\mathcal{S}_1^{@}(*,*,*)]$, $[\mathcal{S}^{\vdash}(*,*)]$, $[\mathcal{S}_1^{\vdash}(*,*,*,*)]$, $[\mathcal{S}^{\Vdash}(*,*)]$, $[\mathcal{S}_1^{\Vdash}(*,*,*,*)]$, $[\mathcal{S}^{\mathrm{i.e.}}(*,*)]$, $[\mathcal{S}_1^{\mathrm{i.e.}}(*,*,*,*)]$, $[\mathcal{S}_2^{\mathrm{i.e.}}(*,*,*,*,*)]$, $[\mathcal{S}^{\forall}(*,*)]$, $[\mathcal{S}_1^{\forall}(*,*,*,*)]$, $[\mathcal{S}^{\cdot}(*,*)]$, $[\mathcal{S}_1^{\cdot}(*,*,*)]$, $[\mathcal{S}_2^{\cdot}(*,*,*,*)]$, $[\mathcal{T}(*)]$, $[\mathrm{claims}(*,*,*)]$, $[\mathrm{claims}_2(*,*,*)]$, [<proof>], [proof], $[[\mathbf{Lemma}\ *\colon *]]$, $[[\mathbf{Proof\ of}\ *\colon *]]$, $[[* \ \mathbf{lemma}\ *\colon *]]$, $[[* \ \mathbf{antilemma}\ *\colon *]]$, $[[* \ \mathbf{rule}\ *\colon *]]$, $[[* \ \mathbf{antirule}\ *\colon *]]$, [verifier], $[\mathcal{V}_1(*)]$, $[\mathcal{V}_2(*,*)]$, $[\mathcal{V}_3(*,*,*,*)]$, $[\mathcal{V}_4(*,*)]$, $[\mathcal{V}_5(*,*,*,*)]$, $[\mathcal{V}_6(*,*,*,*)]$, $[\mathcal{V}_7(*,*,*,*)]$, $[\mathrm{Cut}(*,*)]$, $[\mathrm{Head}_{\oplus}(*)]$, $[\mathrm{Tail}_{\oplus}(*)]$, $[\mathrm{rule}_1(*,*)]$, $[\mathrm{rule}(*,*)]$, [Rule tactic], $[\mathrm{Plus}(*,*)]$, $[[\mathbf{Theory}\ *]]$, $[\mathrm{theory}_2(*,*)]$, $[\mathrm{theory}_3(*,*)]$, $[\mathrm{theory}_4(*,*,*)]$, [HeadNil$''$], [HeadPair$''$], [Transitivity$''$], [Contra$''$], [HeadNil], [HeadPair], [Transitivity], [Contra], $[\mathrm{T}_{\mathrm{E}}]$, [ragged right], [ragged right expansion], $[\mathrm{parm}(*,*,*)]$, $[\mathrm{parm}^*(*,*,*)]$, $[\mathrm{inst}(*,*)]$, $[\mathrm{inst}^*(*,*)]$, $[\mathrm{occur}(*,*,*)]$, $[\mathrm{occur}^*(*,*,*)]$, $[\mathrm{unify}(* = *,*)]$, $[\mathrm{unify}^*(* = *,*)]$, $[\mathrm{unify}_2(* = *,*)]$, $[\mathrm{L_a}]$, $[\mathrm{L_b}]$, $[\mathrm{L_c}]$, $[\mathrm{L_d}]$, $[\mathrm{L_e}]$, $[\mathrm{L_f}]$, $[\mathrm{L_g}]$, $[\mathrm{L_h}]$, $[\mathrm{L_i}]$, $[\mathrm{L_j}]$, $[\mathrm{L_k}]$, $[\mathrm{L_l}]$, $[\mathrm{L_m}]$, $[\mathrm{L_n}]$, $[\mathrm{L_o}]$, $[\mathrm{L_p}]$, $[\mathrm{L_q}]$, $[\mathrm{L_r}]$, $[\mathrm{L_s}]$, $[\mathrm{L_t}]$, $[\mathrm{L_u}]$, $[\mathrm{L_v}]$, $[\mathrm{L_w}]$, $[\mathrm{L_x}]$, $[\mathrm{L_y}]$, $[\mathrm{L_z}]$, $[\mathrm{L_A}]$, $[\mathrm{L_B}]$, $[\mathrm{L_C}]$, $[\mathrm{L_D}]$, $[\mathrm{L_E}]$, $[\mathrm{L_F}]$, $[\mathrm{L_G}]$, $[\mathrm{L_H}]$, $[\mathrm{L_I}]$, $[\mathrm{L_J}]$, $[\mathrm{L_K}]$, $[\mathrm{L_L}]$, $[\mathrm{L_M}]$, $[\mathrm{L_N}]$, $[\mathrm{L_O}]$, $[\mathrm{L_P}]$, $[\mathrm{L_Q}]$, $[\mathrm{L_R}]$, $[\mathrm{L_S}]$, $[\mathrm{L_T}]$, $[\mathrm{L_U}]$, $[\mathrm{L_V}]$, $[\mathrm{L_W}]$, $[\mathrm{L_X}]$, $[\mathrm{L_Y}]$, $[\mathrm{L_Z}]$, $[\mathrm{L_?}]$, [Reflexivity], $[\mathrm{Reflexivity}_1]$, [Commutativity], $[\mathrm{Commutativity}_1]$, [<tactic>], [tactic], $[[* \overset{\text{tactic}}{=} *]]$, $[\mathcal{P}(*,*,*)]$, $[\mathcal{P}^*(*,*,*)]$, $[\mathrm{p}_0]$, $[\mathrm{conclude}_1(*,*)]$, $[\mathrm{conclude}_2(*,*,*)]$, $[\mathrm{conclude}_3(*,*,*,*)]$, $[\mathrm{conclude}_4(*,*)]$;

Preassociative

$[*\_\{*\}]$, $[*']$, $[*[\ *\ ]]$, $[*[*\rightarrow *]]$, $[*[*\Rightarrow *]]$;

Preassociative

[“ * ”], [], $[(*)^{\mathbf{t}}]$, $[\mathrm{string}(*) + *]$, $[\mathrm{string}(*) +\!\!+ *]$, [*], [*], [!*], [”*], [#*], [$*], [%*], [&*], [’*], [(*),)*], [**], [+*], [, *], [-*], [.*], [/*], [0*], [1*], [2*], [3*], [4*], [5*], [6*], [7*], [8*], [9*], [:*], [; *], [<*], [=*], [>*], [?*], [@*], [A*], [B*], [C*], [D*], [E*], [F*], [G*], [H*], [I*], [J*], [K*], [L*], [M*], [N*], [O*], [P*], [Q*], [R*], [S*], [T*], [U*], [V*], [W*], [X*], [Y*], [Z*], [[*], [*], []*], [ˆ*], [_*], [‘*], [a*], [b*], [c*], [d*], [e*], [f*], [g*], [h*], [i*], [j*], [k*], [l*], [m*], [n*], [o*], [p*], [q*], [r*], [s*], [t*], [u*], [v*], [w*], [x*], [y*], [z*], [{*], [|*], [}*], [˜*], [**Preassociative** *; *], [**Postassociative** *; *], [[*], *], [priority * end], [newline *], [macro newline *];

Preassociative

$[*0]$, $[*1]$, $[0\mathrm{b}]$, $[*\text{-color}(*)]$, $[*\text{-color}^*(*)]$;
Preassociative
$[*\ '\ *]$, $[*\ `\ *]$;
Preassociative
$[*^{\mathrm{H}}]$, $[*^{\mathrm{T}}]$, $[*^{\mathrm{U}}]$, $[*^{\mathrm{h}}]$, $[*^{\mathrm{t}}]$, $[*^{\mathrm{s}}]$, $[*^{\mathrm{c}}]$, $[*^{\mathrm{d}}]$, $[*^{\mathrm{a}}]$, $[*^{\mathrm{C}}]$, $[*^{\mathrm{M}}]$, $[*^{\mathrm{B}}]$, $[*^{\mathrm{r}}]$, $[*^{\mathrm{i}}]$, $[*^{\mathrm{d}}]$, $[*^{\mathrm{R}}]$, $[*^0]$, $[*^1]$, $[*^2]$, $[*^3]$, $[*^4]$, $[*^5]$, $[*^6]$, $[*^7]$, $[*^8]$, $[*^9]$, $[*^{\mathrm{E}}]$, $[*^{\mathcal{V}}]$, $[*^{\mathcal{C}}]$, $[*^{\mathcal{C}^*}]$;
Preassociative
$[*\cdot *]$, $[*\cdot_0 *]$;
Preassociative
$[*+*]$, $[*+_0 *]$, $[*+_1 *]$, $[*-*]$, $[*-_0 *]$, $[*-_1 *]$;
Preassociative
$[*\cup\{*\}]$, $[*\cup *]$, $[*\backslash\{*\}]$;
Postassociative
$[*\mathbin{\therefore} *]$, $[*\mathbin{\underline{\therefore}} *]$, $[*\mathbin{::} *]$, $[*\mathbin{\underline{+2*}} *]$, $[*::*]$, $[*+2* *]$;
Postassociative
$[*,*]$;
Preassociative
$[*\overset{\mathrm{B}}{\approx} *]$, $[*\overset{\mathrm{D}}{\approx} *]$, $[*\overset{\mathrm{C}}{\approx} *]$, $[*\overset{\mathrm{P}}{\approx} *]$, $[*\approx *]$, $[*=*]$, $[*\overset{+}{\to} *]$, $[*\overset{\mathrm{t}}{=} *]$, $[*\overset{\mathrm{t}^*}{=} *]$, $[*\overset{\mathrm{r}}{=} *]$, $[*\in_{\mathrm{t}} *]$, $[*\subseteq_{\mathrm{T}} *]$, $[*\overset{\mathrm{T}}{=} *]$, $[*\overset{\mathrm{s}}{=} *]$, $[*\text{ free in }*]$, $[*\text{ free in}^*\ *]$, $[*\text{ free for }*\text{ in }*]$, $[*\text{ free for}^*\ *\text{ in }*]$, $[*\in_{\mathrm{c}} *]$, $[*<*]$, $[*<'\ *]$, $[*\leq'\ *]$;
Preassociative
$[\neg *]$;
Preassociative
$[*\wedge *]$, $[*\mathbin{\ddot{\wedge}} *]$, $[*\mathbin{\tilde{\wedge}} *]$, $[*\wedge_{\mathrm{c}} *]$;
Preassociative
$[*\vee *]$, $[*\parallel *]$, $[*\mathbin{\ddot{\vee}} *]$;
Postassociative
$[*\mathbin{\ddot{\Rightarrow}} *]$;
Postassociative
$[*:*]$, $[*!*]$;
Preassociative
$[*\begin{cases} * \\ * \end{cases}]$;
Preassociative
$[\lambda * .*]$, $[\Lambda *]$, $[\textbf{if }\ *\ \textbf{ then }\ *\ \textbf{ else }*]$, $[\textbf{let }*=*\textbf{ in }*]$, $[\textbf{let }*\mathbin{\ddot{=}}*\ \text{ in }\ *]$;
Preassociative
$[*^{\mathrm{I}}]$, $[*^{\triangleright}]$, $[*^{\mathrm{V}}]$, $[*^+]$, $[*^-]$, $[*^*]$;
Preassociative
$[*\mathbin{@} *]$, $[*\rhd *]$, $[*\mathbin{\blacktriangleright} *]$, $[*\gg *]$;
Postassociative
$[*\vdash *]$, $[*\Vdash *]$, $[*\text{ i.e. }*]$;
Preassociative
$[\forall *: *]$;
Postassociative
$[*\oplus *]$;

Postassociative
$[*;*];$
Preassociative
$[*$ proves $*];$
Preassociative
$[*$ **proof of** $*:*], [\text{Line}*:*\gg *;*], [\text{Last line}*\gg *\,\square],$
$[\text{Line}*:\text{Premise}\gg *;*], [\text{Line}*:\text{Side-condition}\gg *;*], [\text{Arbitrary}\gg *;*],$
$[\text{Local}\gg *=*;*];$
Postassociative
$[*$ then $*], [*[\,*\,]*];$
Preassociative
$[*\&*];$
Preassociative
$[*\backslash\backslash *];]$

$[\text{base} \overset{\text{macro}}{\rightarrow} \lambda \mathsf{t}.\lambda \mathsf{c}.\mathcal{M}(\mathsf{t}, \mathrm{s}_0, \mathsf{c})]$

$[\text{base} \overset{\text{claim}}{\rightarrow} \text{checker} \wedge_{\mathrm{c}} \text{verifier}]$

$[\text{base} \overset{\text{pyk}}{\rightarrow} \text{“base”}]$

$\left[* \bowtie *\right]$

Predef: proclaim

$[[\mathsf{x} \bowtie \mathsf{y}] \overset{\text{tex}}{\rightarrow}$ “
[#1/tex name/tex.
\bowtie#2.
]”]

$[[\mathsf{x} \bowtie \mathsf{y}] \overset{\text{pyk}}{\rightarrow} \text{“proclaim} * \text{as} * \text{end proclaim”}]$

“ $*$ ”

Predef: hide

[“x” $\overset{\text{name}}{\rightarrow}$ “
\mbox{‘‘}#1.
\mbox{’’}”]

[“x” $\overset{\text{macro}}{\rightarrow} \lambda \mathsf{t}.\lambda \mathsf{s}.\lambda \mathsf{c}.\mathsf{t}$]

[“x” $\overset{\text{tex}}{\rightarrow}$ “#1.”]

[“x” $\overset{\text{pyk}}{\rightarrow}$ “unicode start of text $*$ end unicode text”]

[$\overset{\text{tex}}{\to}$ “”]

[$\overset{\text{pyk}}{\to}$ “unicode end of text”]

∗ then ∗

[x then y $\overset{\text{name}}{\to}$ “#1.
\mathrel{\mathrm{then}}#2.”]

[x then y $\overset{\text{val}}{\to}$ ⌈∗∗⌉$^{\text{R}}$ :: [x :: [y :: T]]]

[x then y $\overset{\text{tex}}{\to}$ “#1.#2.”]

[x then y $\overset{\text{pyk}}{\to}$ “∗

then ∗”]

∗[∗]∗

[x[y]z $\overset{\text{name}}{\to}$ “#1.
{[}#2.
{]}#3.”]

[x[y]z $\overset{\text{tex}}{\to}$ “#1.#2.#3.”]

[x[y]z $\overset{\text{pyk}}{\to}$ “∗

begin ∗

end ∗”]

Preassociative ∗; ∗

Predef: pre

[**Preassociative** x; y $\overset{\text{name}}{\to}$ “
\mathbf{Preassociative}\,#1.
; #2.”]

[**Preassociative** x; y $\overset{\text{tex}}{\to}$ “
\newline \mathbf {Preassociative} \newline #1.
; #2.”]

[**Preassociative** x; y $\overset{\text{pyk}}{\rightarrow}$ “preassociative $*$ greater than $*$”]

Postassociative $*; *$

Predef: post

[**Postassociative** x; y $\overset{\text{name}}{\rightarrow}$ “
\mathbf{Postassociative}\, #1.
; #2.”]

[**Postassociative** x; y $\overset{\text{tex}}{\rightarrow}$ “
\newline\mathbf{Postassociative} \newline #1.
; #2.”]

[**Postassociative** x; y $\overset{\text{pyk}}{\rightarrow}$ “postassociative $*$ greater than $*$”]

$\left[*\right], *$

[[x], y $\overset{\text{name}}{\rightarrow}$ “
[#1.
] , \linebreak [0] #2.”]

[[x], y $\overset{\text{tex}}{\rightarrow}$ “
[#1/tex name/tex.
] , \linebreak [0] #2.”]

[[x], y $\overset{\text{pyk}}{\rightarrow}$ “priority $*$ equal $*$”]

priority $*$ end

[priority x end $\overset{\text{name}}{\rightarrow}$ “
\mathrm{priority} \, #1.
\, \mathrm{end}”]

[priority x end $\overset{\text{tex}}{\rightarrow}$ “
[#1/tex name/tex.
]”]

[priority x end $\overset{\text{pyk}}{\rightarrow}$ “priority $*$ end priority”]

$*$

$[$
$\mathsf{x} \overset{\text{name}}{\to}$ “
\newline #1.”$]$
$[$
$\mathsf{x} \overset{\text{tex}}{\to}$ “
#1.”$]$
$[$
$\mathsf{x} \overset{\text{pyk}}{\to}$ “
unicode newline $*$”$]$

$*$

$[* \overset{\text{tex}}{\to}$ “
\ast ”$]$
$[* \overset{\text{pyk}}{\to}$ “x”$]$

$(*)^{\mathbf{t}}$

$[(\mathsf{x})^{\mathbf{t}} \overset{\text{name}}{\to}$ “
(#1.
)^{\bf t}”$]$
$[(\mathsf{x})^{\mathbf{t}} \overset{\text{val}}{\to} \lceil * \rceil^{\mathrm{R}} :: [\, \mathsf{x} :: \mathsf{T} \,]\,]$
$[(\mathsf{x})^{\mathbf{t}} \overset{\text{tex}}{\to}$ “#1/tex name.”$]$
$[(\mathsf{x})^{\mathbf{t}} \overset{\text{pyk}}{\to}$ “text $*$ end text”$]$

$\mathbf{string}(*) + *$

$[\mathrm{string}(\mathsf{x}) + \mathsf{y} \overset{\text{name}}{\to}$ “
\mbox{string}(#1.
)+#2.”$]$
$[\mathrm{string}(\mathsf{x}) + \mathsf{y} \overset{\text{tex}}{\to}$ “
\mathrm{#1/tex name.
}+\newline#2.”$]$

[string(x) + y $\overset{\text{pyk}}{\to}$ “text ∗ plus ∗”]

string(∗) ++ ∗

[string(x) ++ y $\overset{\text{name}}{\to}$ “\mbox{string}(#1.
)\mathrel{++}#2.”]

[string(x) ++ y $\overset{\text{tex}}{\to}$ “
\mathrm{#1/tex name.
}\;{++}\newline{}\qquad#2.”]

[string(x) ++ y $\overset{\text{pyk}}{\to}$ “text ∗ plus indent ∗”]

bracket ∗ end bracket

[bracket x end bracket $\overset{\text{name}}{\to}$ “
\mbox{bracket $#1.$ end bracket}”]

[bracket x end bracket $\overset{\text{tex}}{\to}$ “$[#1.]$”]

[bracket x end bracket $\overset{\text{pyk}}{\to}$ “bracket ∗ end bracket”]

big bracket ∗ end bracket

[big bracket x end bracket $\overset{\text{name}}{\to}$ “
\mbox{big bracket $#1.$ end bracket}”]

[big bracket x end bracket $\overset{\text{tex}}{\to}$ “$\left[#1.\right]$”]

[big bracket x end bracket $\overset{\text{pyk}}{\to}$ “big bracket ∗ end bracket”]

math ∗ end math

[math x end math $\overset{\text{name}}{\to}$ “
\mbox{math $#1.$ end math}”]

[math x end math $\overset{\text{tex}}{\to}$ “$#1.$”]

[math x end math $\overset{\text{pyk}}{\to}$ “math ∗ end math”]

flush left $[*]$

[**flush left** [x] $\overset{\text{name}}{\longrightarrow}$ “
\mathbf{flush\ left\ }[#1.
]”]

[**flush left** [x] $\overset{\text{tex}}{\longrightarrow}$ “
\begin {flushleft}#1.
\end {flushleft}”]

[**flush left** [x] $\overset{\text{pyk}}{\longrightarrow}$ “flush left $*$ end left”]

x

[x $\overset{\text{tex}}{\longrightarrow}$ “
\mathsf{x}”]

[x $\overset{\text{pyk}}{\longrightarrow}$ “var x”]

y

[y $\overset{\text{tex}}{\longrightarrow}$ “
\mathsf{y}”]

[y $\overset{\text{pyk}}{\longrightarrow}$ “var y”]

z

[z $\overset{\text{tex}}{\longrightarrow}$ “
\mathsf{z}”]

[z $\overset{\text{pyk}}{\longrightarrow}$ “var z”]

$\left[* \overset{*}{\longrightarrow} *\right]$

Predef: define
[[y $\overset{\text{x}}{\longrightarrow}$ z] $\overset{\text{tex}}{\longrightarrow}$ “
[#2/tex name/tex.
\stackrel{#1.
}{\rightarrow}#3.
]”]

$[[\mathsf{y} \xrightarrow{\mathsf{x}} \mathsf{z}] \xrightarrow{\mathrm{pyk}} \text{“define } * \text{ of } * \text{ as } * \text{ end define”}]$

pyk

Predef: pyk

$[\mathrm{pyk} \xrightarrow{\mathrm{tex}} \text{“}$
$\backslash\mathrm{mathrm}\{\mathrm{pyk}\}\text{”}]$

$[\mathrm{pyk} \xrightarrow{\mathrm{pyk}} \text{“pyk”}]$

tex

Predef: tex

$[\mathrm{tex} \xrightarrow{\mathrm{tex}} \text{“}$
$\backslash\mathrm{mathrm}\{\mathrm{tex}\}\text{”}]$

$[\mathrm{tex} \xrightarrow{\mathrm{pyk}} \text{“tex”}]$

name

Predef: texname

$[\mathrm{name} \xrightarrow{\mathrm{tex}} \text{“}$
$\backslash\mathrm{mathrm}\{\mathrm{name}\}\text{”}]$

$[\mathrm{name} \xrightarrow{\mathrm{pyk}} \text{“tex name”}]$

prio

Predef: priority

$[\mathrm{prio} \xrightarrow{\mathrm{tex}} \text{“}$
$\backslash\mathrm{mathrm}\{\mathrm{prio}\}\text{”}]$

$[\mathrm{prio} \xrightarrow{\mathrm{pyk}} \text{“priority”}]$

⊤

Predef: true

$[\mathsf{T} \overset{\text{tex}}{\to} \text{“}$
\mathsf {T}”]

$[\mathsf{T} \overset{\text{pyk}}{\to} \text{“true”}]$

$\text{if}(*, *, *)$

Predef: if

$[\text{if}(*, *, *) \overset{\text{tex}}{\to} \text{“}$
\mathrm {if}(#1.
, \linebreak [0]#2.
, \linebreak [0]#3.
)”]

$[\text{if}(*, *, *) \overset{\text{pyk}}{\to} \text{“if } * \text{ then } * \text{ else } * \text{ end if”}]$

$\left[* \overset{*}{\Rightarrow} *\right]$

Predef: introduce

$[[* \overset{*}{\Rightarrow} *] \overset{\text{tex}}{\to} \text{“}$
[#2/tex name/tex.
\stackrel {#1.
}{\Rightarrow }#3.
]”]

$[[* \overset{*}{\Rightarrow} *] \overset{\text{pyk}}{\to} \text{“introduce } * \text{ of } * \text{ as } * \text{ end introduce”}]$

val

Predef: value

$[\text{val} \overset{\text{tex}}{\to} \text{“}$
\mathrm {val}”]

$[\text{val} \overset{\text{pyk}}{\to} \text{“value”}]$

claim

Predef: claim

$[\text{claim} \overset{\text{tex}}{\to} \text{“}$
\mathrm {claim}”]

[claim $\overset{\text{pyk}}{\to}$ “claim”]

*

[x $\overset{\text{name}}{\to}$ “
\linebreak [0]\ \hskip0em plus2.0em{}#1.”]

[x $\overset{\text{tex}}{\to}$ “ #1.”]

[x $\overset{\text{pyk}}{\to}$ “unicode space ∗”]

!∗

[!x $\overset{\text{tex}}{\to}$ “!#1.”]

[!x $\overset{\text{pyk}}{\to}$ “unicode exclamation mark ∗”]

”∗

[”x $\overset{\text{tex}}{\to}$ “”#1.”]

[”x $\overset{\text{pyk}}{\to}$ “unicode quotation mark ∗”]

#∗

[#x $\overset{\text{name}}{\to}$ “
\#.#1.”]

[#x $\overset{\text{tex}}{\to}$ “#.#1.”]

[#x $\overset{\text{pyk}}{\to}$ “unicode number sign ∗”]

$∗

[$x $\overset{\text{name}}{\to}$ “
\$#1.”]

[$x $\overset{\text{tex}}{\to}$ “$#1.”]

[$x $\overset{\text{pyk}}{\to}$ “unicode dollar sign ∗”]

%*

[%x $\overset{\text{name}}{\to}$ “
\%#1.”]

[%x $\overset{\text{tex}}{\to}$ “%#1.”]

[%x $\overset{\text{pyk}}{\to}$ “unicode percent ∗”]

&*

[&x $\overset{\text{name}}{\to}$ “
\&#1.”]

[&x $\overset{\text{tex}}{\to}$ “&#1.”]

[&x $\overset{\text{pyk}}{\to}$ “unicode ampersand ∗”]

’*

[’x $\overset{\text{name}}{\to}$ “
\mbox {’}#1.”]

[’x $\overset{\text{tex}}{\to}$ “’#1.”]

[’x $\overset{\text{pyk}}{\to}$ “unicode apostrophe ∗”]

(*

[(x $\overset{\text{tex}}{\to}$ “(#1.”]

[(x $\overset{\text{pyk}}{\to}$ “unicode left parenthesis ∗”]

)*

[)x $\overset{\text{tex}}{\to}$ “)#1.”]

[)x $\overset{\text{pyk}}{\to}$ “unicode right parenthesis ∗”]

$**$

$[*\mathsf{x} \overset{\text{name}}{\to} \text{“}$
$\{*\}\#1.\text{”}]$
$[*\mathsf{x} \overset{\text{tex}}{\to} \text{“}*\#1.\text{”}]$
$[*\mathsf{x} \overset{\text{pyk}}{\to} \text{“unicode asterisk } *\text{”}]$

$+*$

$[+\mathsf{x} \overset{\text{name}}{\to} \text{“}$
$\{+\}\#1.\text{”}]$
$[+\mathsf{x} \overset{\text{tex}}{\to} \text{“}+\#1.\text{”}]$
$[+\mathsf{x} \overset{\text{pyk}}{\to} \text{“unicode plus sign } *\text{”}]$

$,*$

$[,\mathsf{x} \overset{\text{tex}}{\to} \text{“},\#1.\text{”}]$
$[,\mathsf{x} \overset{\text{pyk}}{\to} \text{“unicode comma } *\text{”}]$

$-*$

$[\text{-}\mathsf{x} \overset{\text{name}}{\to} \text{“}$
$\backslash\text{mbox}\{\text{-}\}\#1.\text{”}]$
$[\text{-}\mathsf{x} \overset{\text{tex}}{\to} \text{“}\text{-}\#1.\text{”}]$
$[\text{-}\mathsf{x} \overset{\text{pyk}}{\to} \text{“unicode hyphen } *\text{”}]$

$.*$

$[.\mathsf{x} \overset{\text{tex}}{\to} \text{“}.\#1.\text{”}]$
$[.\mathsf{x} \overset{\text{pyk}}{\to} \text{“unicode period } *\text{”}]$

$/*$

$[/\mathsf{x} \overset{\text{tex}}{\to} \text{“}/\#1.\text{”}]$

[/x $\overset{\text{pyk}}{\to}$ “unicode slash ∗”]

0∗

[0x $\overset{\text{tex}}{\to}$ “0#1.”]

[0x $\overset{\text{pyk}}{\to}$ “unicode zero ∗”]

1∗

[1x $\overset{\text{tex}}{\to}$ “1#1.”]

[1x $\overset{\text{pyk}}{\to}$ “unicode one ∗”]

2∗

[2x $\overset{\text{tex}}{\to}$ “2#1.”]

[2x $\overset{\text{pyk}}{\to}$ “unicode two ∗”]

3∗

[3x $\overset{\text{tex}}{\to}$ “3#1.”]

[3x $\overset{\text{pyk}}{\to}$ “unicode three ∗”]

4∗

[4x $\overset{\text{tex}}{\to}$ “4#1.”]

[4x $\overset{\text{pyk}}{\to}$ “unicode four ∗”]

5∗

[5x $\overset{\text{tex}}{\to}$ “5#1.”]

[5x $\overset{\text{pyk}}{\to}$ “unicode five ∗”]

6∗

[6x $\overset{\text{tex}}{\to}$ “6#1.”]

[6x $\overset{\text{pyk}}{\to}$ “unicode six ∗”]

7∗

[7x $\overset{\text{tex}}{\to}$ “7#1.”]

[7x $\overset{\text{pyk}}{\to}$ “unicode seven ∗”]

8∗

[8x $\overset{\text{tex}}{\to}$ “8#1.”]

[8x $\overset{\text{pyk}}{\to}$ “unicode eight ∗”]

9∗

[9x $\overset{\text{tex}}{\to}$ “9#1.”]

[9x $\overset{\text{pyk}}{\to}$ “unicode nine ∗”]

:∗

[:x $\overset{\text{name}}{\to}$ “
{:}#1.”]

[:x $\overset{\text{tex}}{\to}$ “:#1.”]

[:x $\overset{\text{pyk}}{\to}$ “unicode colon ∗”]

; ∗

[;x $\overset{\text{tex}}{\to}$ “;#1.”]

[;x $\overset{\text{pyk}}{\to}$ “unicode semicolon ∗”]

<∗

[<x $\overset{\text{name}}{\to}$ “
{<}#1.”]

[<x $\overset{\text{tex}}{\to}$ “<#1.”]

[<x $\overset{\text{pyk}}{\to}$ “unicode less than ∗”]

=∗

[=x $\overset{\text{name}}{\to}$ “
{=}#1.”]

[=x $\overset{\text{tex}}{\to}$ “=#1.”]

[=x $\overset{\text{pyk}}{\to}$ “unicode equal sign ∗”]

>∗

[>x $\overset{\text{name}}{\to}$ “
{>}#1.”]

[>x $\overset{\text{tex}}{\to}$ “>#1.”]

[>x $\overset{\text{pyk}}{\to}$ “unicode greater than ∗”]

?∗

[?x $\overset{\text{tex}}{\to}$ “?#1.”]

[?x $\overset{\text{pyk}}{\to}$ “unicode question mark ∗”]

@∗

[@x $\overset{\text{tex}}{\to}$ “@#1.”]

[@x $\overset{\text{pyk}}{\to}$ “unicode commercial at ∗”]

A∗

[Ax $\overset{\text{tex}}{\to}$ “A#1.”]

[Ax $\overset{\text{pyk}}{\to}$ “unicode capital a ∗”]

B∗

[Bx $\overset{\text{tex}}{\to}$ “B#1.”]

[Bx $\overset{\text{pyk}}{\to}$ “unicode capital b ∗”]

C∗

[Cx $\overset{\text{tex}}{\to}$ “C#1.”]

[Cx $\overset{\text{pyk}}{\to}$ “unicode capital c ∗”]

D∗

[Dx $\overset{\text{tex}}{\to}$ “D#1.”]

[Dx $\overset{\text{pyk}}{\to}$ “unicode capital d ∗”]

E∗

[Ex $\overset{\text{tex}}{\to}$ “E#1.”]

[Ex $\overset{\text{pyk}}{\to}$ “unicode capital e ∗”]

F∗

[Fx $\overset{\text{tex}}{\to}$ “F#1.”]

[Fx $\overset{\text{pyk}}{\to}$ “unicode capital f ∗”]

G∗

[Gx $\overset{\text{tex}}{\to}$ “G#1.”]

[Gx $\overset{\text{pyk}}{\to}$ “unicode capital g ∗”]

H∗

[Hx $\overset{\text{tex}}{\to}$ “H#1.”]

[Hx $\overset{\text{pyk}}{\to}$ “unicode capital h ∗”]

I∗

[Ix $\overset{\text{tex}}{\to}$ “I#1.”]

[Ix $\overset{\text{pyk}}{\to}$ “unicode capital i ∗”]

J∗

[Jx $\overset{\text{tex}}{\to}$ “J#1.”]

[Jx $\overset{\text{pyk}}{\to}$ “unicode capital j ∗”]

K∗

[Kx $\overset{\text{tex}}{\to}$ “K#1.”]

[Kx $\overset{\text{pyk}}{\to}$ “unicode capital k ∗”]

L∗

[Lx $\overset{\text{tex}}{\to}$ “L#1.”]

[Lx $\overset{\text{pyk}}{\to}$ “unicode capital l ∗”]

M∗

[Mx $\overset{\text{tex}}{\to}$ “M#1.”]

[Mx $\overset{\text{pyk}}{\to}$ “unicode capital m ∗”]

N∗

[Nx $\overset{\text{tex}}{\to}$ “N#1.”]

[Nx $\overset{\text{pyk}}{\to}$ “unicode capital n ∗”]

O∗

[Ox $\overset{\text{tex}}{\to}$ “O#1.”]

[Ox $\overset{\text{pyk}}{\to}$ “unicode capital o ∗”]

P∗

[Px $\overset{\text{tex}}{\to}$ “P#1.”]

[Px $\overset{\text{pyk}}{\to}$ “unicode capital p ∗”]

Q∗

[Qx $\overset{\text{tex}}{\to}$ “Q#1.”]

[Qx $\overset{\text{pyk}}{\to}$ “unicode capital q ∗”]

R∗

[Rx $\overset{\text{tex}}{\to}$ “R#1.”]

[Rx $\overset{\text{pyk}}{\to}$ “unicode capital r ∗”]

S∗

[Sx $\overset{\text{tex}}{\to}$ “S#1.”]

[Sx $\overset{\text{pyk}}{\to}$ “unicode capital s ∗”]

T∗

[Tx $\overset{\text{tex}}{\to}$ “T#1.”]

[Tx $\overset{\text{pyk}}{\to}$ “unicode capital t ∗”]

U∗

[U$x \overset{\text{tex}}{\to}$ “U#1.”]

[U$x \overset{\text{pyk}}{\to}$ “unicode capital u ∗”]

V∗

[V$x \overset{\text{tex}}{\to}$ “V#1.”]

[V$x \overset{\text{pyk}}{\to}$ “unicode capital v ∗”]

W∗

[W$x \overset{\text{tex}}{\to}$ “W#1.”]

[W$x \overset{\text{pyk}}{\to}$ “unicode capital w ∗”]

X∗

[X$x \overset{\text{tex}}{\to}$ “X#1.”]

[X$x \overset{\text{pyk}}{\to}$ “unicode capital x ∗”]

Y∗

[Y$x \overset{\text{tex}}{\to}$ “Y#1.”]

[Y$x \overset{\text{pyk}}{\to}$ “unicode capital y ∗”]

Z∗

[Z$x \overset{\text{tex}}{\to}$ “Z#1.”]

[Z$x \overset{\text{pyk}}{\to}$ “unicode capital z ∗”]

[∗

[[$x \overset{\text{tex}}{\to}$ “[#1.”]

[[x $\overset{\text{pyk}}{\to}$ “unicode left bracket ∗”]

\∗

[\x $\overset{\text{name}}{\to}$ “
\mbox {$\backslash $}#1.”]

[\x $\overset{\text{tex}}{\to}$ “\#1.”]

[\x $\overset{\text{pyk}}{\to}$ “unicode backslash ∗”]

]∗

[]x $\overset{\text{tex}}{\to}$ “]#1.”]

[]x $\overset{\text{pyk}}{\to}$ “unicode right bracket ∗”]

ˆ∗

[ˆx $\overset{\text{name}}{\to}$ “
{\char94}#1.”]

[ˆx $\overset{\text{tex}}{\to}$ “ˆ#1.”]

[ˆx $\overset{\text{pyk}}{\to}$ “unicode circumflex ∗”]

_∗

[_x $\overset{\text{name}}{\to}$ “
_#1.”]

[_x $\overset{\text{tex}}{\to}$ “_#1.”]

[_x $\overset{\text{pyk}}{\to}$ “unicode underscore ∗”]

‘∗

[‘x $\overset{\text{name}}{\to}$ “
\mbox {‘}#1.”]

[‘x $\overset{\text{tex}}{\to}$ “‘#1.”]

[‘x $\overset{\text{pyk}}{\to}$ “unicode grave accent ∗”]

a∗

[ax $\overset{\text{tex}}{\to}$ “a#1.”]

[ax $\overset{\text{pyk}}{\to}$ “unicode small a ∗”]

b∗

[bx $\overset{\text{tex}}{\to}$ “b#1.”]

[bx $\overset{\text{pyk}}{\to}$ “unicode small b ∗”]

c∗

[cx $\overset{\text{tex}}{\to}$ “c#1.”]

[cx $\overset{\text{pyk}}{\to}$ “unicode small c ∗”]

d∗

[dx $\overset{\text{tex}}{\to}$ “d#1.”]

[dx $\overset{\text{pyk}}{\to}$ “unicode small d ∗”]

e∗

[ex $\overset{\text{tex}}{\to}$ “e#1.”]

[ex $\overset{\text{pyk}}{\to}$ “unicode small e ∗”]

f∗

[fx $\overset{\text{tex}}{\to}$ “f#1.”]

[fx $\overset{\text{pyk}}{\to}$ “unicode small f ∗”]

g∗

[gx $\overset{\text{tex}}{\to}$ “g#1.”]

[gx $\overset{\text{pyk}}{\to}$ “unicode small g ∗”]

h∗

[hx $\overset{\text{tex}}{\to}$ “h#1.”]

[hx $\overset{\text{pyk}}{\to}$ “unicode small h ∗”]

i∗

[ix $\overset{\text{tex}}{\to}$ “i#1.”]

[ix $\overset{\text{pyk}}{\to}$ “unicode small i ∗”]

j∗

[jx $\overset{\text{tex}}{\to}$ “j#1.”]

[jx $\overset{\text{pyk}}{\to}$ “unicode small j ∗”]

k∗

[kx $\overset{\text{tex}}{\to}$ “k#1.”]

[kx $\overset{\text{pyk}}{\to}$ “unicode small k ∗”]

l∗

[lx $\overset{\text{tex}}{\to}$ “l#1.”]

[lx $\overset{\text{pyk}}{\to}$ “unicode small l ∗”]

m∗

[mx $\overset{\text{tex}}{\to}$ “m#1.”]

[mx $\overset{\text{pyk}}{\rightarrow}$ “unicode small m $*$”]

n$*$

[nx $\overset{\text{tex}}{\rightarrow}$ “n#1.”]

[nx $\overset{\text{pyk}}{\rightarrow}$ “unicode small n $*$”]

o$*$

[ox $\overset{\text{tex}}{\rightarrow}$ “o#1.”]

[ox $\overset{\text{pyk}}{\rightarrow}$ “unicode small o $*$”]

p$*$

[px $\overset{\text{tex}}{\rightarrow}$ “p#1.”]

[px $\overset{\text{pyk}}{\rightarrow}$ “unicode small p $*$”]

q$*$

[qx $\overset{\text{tex}}{\rightarrow}$ “q#1.”]

[qx $\overset{\text{pyk}}{\rightarrow}$ “unicode small q $*$”]

r$*$

[rx $\overset{\text{tex}}{\rightarrow}$ “r#1.”]

[rx $\overset{\text{pyk}}{\rightarrow}$ “unicode small r $*$”]

s$*$

[sx $\overset{\text{tex}}{\rightarrow}$ “s#1.”]

[sx $\overset{\text{pyk}}{\rightarrow}$ “unicode small s $*$”]

t∗

[tx $\overset{\text{tex}}{\rightarrow}$ “t#1.”]

[tx $\overset{\text{pyk}}{\rightarrow}$ “unicode small t ∗”]

u∗

[ux $\overset{\text{tex}}{\rightarrow}$ “u#1.”]

[ux $\overset{\text{pyk}}{\rightarrow}$ “unicode small u ∗”]

v∗

[vx $\overset{\text{tex}}{\rightarrow}$ “v#1.”]

[vx $\overset{\text{pyk}}{\rightarrow}$ “unicode small v ∗”]

w∗

[wx $\overset{\text{tex}}{\rightarrow}$ “w#1.”]

[wx $\overset{\text{pyk}}{\rightarrow}$ “unicode small w ∗”]

x∗

[xx $\overset{\text{tex}}{\rightarrow}$ “x#1.”]

[xx $\overset{\text{pyk}}{\rightarrow}$ “unicode small x ∗”]

y∗

[yx $\overset{\text{tex}}{\rightarrow}$ “y#1.”]

[yx $\overset{\text{pyk}}{\rightarrow}$ “unicode small y ∗”]

z∗

[zx $\overset{\text{tex}}{\rightarrow}$ “z#1.”]

[zx $\overset{\text{pyk}}{\to}$ “unicode small z ∗”]

{∗

[{x $\overset{\text{name}}{\to}$ “
\{#1.”]

[{x $\overset{\text{tex}}{\to}$ “{#1.”]

[{x $\overset{\text{pyk}}{\to}$ “unicode left brace ∗”]

|∗

[|x $\overset{\text{tex}}{\to}$ “|#1.”]

[|x $\overset{\text{pyk}}{\to}$ “unicode vertical line ∗”]

}∗

[}x $\overset{\text{name}}{\to}$ “
\}#1.”]

[}x $\overset{\text{tex}}{\to}$ “}#1.”]

[}x $\overset{\text{pyk}}{\to}$ “unicode right brace ∗”]

˜∗

[˜x $\overset{\text{name}}{\to}$ “
\char126 #1.”]

[˜x $\overset{\text{tex}}{\to}$ “˜#1.”]

[˜x $\overset{\text{pyk}}{\to}$ “unicode tilde ∗”]

⊥

[⊥ $\overset{\text{val}}{\Rightarrow}$ (λx. [x ’ x])$^{\text{I}}$ ’ (λx. [x ’ x])$^{\text{I}}$]

[⊥ $\overset{\text{tex}}{\to}$ “
\bot ”]

$[\bot \overset{\text{pyk}}{\to} \text{“bottom”}]$

$\mathrm{f}(*)$

$[\mathrm{f}(\mathsf{x}) \overset{\text{val}}{\to} \mathrm{if}(\mathsf{x}, \mathsf{T}, \mathrm{f}(\mathsf{x}\,\text{'}\,\mathsf{T}))]$

$[\mathrm{f}(*) \overset{\text{tex}}{\to} \text{“}$
f(#1.
)”]

$[\mathrm{f}(*) \overset{\text{pyk}}{\to} \text{“function f of } * \text{ end function”}]$

$(*)^{\mathrm{I}}$

$[(\mathsf{x})^{\mathrm{I}} \overset{\text{val}}{\to} \mathsf{x}]$

$[(*)^{\mathrm{I}} \overset{\text{tex}}{\to} \text{“}$
(#1.
)\{\}\^{}\{I\} ”]

$[(*)^{\mathrm{I}} \overset{\text{pyk}}{\to} \text{“identity } * \text{ end identity”}]$

F

$[\mathsf{F} \overset{\text{val}}{\Rightarrow} \mathsf{T} \therefore \mathsf{T}]$

$[\mathsf{F} \overset{\text{tex}}{\to} \text{“}$
\mathsf {F}”]

$[\mathsf{F} \overset{\text{pyk}}{\to} \text{“false”}]$

$\underline{0}$

$[\underline{0} \overset{\text{val}}{\to} \mathsf{T}]$

$[\underline{0} \overset{\text{tex}}{\to} \text{“}$
\underline {0}”]

$[\underline{0} \overset{\text{pyk}}{\to} \text{“untagged zero”}]$

$\underline{1}$

$[\underline{1} \overset{\text{val}}{\rightarrow} \mathsf{F}\ \underline{+2*}\ \underline{0}]$

$[\underline{1} \overset{\text{tex}}{\rightarrow} \text{“}$
\underline {1}”]

$[\underline{1} \overset{\text{pyk}}{\rightarrow} \text{“untagged one”}]$

$\underline{2}$

$[\underline{2} \overset{\text{val}}{\rightarrow} \mathsf{T}\ \underline{+2*}\ \underline{1}]$

$[\underline{2} \overset{\text{tex}}{\rightarrow} \text{“}$
\underline {2}”]

$[\underline{2} \overset{\text{pyk}}{\rightarrow} \text{“untagged two”}]$

$\underline{3}$

$[\underline{3} \overset{\text{val}}{\rightarrow} \mathsf{F}\ \underline{+2*}\ \underline{1}]$

$[\underline{3} \overset{\text{tex}}{\rightarrow} \text{“}$
\underline {3}”]

$[\underline{3} \overset{\text{pyk}}{\rightarrow} \text{“untagged three”}]$

$\underline{4}$

$[\underline{4} \overset{\text{val}}{\rightarrow} \mathsf{T}\ \underline{+2*}\ \underline{2}]$

$[\underline{4} \overset{\text{tex}}{\rightarrow} \text{“}$
\underline {4}”]

$[\underline{4} \overset{\text{pyk}}{\rightarrow} \text{“untagged four”}]$

$\underline{5}$

$[\underline{5} \overset{\text{val}}{\rightarrow} \mathsf{F}\ \underline{+2*}\ \underline{2}]$

$[\underline{5} \overset{\text{tex}}{\rightarrow} \text{“}$
\underline {5}”]

[$\underline{5} \overset{\text{pyk}}{\rightarrow}$ “untagged five”]

$\underline{6}$

[$\underline{6} \overset{\text{val}}{\rightarrow} \mathsf{T}\ \underline{+2*}\ \underline{3}$]

[$\underline{6} \overset{\text{tex}}{\rightarrow}$ “
\underline {6}”]

[$\underline{6} \overset{\text{pyk}}{\rightarrow}$ “untagged six”]

$\underline{7}$

[$\underline{7} \overset{\text{val}}{\rightarrow} \mathsf{F}\ \underline{+2*}\ \underline{3}$]

[$\underline{7} \overset{\text{tex}}{\rightarrow}$ “
\underline {7}”]

[$\underline{7} \overset{\text{pyk}}{\rightarrow}$ “untagged seven”]

$\underline{8}$

[$\underline{8} \overset{\text{val}}{\rightarrow} \mathsf{T}\ \underline{+2*}\ \underline{4}$]

[$\underline{8} \overset{\text{tex}}{\rightarrow}$ “
\underline {8}”]

[$\underline{8} \overset{\text{pyk}}{\rightarrow}$ “untagged eight”]

$\underline{9}$

[$\underline{9} \overset{\text{val}}{\rightarrow} \mathsf{F}\ \underline{+2*}\ \underline{4}$]

[$\underline{9} \overset{\text{tex}}{\rightarrow}$ “
\underline {9}”]

[$\underline{9} \overset{\text{pyk}}{\rightarrow}$ “untagged nine”]

0

[$0 \overset{\text{val}}{\Rightarrow} \mathsf{T} \therefore \mathsf{T}$]

$[0 \overset{\text{tex}}{\rightarrow} \text{“}$
$0\text{”}]$

$[0 \overset{\text{pyk}}{\rightarrow} \text{“zero”}]$

1

$[1 \overset{\text{val}}{\rightarrow} \mathsf{F}\ {+}2{*}\ 0]$

$[1 \overset{\text{tex}}{\rightarrow} \text{“}$
$1\text{”}]$

$[1 \overset{\text{pyk}}{\rightarrow} \text{“one”}]$

2

$[2 \overset{\text{val}}{\rightarrow} \mathsf{T}\ {+}2{*}\ 1]$

$[2 \overset{\text{tex}}{\rightarrow} \text{“}$
$2\text{”}]$

$[2 \overset{\text{pyk}}{\rightarrow} \text{“two”}]$

3

$[3 \overset{\text{val}}{\rightarrow} \mathsf{F}\ {+}2{*}\ 1]$

$[3 \overset{\text{tex}}{\rightarrow} \text{“}$
$3\text{”}]$

$[3 \overset{\text{pyk}}{\rightarrow} \text{“three”}]$

4

$[4 \overset{\text{val}}{\rightarrow} \mathsf{T}\ {+}2{*}\ 2]$

$[4 \overset{\text{tex}}{\rightarrow} \text{“}$
$4\text{”}]$

$[4 \overset{\text{pyk}}{\rightarrow} \text{“four”}]$

5

$[5 \overset{\text{val}}{\rightarrow} \mathsf{F}\ {+}2{*}\ 2]$

$[5 \overset{\text{tex}}{\rightarrow}$ “
5”$]$

$[5 \overset{\text{pyk}}{\rightarrow}$ “five”$]$

6

$[6 \overset{\text{val}}{\rightarrow} \mathsf{T}\ {+}2{*}\ 3]$

$[6 \overset{\text{tex}}{\rightarrow}$ “
6”$]$

$[6 \overset{\text{pyk}}{\rightarrow}$ “six”$]$

7

$[7 \overset{\text{val}}{\rightarrow} \mathsf{F}\ {+}2{*}\ 3]$

$[7 \overset{\text{tex}}{\rightarrow}$ “
7”$]$

$[7 \overset{\text{pyk}}{\rightarrow}$ “seven”$]$

8

$[8 \overset{\text{val}}{\rightarrow} \mathsf{T}\ {+}2{*}\ 4]$

$[8 \overset{\text{tex}}{\rightarrow}$ “
8”$]$

$[8 \overset{\text{pyk}}{\rightarrow}$ “eight”$]$

9

$[9 \overset{\text{val}}{\rightarrow} \mathsf{F}\ {+}2{*}\ 4]$

$[9 \overset{\text{tex}}{\rightarrow}$ “
9”$]$

$[9 \overset{\text{pyk}}{\rightarrow}$ “nine”$]$

a

$[\mathsf{a} \overset{\text{tex}}{\to} \text{“}\backslash\text{mathsf } \{\text{a}\}\text{”}]$

$[\mathsf{a} \overset{\text{pyk}}{\to} \text{“var a”}]$

b

$[\mathsf{b} \overset{\text{tex}}{\to} \text{“}\backslash\text{mathsf } \{\text{b}\}\text{”}]$

$[\mathsf{b} \overset{\text{pyk}}{\to} \text{“var b”}]$

c

$[\mathsf{c} \overset{\text{tex}}{\to} \text{“}\backslash\text{mathsf } \{\text{c}\}\text{”}]$

$[\mathsf{c} \overset{\text{pyk}}{\to} \text{“var c”}]$

d

$[\mathsf{d} \overset{\text{tex}}{\to} \text{“}\backslash\text{mathsf } \{\text{d}\}\text{”}]$

$[\mathsf{d} \overset{\text{pyk}}{\to} \text{“var d”}]$

e

$[\mathsf{e} \overset{\text{tex}}{\to} \text{“}\backslash\text{mathsf } \{\text{e}\}\text{”}]$

$[\mathsf{e} \overset{\text{pyk}}{\to} \text{“var e”}]$

f

$[\mathsf{f} \overset{\text{tex}}{\to} \text{“}\backslash\text{mathsf } \{\text{f}\}\text{”}]$

$[\mathsf{f} \overset{\text{pyk}}{\to} \text{“var f”}]$

g

[g $\overset{\text{tex}}{\to}$ “
\mathsf {g}”]

[g $\overset{\text{pyk}}{\to}$ “var g”]

h

[h $\overset{\text{tex}}{\to}$ “
\mathsf {h}”]

[h $\overset{\text{pyk}}{\to}$ “var h”]

i

[i $\overset{\text{tex}}{\to}$ “
\mathsf {i}”]

[i $\overset{\text{pyk}}{\to}$ “var i”]

j

[j $\overset{\text{tex}}{\to}$ “
\mathsf {j}”]

[j $\overset{\text{pyk}}{\to}$ “var j”]

k

[k $\overset{\text{tex}}{\to}$ “
\mathsf {k}”]

[k $\overset{\text{pyk}}{\to}$ “var k”]

l

[l $\overset{\text{tex}}{\to}$ “
\mathsf {l}”]

[l $\overset{\text{pyk}}{\to}$ “var l”]

m

$[\mathsf{m} \overset{\text{tex}}{\to} \text{“}\backslash\text{mathsf } \{\text{m}\}\text{”}]$

$[\mathsf{m} \overset{\text{pyk}}{\to} \text{“var m”}]$

n

$[\mathsf{n} \overset{\text{tex}}{\to} \text{“}\backslash\text{mathsf } \{\text{n}\}\text{”}]$

$[\mathsf{n} \overset{\text{pyk}}{\to} \text{“var n”}]$

o

$[\mathsf{o} \overset{\text{tex}}{\to} \text{“}\backslash\text{mathsf } \{\text{o}\}\text{”}]$

$[\mathsf{o} \overset{\text{pyk}}{\to} \text{“var o”}]$

p

$[\mathsf{p} \overset{\text{tex}}{\to} \text{“}\backslash\text{mathsf } \{\text{p}\}\text{”}]$

$[\mathsf{p} \overset{\text{pyk}}{\to} \text{“var p”}]$

q

$[\mathsf{q} \overset{\text{tex}}{\to} \text{“}\backslash\text{mathsf } \{\text{q}\}\text{”}]$

$[\mathsf{q} \overset{\text{pyk}}{\to} \text{“var q”}]$

r

$[\mathsf{r} \overset{\text{tex}}{\to} \text{“}\backslash\text{mathsf } \{\text{r}\}\text{”}]$

$[\mathsf{r} \overset{\text{pyk}}{\to} \text{“var r”}]$

s

[$\mathsf{s} \overset{\text{tex}}{\to}$ “
\mathsf {s}”]

[$\mathsf{s} \overset{\text{pyk}}{\to}$ “var s”]

t

[$\mathsf{t} \overset{\text{tex}}{\to}$ “
\mathsf {t}”]

[$\mathsf{t} \overset{\text{pyk}}{\to}$ “var t”]

u

[$\mathsf{u} \overset{\text{tex}}{\to}$ “
\mathsf {u}”]

[$\mathsf{u} \overset{\text{pyk}}{\to}$ “var u”]

v

[$\mathsf{v} \overset{\text{tex}}{\to}$ “
\mathsf {v}”]

[$\mathsf{v} \overset{\text{pyk}}{\to}$ “var v”]

w

[$\mathsf{w} \overset{\text{tex}}{\to}$ “
\mathsf {w}”]

[$\mathsf{w} \overset{\text{pyk}}{\to}$ “var w”]

$\big(*\big)^{\mathrm{M}}$

[$(\mathsf{x})^{\mathrm{M}} \overset{\text{val}}{\to} \mathsf{x}^{\mathrm{M}}$]

[$(*)^{\mathrm{M}} \overset{\text{tex}}{\to}$ “
(#1.

)ˆM”]

[$(*)^{\mathrm{M}}$ $\overset{\mathrm{pyk}}{\rightarrow}$ “tagged parenthesis $*$ end tagged”]

$\mathrm{If}(*,*,*)$

[$\mathrm{If}(\mathsf{x},\mathsf{y},\mathsf{z})$ $\overset{\mathrm{val}}{\Rightarrow}$ $\mathrm{if}(\mathsf{x}^{\mathrm{M}},\mathsf{y}^{\mathrm{M}},\mathsf{z}^{\mathrm{M}})$]

[$\mathrm{If}(*,*,*)$ $\overset{\mathrm{tex}}{\rightarrow}$ “
\mathrm {If}(#1.
, \linebreak [0]#2.
, \linebreak [0]#3.
)”]

[$\mathrm{If}(*,*,*)$ $\overset{\mathrm{pyk}}{\rightarrow}$ “tagged if $*$ then $*$ else $*$ end if”]

$\mathrm{array}\{*\}\ *\ \mathrm{end\ array}$

[$\mathrm{array}\{*\}\ *\ \mathrm{end\ array}$ $\overset{\mathrm{name}}{\rightarrow}$ “\mathrm {array}\{#1.
\}#2.
\mathrm {end\ array}”]

[$\mathrm{array}\{*\}\ *\ \mathrm{end\ array}$ $\overset{\mathrm{tex}}{\rightarrow}$ “
\begin {array}{#1.
}#2.
\end {array}”]

[$\mathrm{array}\{*\}\ *\ \mathrm{end\ array}$ $\overset{\mathrm{pyk}}{\rightarrow}$ “array $*$ is $*$ end array”]

l

[l $\overset{\mathrm{tex}}{\rightarrow}$ “
l”]

[l $\overset{\mathrm{pyk}}{\rightarrow}$ “left”]

c

[c $\overset{\mathrm{tex}}{\rightarrow}$ “
c”]

[c $\overset{\mathrm{pyk}}{\rightarrow}$ “center”]

r

$[\mathsf{r} \overset{\text{tex}}{\to} \text{“}
\mathsf{r}\text{”}]$

$[\mathsf{r} \overset{\text{pyk}}{\to} \text{“right”}]$

empty

$[\mathsf{empty} \overset{\text{name}}{\to} \text{“}
\backslash\text{mathrm \{empty\}”}]$

$[\mathsf{empty} \overset{\text{tex}}{\to} \text{“}
\text{”}]$

$[\mathsf{empty} \overset{\text{pyk}}{\to} \text{“empty”}]$

$\langle * \mid * := * \rangle$

$[\langle * \mid * := * \rangle \overset{\text{tex}}{\to} \text{“}
\backslash\text{langle \#1.}
\backslash,\{|\}\#2.
\{:=\}\backslash,\#3.
\backslash\text{rangle ”}]$

$[\langle * \mid * := * \rangle \overset{\text{pyk}}{\to} \text{“substitute } * \text{ set } * \text{ to } * \text{ end substitute”}]$

$\mathcal{M}(*)$

$[\mathcal{M}(\mathsf{x}) \overset{\text{val}}{\to} (\underline{0} \mathbin{\underline{\cdot\cdot}} [\, \underline{1} \mathbin{\underline{\cdot\cdot}} \mathsf{T} \,])^{\mathrm{I}} \mathbin{\cdot\cdot} \mathsf{x}]$

$[\mathcal{M}(*) \overset{\text{tex}}{\to} \text{“}
\{\backslash\text{cal M}\}(\#1.
)\text{”}]$

$[\mathcal{M}(*) \overset{\text{pyk}}{\to} \text{“map tag } * \text{ end tag”}]$

$\tilde{\mathcal{U}}(*)$

$[\tilde{\mathcal{U}}(\mathsf{x}) \overset{\text{val}}{\to} \mathrm{if}(\mathsf{x}^{\mathrm{d}}, \mathsf{x}, \mathsf{x}^{\mathrm{T}})]$

$[\tilde{\mathcal{U}}(*) \overset{\text{tex}}{\to} \text{“}$
\tilde {{\cal U}}(#1.
)”]

$[\tilde{\mathcal{U}}(*) \overset{\text{pyk}}{\to} \text{“raw map untag } * \text{ end untag”}]$

$\mathcal{U}(*)$

$[\mathcal{U}(\mathsf{x}) \overset{\text{val}}{\to} \tilde{\mathcal{U}}(\mathsf{x}^{\mathrm{M}})]$

$[\mathcal{U}(*) \overset{\text{tex}}{\to} \text{“}$
{\cal U}(#1.
)”]

$[\mathcal{U}(*) \overset{\text{pyk}}{\to} \text{“map untag } * \text{ end untag”}]$

$\mathcal{U}^{\mathrm{M}}(*)$

$[\mathcal{U}^{\mathrm{M}}(\mathsf{x}) \overset{\text{val}}{\Rightarrow} \mathcal{U}(\mathsf{x})^{\mathrm{M}}]$

$[\mathcal{U}^{\mathrm{M}}(*) \overset{\text{tex}}{\to} \text{“}$
{\cal U}^M(#1.
)”]

$[\mathcal{U}^{\mathrm{M}}(*) \overset{\text{pyk}}{\to} \text{“normalizing untag } * \text{ end untag”}]$

$\mathbf{apply}(*,*)$

$[\mathbf{apply}(\mathsf{f},\mathsf{x}) \overset{\text{val}}{\Rightarrow} \mathbf{apply}_1(\mathsf{f}^{\mathrm{M}},\mathsf{x}^{\mathrm{M}})]$

$[\mathbf{apply}(*,*) \overset{\text{tex}}{\to} \text{“}$
\mathbf {apply}(#1.
,#2.
)”]

$[\mathbf{apply}(*,*) \overset{\text{pyk}}{\to} \text{“apply } * \text{ to } * \text{ end apply”}]$

$\mathbf{apply}_1(*,*)$

$$[\mathbf{apply}_1(\mathsf{f},\mathsf{x}) \overset{\text{val}}{\to} \mathsf{f}^{\mathrm{d}} \begin{cases} \mathrm{If}(\mathsf{x}^{\mathrm{d}},\mathsf{f},\mathsf{f}) \\ \mathrm{If}(\mathsf{x}^{\mathrm{d}},\mathcal{M}(\mathsf{f}^{\mathrm{T}},\mathsf{x}),\mathcal{M}(\mathsf{f}^{\mathrm{T}},(\mathsf{x}^{\mathrm{T}})^{\mathrm{I}})) \end{cases}]$$

$[\mathbf{apply}_1(*,*) \overset{\text{tex}}{\to} \text{“}$
\mathbf {apply}_1(#1.
, #2.
)”]

$[\mathbf{apply}_1(*,*) \overset{\text{pyk}}{\to} \text{“apply one } * \text{ to } * \text{ end apply”}]$

identifier$(*)$

$[\text{identifier}(\mathsf{x}) \overset{\text{val}}{\to} \text{If}(\mathsf{x}^{\mathsf{t}}, 0, \text{identifier}_1(\mathsf{x}^{\mathsf{i}}, \text{identifier}(\mathsf{x}^1)))]$

$[\text{identifier}(\mathsf{x}) \overset{\text{tex}}{\to} \text{“}$
identifier(#1.
)”]

$[\text{identifier}(\mathsf{x}) \overset{\text{pyk}}{\to} \text{“identifier } * \text{ end identifier”}]$

identifier$_1(*,*)$

$[\text{identifier}_1(\mathsf{x},\mathsf{y}) \overset{\text{val}}{\to} \text{If}(\mathsf{x}^6, \mathsf{y}, \mathsf{x}^0 +2* [\, \mathsf{x}^1 +2* [\, \mathsf{x}^2 +2* [\, \mathsf{x}^3 +2* [\, \mathsf{x}^4 +2* [\, \mathsf{x}^5 +2* [\, \mathsf{F} +2* [\, \mathsf{T} +2* \mathsf{y} \,] \,] \,] \,] \,] \,] \,])]$

$[\text{identifier}_1(\mathsf{x},\mathsf{y}) \overset{\text{tex}}{\to} \text{“}$
identifier_{1}(#1.
, #2.
)”]

$[\text{identifier}_1(\mathsf{x},\mathsf{y}) \overset{\text{pyk}}{\to} \text{“identifier one } * \text{ plus id } * \text{ end identifier”}]$

array-plus$(*,*)$

$$[\text{array-plus}(\mathsf{x},\mathsf{y}) \overset{\text{val}}{\to} \mathsf{x}^{\mathsf{a}} \begin{cases} \mathsf{y}^{\mathsf{a}} \begin{cases} \mathsf{T} \\ \mathsf{y}^{\mathsf{hc}} \begin{cases} \mathsf{y} \\ \mathsf{x} :: \mathsf{y} \end{cases} \end{cases} \\ \mathsf{y}^{\mathsf{a}} \begin{cases} \mathsf{x}^{\mathsf{hc}} \begin{cases} \mathsf{x} \\ \mathsf{x} :: \mathsf{y} \end{cases} \\ \mathsf{x} :: \mathsf{y} \end{cases} \end{cases} \quad]$$

$[\text{array-plus}(\mathsf{x},\mathsf{y}) \overset{\text{tex}}{\to} \text{“}$
array\mbox{-}\linebreak[0]plus(#1.
, #2.
)”]

$[\text{array-plus}(\mathsf{x},\mathsf{y}) \overset{\text{pyk}}{\to} \text{“array plus } * \text{ and } * \text{ end plus”}]$

array-remove$(*, *, *)$

$$[\text{array-remove}(\mathsf{i}, \mathsf{a}, \mathsf{l}) \overset{\text{val}}{\to} \; [\;[$$
$$\mathsf{i}\;]\;!\;[\;\mathsf{l}!\;[\;\mathsf{a}^{\mathrm{a}}\;]\;]\;]$$
$$\begin{cases} \mathsf{T} \\ \mathsf{a}^{\mathrm{hc}} \begin{cases} [\;\mathsf{a}^{\mathrm{h}} \approx \mathsf{i}\;] \begin{cases} \mathsf{T} \\ \mathsf{a} \end{cases} \\ \text{bit}(\mathsf{l}, \mathsf{i}) \begin{cases} \text{array-plus}(\text{array-remove}(\mathsf{i}, \mathsf{a}^{\mathrm{h}}, \mathsf{l}+1), \mathsf{a}^{\mathrm{t}}) \\ \text{array-plus}(\mathsf{a}^{\mathrm{h}}, \text{array-remove}(\mathsf{i}, \mathsf{a}^{\mathrm{t}}, \mathsf{l}+1)) \end{cases} \end{cases} \end{cases}]$$

$$[\text{array-remove}(\mathsf{i}, \mathsf{a}, \mathsf{l}) \overset{\text{tex}}{\to} \text{“}$$
array\mbox{-}\linebreak[0]remove(#1.
, #2.
, #3.
)”]

$$[\text{array-remove}(\mathsf{i}, \mathsf{a}, \mathsf{l}) \overset{\text{pyk}}{\to} \text{“array remove} * \text{array} * \text{level} * \text{end remove”}]$$

array-put$(*, *, *, *)$

$$[\text{array-put}(\mathsf{i}, \mathsf{v}, \mathsf{a}, \mathsf{l}) \overset{\text{val}}{\to} \; [\;[$$
$$\mathsf{l}\;]\;!\;[\;\mathsf{a}^{\mathrm{a}}\;]\;]$$
$$\begin{cases} \mathsf{i} :: \mathsf{v} \\ \mathsf{a}^{\mathrm{hc}} \begin{cases} [\;\mathsf{a}^{\mathrm{h}} \approx \mathsf{i}\;] \begin{cases} \mathsf{i} :: \mathsf{v} \\ \text{array-add}(\mathsf{i}, \mathsf{v}, \mathsf{a}^{\mathrm{h}}, \mathsf{a}^{\mathrm{t}}, \mathsf{l}) \end{cases} \\ \text{bit}(\mathsf{l}, \mathsf{i}) \begin{cases} \text{array-put}(\mathsf{i}, \mathsf{v}, \mathsf{a}^{\mathrm{h}}, \mathsf{l}+1) :: [\;\mathsf{a}^{\mathrm{t}}\;] \\ \mathsf{a}^{\mathrm{h}} :: \text{array-put}(\mathsf{i}, \mathsf{v}, \mathsf{a}^{\mathrm{t}}, \mathsf{l}+1) \end{cases} \end{cases} \end{cases}]$$

$$[\text{array-put}(\mathsf{i}, \mathsf{v}, \mathsf{a}, \mathsf{l}) \overset{\text{tex}}{\to} \text{“}$$
array\mbox{-}\linebreak[0]put(#1.
, #2.
, #3.
, #4.
)”]

$$[\text{array-put}(\mathsf{i}, \mathsf{v}, \mathsf{a}, \mathsf{l}) \overset{\text{pyk}}{\to} \text{“array put} * \text{value} * \text{array} * \text{level} * \text{end put”}]$$

array-add$(*, *, *, *, *)$

$$[\text{array-add}(\mathsf{i}, \mathsf{v}, \mathsf{i}', \mathsf{v}', \mathsf{l}) \overset{\text{val}}{\to} \;[$$
$$\text{bit}(\mathsf{l}, \mathsf{i})\;] \begin{cases} \text{bit}(\mathsf{l}, \mathsf{i}') \begin{cases} \text{array-add}(\mathsf{i}, \mathsf{v}, \mathsf{i}', \mathsf{v}', \mathsf{l}+1) :: \mathsf{T} \\ (\mathsf{i} :: \mathsf{v})^{\mathrm{M}} :: (\mathsf{i}' :: [\;\mathsf{v}'\;])^{\mathrm{M}} \end{cases} \\ \text{bit}(\mathsf{l}, \mathsf{i}') \begin{cases} (\mathsf{i}' :: [\;\mathsf{v}'\;])^{\mathrm{M}} :: (\mathsf{i} :: \mathsf{v})^{\mathrm{M}} \\ \mathsf{T} :: \text{array-add}(\mathsf{i}, \mathsf{v}, \mathsf{i}', \mathsf{v}', \mathsf{l}+1) \end{cases} \end{cases}]$$

[array-add(i, v, i′, v′, l) $\overset{\text{tex}}{\to}$ “
array\mbox{-}\linebreak[0]add(#1.
, #2.
, #3.
, #4.
, #5.
)”]

[array-add(i, v, i′, v′, l) $\overset{\text{pyk}}{\to}$ “array add ∗ value ∗ index ∗ value ∗ level ∗ end add”]

bit(∗, ∗)

[bit(x, y) $\overset{\text{val}}{\to}$ If($x^{c} \wedge$ [y^{c}] , $\text{bit}_1(x, y)$, ⊤)]

[bit(x, y) $\overset{\text{tex}}{\to}$ “
bit(#1.
, #2.
)”]

[bit(x, y) $\overset{\text{pyk}}{\to}$ “bit ∗ of ∗ end bit”]

$\text{bit}_1(*, *)$

[$\text{bit}_1(x, y)$ $\overset{\text{val}}{\to}$ If($x^{s}, y^{h}, \text{bit}(x - 1, y^{t})$)]

[$\text{bit}_1(x, y)$ $\overset{\text{tex}}{\to}$ “
bit_1(#1.
, #2.
)”]

[$\text{bit}_1(x, y)$ $\overset{\text{pyk}}{\to}$ “bit one ∗ of ∗ end bit”]

rack

[rack $\overset{\text{val}}{\to}$ base[base[0]]]

[rack $\overset{\text{tex}}{\to}$ “
rack”]

[rack $\overset{\text{pyk}}{\to}$ “example rack”]

"vector"

["vector" $\overset{\text{val}}{\to}$ identifier(⌈“vector”⌉)]

["vector" $\overset{\text{tex}}{\to}$ “
\mbox {\tt \char34}\mathrm {vector}\mbox {\tt \char34}”]

["vector" $\overset{\text{pyk}}{\to}$ “vector hook”]

"bibliography"

["bibliography" $\overset{\text{val}}{\to}$ identifier(⌈“bibliography”⌉)]

["bibliography" $\overset{\text{tex}}{\to}$ “
\mbox {\tt \char34}\mathrm {bibliography}\mbox {\tt \char34}”]

["bibliography" $\overset{\text{pyk}}{\to}$ “bibliography hook”]

"dictionary"

["dictionary" $\overset{\text{val}}{\to}$ identifier(⌈“dictionary”⌉)]

["dictionary" $\overset{\text{tex}}{\to}$ “
\mbox {\tt \char34}\mathrm {dictionary}\mbox {\tt \char34}”]

["dictionary" $\overset{\text{pyk}}{\to}$ “dictionary hook”]

"body"

["body" $\overset{\text{val}}{\to}$ identifier(⌈“body”⌉)]

["body" $\overset{\text{tex}}{\to}$ “
\mbox {\tt \char34}\mathrm {body}\mbox {\tt \char34}”]

["body" $\overset{\text{pyk}}{\to}$ “body hook”]

"codex"

["codex" $\overset{\text{val}}{\to}$ identifier(⌈“codex”⌉)]

["codex" $\overset{\text{tex}}{\to}$ “
\mbox {\tt \char34}\mathrm {codex}\mbox {\tt \char34}”]

["codex" $\overset{\text{pyk}}{\to}$ “codex hook”]

"expansion"

["expansion" $\overset{\text{val}}{\to}$ identifier(⌈“expansion”⌉)]

["expansion" $\overset{\text{tex}}{\to}$ “
\mbox {\tt \char34}\mathrm {expansion}\mbox {\tt \char34}”]

["expansion" $\overset{\text{pyk}}{\to}$ “expansion hook”]

"code"

["code" $\overset{\text{val}}{\to}$ identifier(⌈“code”⌉)]

["code" $\overset{\text{tex}}{\to}$ “
\mbox {\tt \char34}\mathrm {code}\mbox {\tt \char34}”]

["code" $\overset{\text{pyk}}{\to}$ “code hook”]

"cache"

["cache" $\overset{\text{val}}{\to}$ identifier(⌈“cache”⌉)]

["cache" $\overset{\text{tex}}{\to}$ “
\mbox {\tt \char34}\mathrm {cache}\mbox {\tt \char34}”]

["cache" $\overset{\text{pyk}}{\to}$ “cache hook”]

"diagnose"

["diagnose" $\overset{\text{val}}{\to}$ identifier(⌈“diagnose”⌉)]

["diagnose" $\overset{\text{tex}}{\to}$ “
\mbox {\tt \char34}\mathrm {diagnose}\mbox {\tt \char34}”]

["diagnose" $\overset{\text{pyk}}{\to}$ “diagnose hook”]

"pyk"

["pyk" $\overset{\text{val}}{\to}$ identifier(⌈“pyk”⌉)]

["pyk" $\overset{\text{tex}}{\to}$ “
\mbox {\tt \char34}\mathrm {pyk}\mbox {\tt \char34}”]

["pyk" $\overset{\text{pyk}}{\to}$ “pyk aspect”]

"tex"

["tex" $\overset{\text{val}}{\to}$ identifier(⌈“tex”⌉)]

["tex" $\overset{\text{tex}}{\to}$ “
\mbox {\tt \char34}\mathrm {tex}\mbox {\tt \char34}”]

["tex" $\overset{\text{pyk}}{\to}$ “tex aspect”]

"texname"

["texname" $\overset{\text{val}}{\to}$ identifier(⌈“texname”⌉)]

["texname" $\overset{\text{tex}}{\to}$ “
\mbox {\tt \char34}\mathrm {texname}\mbox {\tt \char34}”]

["texname" $\overset{\text{pyk}}{\to}$ “texname aspect”]

"value"

["value" $\overset{\text{val}}{\to}$ identifier(⌈“value”⌉)]

["value" $\overset{\text{tex}}{\to}$ “
\mbox {\tt \char34}\mathrm {value}\mbox {\tt \char34}”]

["value" $\overset{\text{pyk}}{\to}$ “value aspect”]

"message"

["message" $\overset{\text{val}}{\to}$ identifier(⌈“message”⌉)]

["message" $\overset{\text{tex}}{\to}$ “
\mbox {\tt \char34}\mathrm {message}\mbox {\tt \char34}”]

["message" $\overset{\text{pyk}}{\to}$ “message aspect”]

"macro"

["macro" $\overset{\text{val}}{\to}$ identifier(⌈“macro”⌉)]

["macro" $\overset{\text{tex}}{\to}$ “
\mbox {\tt \char34}\mathrm {macro}\mbox {\tt \char34}”]

["macro" $\overset{\text{pyk}}{\to}$ “macro aspect”]

"definition"

["definition" $\overset{\text{val}}{\to}$ identifier(⌈“definition”⌉)]

["definition" $\overset{\text{tex}}{\to}$ “
\mbox {\tt \char34}\mathrm {definition}\mbox {\tt \char34}”]

["definition" $\overset{\text{pyk}}{\to}$ “definition aspect”]

"unpack"

["unpack" $\overset{\text{val}}{\to}$ identifier(⌈“unpack”⌉)]

["unpack" $\overset{\text{tex}}{\to}$ “
\mbox {\tt \char34}\mathrm {unpack}\mbox {\tt \char34}”]

["unpack" $\overset{\text{pyk}}{\to}$ “unpack aspect”]

"claim"

["claim" $\overset{\text{val}}{\to}$ identifier(⌈“claim”⌉)]

["claim" $\overset{\text{tex}}{\to}$ “
\mbox {\tt \char34}\mathrm {claim}\mbox {\tt \char34}”]

["claim" $\overset{\text{pyk}}{\to}$ “claim aspect”]

"priority"

["priority" $\overset{\text{val}}{\to}$ identifier(⌈“priority”⌉)]

["priority" $\overset{\text{tex}}{\to}$ “
\mbox {\tt \char34}\mathrm {priority}\mbox {\tt \char34}”]

["priority" $\overset{\text{pyk}}{\to}$ “priority aspect”]

"lambda"

["lambda" $\overset{\text{val}}{\to}$ identifier(⌈“lambda”⌉)]

["lambda" $\overset{\text{tex}}{\to}$ “
\mbox {\tt \char34}\mathrm {lambda}\mbox {\tt \char34}”]

["lambda" $\overset{\text{pyk}}{\to}$ “lambda identifier”]

"apply"

["apply" $\overset{\text{val}}{\to}$ identifier(⌈“apply”⌉)]

["apply" $\overset{\text{tex}}{\to}$ “
\mbox {\tt \char34}\mathrm {apply}\mbox {\tt \char34}”]

["apply" $\overset{\text{pyk}}{\to}$ “apply identifier”]

"true"

["true" $\overset{\text{val}}{\to}$ identifier(⌈“true”⌉)]

["true" $\overset{\text{tex}}{\to}$ “
\mbox {\tt \char34}\mathrm {true}\mbox {\tt \char34}”]

["true" $\overset{\text{pyk}}{\to}$ “true identifier”]

"if"

["if" $\overset{\text{val}}{\to}$ identifier(⌈“if”⌉)]

["if" $\overset{\text{tex}}{\to}$ “
\mbox {\tt \char34}\mathrm {if}\mbox {\tt \char34}”]

["if" $\overset{\text{pyk}}{\to}$ “if identifier”]

"quote"

["quote" $\overset{\text{val}}{\to}$ identifier(⌈“quote”⌉)]

["quote" $\overset{\text{tex}}{\to}$ “
\mbox {\tt \char34}\mathrm {quote}\mbox {\tt \char34}”]

["quote" $\overset{\text{pyk}}{\to}$ “quote identifier”]

"proclaim"

["proclaim" $\overset{\text{val}}{\to}$ identifier(⌈“proclaim”⌉)]

["proclaim" $\overset{\text{tex}}{\to}$ “
\mbox {\tt \char34}\mathrm {proclaim}\mbox {\tt \char34}”]

["proclaim" $\overset{\text{pyk}}{\to}$ “proclaim identifier”]

"define"

["define" $\overset{\text{val}}{\to}$ identifier(⌈“define”⌉)]

["define" $\overset{\text{tex}}{\to}$ “
\mbox {\tt \char34}\mathrm {define}\mbox {\tt \char34}”]

["define" $\overset{\text{pyk}}{\to}$ “define identifier”]

"introduce"

["introduce" $\overset{\text{val}}{\to}$ identifier(⌈“introduce”⌉)]

["introduce" $\overset{\text{tex}}{\to}$ “
\mbox {\tt \char34}\mathrm {introduce}\mbox {\tt \char34}”]

["introduce" $\overset{\text{pyk}}{\to}$ “introduce identifier”]

"hide"

["hide" $\overset{\text{val}}{\to}$ identifier(⌈“hide”⌉)]

["hide" $\overset{\text{tex}}{\to}$ “
\mbox {\tt \char34}\mathrm {hide}\mbox {\tt \char34}”]

["hide" $\overset{\text{pyk}}{\to}$ “hide identifier”]

"pre"

["pre" $\overset{\text{val}}{\to}$ identifier(⌈“pre”⌉)]

["pre" $\overset{\text{tex}}{\to}$ “
\mbox {\tt \char34}\mathrm {pre}\mbox {\tt \char34}”]

["pre" $\overset{\text{pyk}}{\to}$ “pre identifier”]

"post"

["post" $\overset{\text{val}}{\to}$ identifier(⌈“post”⌉)]

["post" $\overset{\text{tex}}{\to}$ “
\mbox {\tt \char34}\mathrm {post}\mbox {\tt \char34}”]

["post" $\overset{\text{pyk}}{\to}$ “post identifier”]

$\mathcal{E}(*,*,*)$

$[\mathcal{E}(\mathsf{t},\mathsf{s},\mathsf{c}) \overset{\text{val}}{\to} \mathcal{E}_2(\mathsf{t},\mathsf{t}^{\mathsf{r}},\mathsf{t}^{\mathsf{i}},\mathsf{s},\mathsf{c})]$

[$\mathcal{E}(*,*,*)$ $\overset{\text{tex}}{\to}$ “
{\cal E}(#1.
,#2.
,#3.
)”]

[$\mathcal{E}(*,*,*)$ $\overset{\text{pyk}}{\to}$ “eval $*$ stack $*$ cache $*$ end eval”]

$\mathcal{E}_2(*,*,*,*,*)$

$$[\mathcal{E}_2(\mathsf{t},\mathsf{r},\mathsf{i},\mathsf{s},\mathsf{c}) \overset{\text{val}}{\to} \mathsf{i}^{\mathsf{s}} \left\{ \begin{array}{l} \mathsf{t}!\ [\ \mathsf{s}!\mathrm{If}(\mathsf{r} \approx\ [\ \mathsf{c}[0]\ ]\ ,\mathsf{c},\mathsf{c}[\mathsf{c}[0]][\text{"cache"}][\mathsf{r}])\ ] \\ \mathcal{E}_3(\mathsf{t},\mathsf{c}[\mathsf{r}][\text{"code"}][\mathsf{i}],\mathsf{s},\mathsf{c}) \end{array} \right.]$$

[$\mathcal{E}_2(*,*,*,*,*)$ $\overset{\text{tex}}{\to}$ “
{\cal E}_2(#1.
,#2.
,#3.
,#4.
,#5.
)”]

[$\mathcal{E}_2(*,*,*,*,*)$ $\overset{\text{pyk}}{\to}$ “eval two $*$ ref $*$ id $*$ stack $*$ cache $*$ end eval”]

$\mathcal{E}_3(*,*,*,*)$

$$[\mathcal{E}_3(\mathsf{t},\mathsf{f},\mathsf{s},\mathsf{c}) \overset{\text{val}}{\to} \mathsf{f}^{\mathsf{c}} \left\{ \begin{array}{ll} \mathsf{f}^{\mathsf{s}} \left\{ \begin{array}{l} \mathbf{abstract}(\mathsf{t}^1,\mathsf{t}^2,\mathsf{s},\mathsf{c}) \\ \mathsf{c}!\ [\ \mathsf{s}!\ [\ \mathsf{t}^1\ ]\ ] \end{array} \right. & \\ \mathsf{f} \left\{ \begin{array}{l} \mathsf{c}!\mathbf{lookup}(\mathsf{t},\mathsf{s},\mathsf{T}) \\ \mathcal{E}_4(\mathsf{f},\mathsf{t}^{\mathsf{t}},\mathsf{s},\mathsf{c}) \end{array} \right. & \end{array} \right.]$$

$[\mathcal{E}_3(*,*,*,*) \overset{\text{tex}}{\to} \text{“}$
{\cal E}_3(#1.
,#2.
,#3.
,#4.
)”]

$[\mathcal{E}_3(*,*,*,*) \overset{\text{pyk}}{\to} \text{“eval three } * \text{ function } * \text{ stack } * \text{ cache } * \text{ end eval”}]$

$\mathcal{E}_4(*,*,*,*)$

$[\mathcal{E}_4(\mathsf{f},\mathsf{a},\mathsf{s},\mathsf{c}) \overset{\text{val}}{\to} \mathrm{If}(\mathsf{a},\mathsf{s}!\ [\ \mathsf{c}!\mathsf{f}\ ]\ ,\mathcal{E}_4(\mathbf{apply}(\mathsf{f},\mathcal{E}(\mathsf{a}^{\mathrm{h}},\mathsf{s},\mathsf{c})),\mathsf{a}^{\mathrm{t}},\mathsf{s},\mathsf{c}))]$

$[\mathcal{E}_4(*,*,*,*) \overset{\text{tex}}{\to} \text{“}$
{\cal E}_4(#1.
,#2.
,#3.
,#4.
)”]

$[\mathcal{E}_4(*,*,*,*) \overset{\text{pyk}}{\to} \text{“eval four } * \text{ arguments } * \text{ stack } * \text{ cache } * \text{ end eval”}]$

$\mathbf{lookup}(*,*,*)$

$[\mathbf{lookup}(\mathsf{v},\mathsf{s},\mathsf{d}) \overset{\text{val}}{\to} \mathsf{v}!\ [\ \mathsf{d}!\mathrm{If}(\mathsf{s},\mathsf{d},\mathrm{If}(\mathsf{v} \overset{\mathrm{t}}{=}\ [\ \mathsf{s}^{\mathrm{hh}}\ ]\ ,\mathsf{s}^{\mathrm{ht}},\mathbf{lookup}(\mathsf{v},\mathsf{s}^{\mathrm{t}},\mathsf{d})))\ ]\ ]$

$[\mathbf{lookup}(*,*,*) \overset{\text{tex}}{\to} \text{“}$
\mathbf {lookup}(#1.
,#2.
,#3.
)”]

$[\mathbf{lookup}(*,*,*) \overset{\text{pyk}}{\to} \text{“lookup } * \text{ stack } * \text{ default } * \text{ end lookup”}]$

$\mathbf{abstract}(*,*,*,*)$

$[\mathbf{abstract}(\mathsf{v},\mathsf{t},\mathsf{s},\mathsf{c}) \overset{\text{val}}{\to} \mathsf{v}!\ [\ \mathsf{t}!\ [\ \mathsf{s}!\ [\ \mathsf{c}!\Lambda\lambda\mathsf{x}.\mathcal{E}(\mathsf{t},(\mathsf{v}::\mathsf{x})^{\mathrm{M}}::\mathsf{s},\mathsf{c})\ ]\ ]\ ]\ ]$

$[\mathbf{abstract}(*,*,*,*) \overset{\text{tex}}{\to} \text{“}$
\mathbf {abstract}(#1.
,#2.
,#3.

, #4.
)”]

[**abstract**$(*,*,*,*) \overset{\text{pyk}}{\to}$ “abstract ∗ term ∗ stack ∗ cache ∗ end abstract”]

$\lceil * \rceil$

Predef: quote

[$\lceil * \rceil \overset{\text{tex}}{\to}$ “
\lceil #1.
\rceil ”]

[$\lceil * \rceil \overset{\text{pyk}}{\to}$ “quote ∗ end quote”]

$\mathcal{M}(*,*,*)$

[$\mathcal{M}(\mathsf{t},\mathsf{s},\mathsf{c}) \overset{\text{val}}{\to} \mathsf{s}!\ [\ \mathsf{c}!\mathrm{If}(\mathsf{t}^{\mathrm{is}},\mathsf{t},\mathcal{M}_2(\mathsf{t},\mathbf{aspect}(\texttt{"macro"},\mathsf{t},\mathsf{c}),\mathsf{s},\mathsf{c}))\ ]\ ]$

[$\mathcal{M}(*,*,*) \overset{\text{tex}}{\to}$ “
{\cal M}(#1.
, #2.
, #3.
)”]

[$\mathcal{M}(*,*,*) \overset{\text{pyk}}{\to}$ “expand ∗ state ∗ cache ∗ end expand”]

$\mathcal{M}_2(*,*,*,*)$

[$\mathcal{M}_2(\mathsf{t},\mathsf{d},\mathsf{s},\mathsf{c}) \overset{\text{val}}{\to} \mathsf{d}\left\{\begin{array}{l}\mathsf{t}^{\mathrm{h}} :: \mathcal{M}^*(\mathsf{t}^{\mathrm{t}},\mathsf{s},\mathsf{c}) \\ \mathcal{U}^{\mathrm{M}}(\ [\ [\ \mathcal{E}(\mathsf{d}^3,\mathsf{T},\mathsf{c})\ `\ \mathsf{t}\ ]\ `\ \mathsf{s}\ ]\ `\ \mathsf{c})\end{array}\right.\ ]$

[$\mathcal{M}_2(*,*,*,*) \overset{\text{tex}}{\to}$ “
{\cal M}_2(#1.
, #2.
, #3.
, #4.
)”]

[$\mathcal{M}_2(*,*,*,*) \overset{\text{pyk}}{\to}$ “expand two ∗ definition ∗ state ∗ cache ∗ end expand”]

$\mathcal{M}^*(*,*,*)$

$[\mathcal{M}^*(\mathsf{a},\mathsf{s},\mathsf{c}) \overset{\text{val}}{\to} \mathsf{s}!\ [\ \mathsf{c}!\mathrm{If}(\mathsf{a},\mathsf{T},\mathcal{M}(\mathsf{a}^{\mathrm{h}},\mathsf{s},\mathsf{c}) :: \mathcal{M}^*(\mathsf{a}^{\mathrm{t}},\mathsf{s},\mathsf{c}))\ ]\ ]$

$[\mathcal{M}^*(*,*,*) \overset{\text{tex}}{\to}$ “
{\cal M}ˆ*(#1.
,#2.
,#3.
)”]

$[\mathcal{M}^*(*,*,*) \overset{\text{pyk}}{\to}$ “expand list $*$ state $*$ cache $*$ end expand”]

macro

Predef: macro
[macro $\overset{\text{tex}}{\to}$ “
\mathrm {macro}”]

[macro $\overset{\text{pyk}}{\to}$ “macro”]

s_0

$[\mathrm{s}_0 \overset{\text{val}}{\to} \mathcal{M}(\lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\mathcal{M}(\mathsf{t},\mathsf{s},\mathsf{c})) :: \mathsf{T}]$

[$\mathrm{s}_0 \overset{\text{tex}}{\to}$ “
s_0”]

[$\mathrm{s}_0 \overset{\text{pyk}}{\to}$ “macro state”]

$\mathbf{zip}(*,*)$

$[\mathbf{zip}(\mathsf{p},\mathsf{a}) \overset{\text{val}}{\to} \mathsf{a}!\mathrm{If}(\mathsf{p},\mathsf{T},(\mathsf{p}^{\mathrm{h}} ::\ [\ \mathsf{a}^{\mathrm{h}}\ ]\ )^{\mathrm{M}} :: \mathbf{zip}(\mathsf{p}^{\mathrm{t}},\mathsf{a}^{\mathrm{t}}))]$

[$\mathbf{zip}(*,*) \overset{\text{tex}}{\to}$ “
\mathbf {zip}(#1.
,#2.
)”]

[$\mathbf{zip}(*,*) \overset{\text{pyk}}{\to}$ “zip $*$ with $*$ end zip”]

$\mathbf{assoc}_1(*,*,*)$

$$[\mathbf{assoc}_1(\mathsf{a},\mathsf{d},\mathsf{i}) \overset{\text{val}}{\to} \mathsf{a}^{\mathsf{a}} \left\{ \begin{array}{l} \mathsf{d}!\ [\ \mathsf{i}!\mathsf{T}\ ] \\ \mathsf{a}^{\mathsf{hc}} \left\{ \begin{array}{l} [\ \mathsf{i} \approx\ [\ \mathsf{a}^{\mathsf{h}}\ ]\ ]\ \left\{ \begin{array}{l} \mathsf{d}!\ [\ \mathsf{a}^{\mathsf{t}}\ ] \\ \mathsf{d}!\mathsf{T} \end{array} \right. \\ \mathsf{d}^{\mathsf{h}} \left\{ \begin{array}{l} \mathbf{assoc}_1(\mathsf{a}^{\mathsf{h}},\mathsf{d}^{\mathsf{t}},\mathsf{i}) \\ \mathbf{assoc}_1(\mathsf{a}^{\mathsf{t}},\mathsf{d}^{\mathsf{t}},\mathsf{i}) \end{array} \right. \end{array} \right. \end{array} \right.]$$

$[\mathbf{assoc}_1(*,*,*) \overset{\text{tex}}{\to}$ “
\mathbf {assoc}_1(#1.
,#2.
,#3.
)”]

$[\mathbf{assoc}_1(*,*,*) \overset{\text{pyk}}{\to}$ “assoc one $*$ address $*$ index $*$ end assoc”]

$(*)^{\mathbf{p}}$

$[(\mathsf{x})^{\mathbf{p}} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\ [\ \mathsf{t}^1\ ]\ ]$

$[(*)^{\mathbf{p}} \overset{\text{tex}}{\to}$ “(#1.
)^{\mathbf {p}}”]

$[(*)^{\mathbf{p}} \overset{\text{pyk}}{\to}$ “protect $*$ end protect”]

self

$[\text{self} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\ [\ (\mathsf{c}[0] ::\ [\ 0 ::\ [\ \mathsf{t}^{\mathsf{d}}\ ]\ ]\ )^{\mathrm{I}} ::\ \mathsf{T}\ ]\ ]$

$[\text{self} \overset{\text{pyk}}{\to}$ “self”]

$\left[* \doteqdot *\right]$

$[[\mathsf{x} \doteqdot \mathsf{y}] \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_3(\mathsf{t})]$

$[[* \doteqdot *] \overset{\text{tex}}{\to}$ “
[#1/tex name/tex.
\mathrel {\ddot {=}}#2.
]”]

$[[* \doteqdot *] \overset{\text{pyk}}{\to}$ macrodefine $*$ as $*$ enddefine]

$\left[* \dot{=} *\right]$

$[[\mathsf{x} \dot{=} \mathsf{y}] \overset{\text{macro}}{\rightarrow} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[[\mathsf{x} \dot{=} \mathsf{y}] \ddot{=} [(\mathsf{x})^{\mathbf{p}} \overset{\text{val}}{\rightarrow} \mathsf{y}]]\rceil)]$

$[[* \dot{=} *] \overset{\text{tex}}{\rightarrow}$ “
[#1/tex name/tex.
\mathrel {\dot {=}}#2.
]”]

$[[* \dot{=} *] \overset{\text{pyk}}{\rightarrow}$ “value define ∗ as ∗ end define”]

$\left[* \acute{=} *\right]$

$[[\mathsf{x} \acute{=} \mathsf{y}] \overset{\text{macro}}{\rightarrow} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[[\mathsf{x} \acute{=} \mathsf{y}] \ddot{=} [(\mathsf{x})^{\mathbf{p}} \overset{\text{val}}{\Rightarrow} \mathsf{y}]]\rceil)]$

$[[* \acute{=} *] \overset{\text{tex}}{\rightarrow}$ “
[#1/tex name/tex.
\mathrel {\acute {=}}#2.
]”]

$[[* \acute{=} *] \overset{\text{pyk}}{\rightarrow}$ “intro define ∗ as ∗ end define”]

$\left[* \overset{\text{pyk}}{=} *\right]$

$[[\mathsf{x} \overset{\text{pyk}}{=} \mathsf{y}] \overset{\text{macro}}{\rightarrow} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[[\mathsf{x} \overset{\text{pyk}}{=} \mathsf{y}] \ddot{=} [(\mathsf{x})^{\mathbf{p}} \overset{\text{pyk}}{\rightarrow} \mathsf{y}]]\rceil)]$

$[[* \overset{\text{pyk}}{=} *] \overset{\text{tex}}{\rightarrow}$ “
[#1/tex name/tex.
\stackrel {\mathrm {pyk}}{=} #2/tex name.
]”]

$[[* \overset{\text{pyk}}{=} *] \overset{\text{pyk}}{\rightarrow}$ “pyk define ∗ as ∗ end define”]

$\left[* \overset{\text{tex}}{=} *\right]$

$[[\mathsf{x} \overset{\text{tex}}{=} \mathsf{y}] \overset{\text{macro}}{\rightarrow} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[[\mathsf{x} \overset{\text{tex}}{=} \mathsf{y}] \ddot{=} [(\mathsf{x})^{\mathbf{p}} \overset{\text{tex}}{\rightarrow} \mathsf{y}]]\rceil)]$

$[[* \overset{\text{tex}}{=} *] \overset{\text{tex}}{\rightarrow}$ “
[#1/tex name/tex.
\stackrel {\mathrm {tex}}{=} #2/tex name.
]”]

$[[* \overset{\text{tex}}{=} *] \overset{\text{pyk}}{\rightarrow}$ “tex define ∗ as ∗ end define”]

$[* \overset{\text{name}}{=} *]$

$[[\mathsf{x} \overset{\text{name}}{=} \mathsf{y}] \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[[\mathsf{x} \overset{\text{name}}{=} \mathsf{y}] \doteqdot [(\mathsf{x})^{\mathbf{p}} \overset{\text{name}}{\to} \mathsf{y}]]\rceil)]$

$[[* \overset{\text{name}}{=} *] \overset{\text{tex}}{\to}$ “
[#1/tex name/tex.
\stackrel {\mathrm {name}}{=} #2/tex name.
]”]

$[[* \overset{\text{name}}{=} *] \overset{\text{pyk}}{\to}$ “tex name define $*$ as $*$ end define”]

Priority table$[*]$

[**Priority table**[x] $\overset{\text{name}}{\to}$ “
\mathbf{Priority\ table} [#1.
]”]

[**Priority table**[x] $\overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\textbf{Priority table}[\mathsf{x}] \doteqdot [\mathrm{self} \overset{\text{prio}}{\to} (\mathsf{x})^{\mathbf{p}}]]\rceil)]$

[**Priority table**[x] $\overset{\text{tex}}{\to}$ “
\mathbf{Priority\ table} #1.
\mathbf{End\ table}”]

[**Priority table**[x] $\overset{\text{pyk}}{\to}$ “priority table $*$ end table”]

$\tilde{\mathcal{M}}_1$

$[\tilde{\mathcal{M}}_1 \overset{\text{val}}{\to} \lceil[\mathsf{x} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil\mathsf{d}\rceil)]\rceil]$

$[\tilde{\mathcal{M}}_1 \overset{\text{tex}}{\to}$ “
\tilde {{\cal M}}_1”]

$[\tilde{\mathcal{M}}_1 \overset{\text{pyk}}{\to}$ “macro define one”]

$\tilde{\mathcal{M}}_2(*)$

$[\tilde{\mathcal{M}}_2(\mathsf{t}) \overset{\text{val}}{\to} (\lceil\mathsf{x}\rceil :: [\ \mathsf{t}^1\ ])^{\mathrm{M}} :: [\ (\lceil\mathsf{d}\rceil :: \mathsf{t})^{\mathrm{M}} :: \mathsf{T}\ ]\ ]$

$[\tilde{\mathcal{M}}_2(*) \overset{\text{tex}}{\to}$ “
\tilde {{\cal M}}_2(#1.
)”]

$[\tilde{\mathcal{M}}_2(*) \overset{\text{pyk}}{\to}$ “macro define two $*$ end define”]

$\tilde{\mathcal{M}}_3(*)$

$[\tilde{\mathcal{M}}_3(\mathsf{t}) \overset{\text{val}}{\to} \tilde{\mathcal{Q}}(\mathsf{t}, \tilde{\mathcal{M}}_1, \tilde{\mathcal{M}}_2(\mathsf{t}))]$

$[\tilde{\mathcal{M}}_3(*) \overset{\text{tex}}{\to}$ “
\tilde {{\cal M}}_3(#1.
)”]

$[\tilde{\mathcal{M}}_3(*) \overset{\text{pyk}}{\to}$ “macro define three ∗ end define”]

$\tilde{\mathcal{M}}_4(*, *, *, *)$

$[\tilde{\mathcal{M}}_4(\mathsf{t}, \mathsf{s}, \mathsf{c}, \mathsf{d}) \overset{\text{val}}{\to} \tilde{\mathcal{M}}(\tilde{\mathcal{Q}}(\mathsf{t}, \mathsf{d}^2, \mathbf{zip}(\mathsf{d}^{1\mathsf{t}}, \mathsf{t}^{\mathsf{t}})), \mathsf{s}, \mathsf{c})]$

$[\tilde{\mathcal{M}}_4(*, *, *, *) \overset{\text{tex}}{\to}$ “
\tilde {{\cal M}}_4(#1.
,#2.
,#3.
,#4.
)”]

$[\tilde{\mathcal{M}}_4(*, *, *, *) \overset{\text{pyk}}{\to}$ “macro define four ∗ state ∗ cache ∗ definition ∗ end define”]

$\tilde{\mathcal{M}}(*, *, *)$

$[\tilde{\mathcal{M}}(\mathsf{t}, \mathsf{s}, \mathsf{c}) \overset{\text{val}}{\to} \mathcal{U}(\ [\ [\ \mathsf{s}^{\mathsf{h}}\ \text{`}\ \mathsf{t}\ ]\ \text{`}\ \mathsf{s}\ ]\ \text{`}\ \mathsf{c})]$

$[\tilde{\mathcal{M}}(*, *, *) \overset{\text{tex}}{\to}$ “
\tilde {{\cal M}}(#1.
,#2.
,#3.
)”]

$[\tilde{\mathcal{M}}(*, *, *) \overset{\text{pyk}}{\to}$ “state expand ∗ state ∗ cache ∗ end expand”]

$\tilde{\mathcal{Q}}(*, *, *)$

$[\tilde{\mathcal{Q}}(\mathsf{r}, \mathsf{t}, \mathsf{s}) \overset{\text{val}}{\to} \tilde{\mathcal{Q}}_2(\mathsf{r}^{\mathsf{d}}, \mathsf{t}, \mathsf{s})]$

$[\tilde{\mathcal{Q}}(*, *, *) \overset{\text{tex}}{\to}$ “
\tilde {{\cal Q}}(#1.
,#2.

,#3.
)"]

$[\tilde{\mathcal{Q}}(*,*,*) \overset{\text{pyk}}{\to} \text{“quote expand } * \text{ term } * \text{ stack } * \text{ end expand”}]$

$\tilde{\mathcal{Q}}_2(*,*,*)$

$[\tilde{\mathcal{Q}}_2(\mathsf{r},\mathsf{t},\mathsf{s}) \overset{\text{val}}{\to} \tilde{\mathcal{Q}}_3(\mathsf{r},\mathsf{t},\mathsf{s},\mathbf{lookup}(\mathsf{t},\mathsf{s},\mathsf{T}))]$

$[\tilde{\mathcal{Q}}_2(*,*,*) \overset{\text{tex}}{\to} \text{“}$
\tilde {{\cal Q}}_2(#1.
,#2.
,#3.
)"]

$[\tilde{\mathcal{Q}}_2(*,*,*) \overset{\text{pyk}}{\to} \text{“quote expand two } * \text{ term } * \text{ stack } * \text{ end expand”}]$

$\tilde{\mathcal{Q}}_3(*,*,*,*)$

$$[\tilde{\mathcal{Q}}_3(\mathsf{r},\mathsf{t},\mathsf{s},\mathsf{v}) \overset{\text{val}}{\to} \mathsf{v} \left\{ \begin{array}{l} (\mathsf{t}^{\mathrm{r}} :: [\ \mathsf{t}^{\mathrm{i}} :: \mathsf{r}\ ])^{\mathrm{M}} :: \tilde{\mathcal{Q}}^*(\mathsf{r},\mathsf{t}^{\mathrm{t}},\mathsf{s}) \\ \mathsf{r}!\ [\ \mathsf{t}!\ [\ \mathsf{s}!\mathsf{v}\ ]\ ] \end{array} \right.]$$

$[\tilde{\mathcal{Q}}_3(*,*,*,*) \overset{\text{tex}}{\to} \text{“}$
\tilde {{\cal Q}}_3(#1.
,#2.
,#3.
,#4.
)"]

$[\tilde{\mathcal{Q}}_3(*,*,*,*) \overset{\text{pyk}}{\to} \text{“quote expand three } * \text{ term } * \text{ stack } * \text{ value } * \text{ end expand”}]$

$\tilde{\mathcal{Q}}^*(*,*,*)$

$$[\tilde{\mathcal{Q}}^*(\mathsf{r},\mathsf{t},\mathsf{s}) \overset{\text{val}}{\to} \mathsf{t} \left\{ \begin{array}{l} \mathsf{r}!\ [\ \mathsf{t}!\ [\ \mathsf{s}!\mathsf{T}\ ]\ ] \\ \tilde{\mathcal{Q}}_2(\mathsf{r},\mathsf{t}^{\mathrm{h}},\mathsf{s}) :: \tilde{\mathcal{Q}}^*(\mathsf{r},\mathsf{t}^{\mathrm{t}},\mathsf{s}) \end{array} \right.]$$

$[\tilde{\mathcal{Q}}^*(*,*,*) \overset{\text{tex}}{\to} \text{“}$
\tilde {{\cal Q}}^*(#1.
,#2.
,#3.
)"]

$[\tilde{\mathcal{Q}}^*(*,*,*) \overset{\text{pyk}}{\to} \text{“quote expand star } * \text{ term } * \text{ stack } * \text{ end expand”}]$

$\big(*\big)$

$[(\mathsf{x}) \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[(\mathsf{x}) \doteq \mathsf{x}]\rceil)]$

$[(*) \overset{\text{tex}}{\to} \text{“}$
(#1.
)”]

$[(*) \overset{\text{pyk}}{\to} \text{“parenthesis } * \text{ end parenthesis”}]$

$\mathbf{aspect}\big(*,*\big)$

$[\mathbf{aspect}(\mathsf{a},\mathsf{c}) \overset{\text{val}}{\to} \mathsf{a}^{\mathrm{c}} \begin{cases} \mathsf{c}[0][\mathsf{a}] \\ \mathsf{c}[\mathsf{a}^{\mathrm{r}}][\mathsf{a}^{\mathrm{i}}] \end{cases}]$

$[\mathbf{aspect}(\mathsf{a},\mathsf{c}) \overset{\text{tex}}{\to} \text{“}$
\mathbf{aspect}(#1.
, #2.
)”]

$[\mathbf{aspect}(\mathsf{a},\mathsf{c}) \overset{\text{pyk}}{\to} \text{“aspect } * \text{ subcodex } * \text{ end aspect”}]$

$\mathbf{aspect}\big(*,*,*\big)$

$[\mathbf{aspect}(\mathsf{a},\mathsf{t},\mathsf{c}) \overset{\text{val}}{\to} \mathbf{aspect}(\mathsf{a},\mathsf{c}[\mathsf{t}^{\mathrm{r}}][\texttt{"codex"}][\mathsf{t}^{\mathrm{r}}][\mathsf{t}^{\mathrm{i}}])]$

$[\mathbf{aspect}(*,*,*) \overset{\text{tex}}{\to} \text{“}$
\mathbf{aspect}(#1.
, #2.
, #3.
)”]

$[\mathbf{aspect}(\mathsf{a},\mathsf{t},\mathsf{c}) \overset{\text{pyk}}{\to} \text{“aspect } * \text{ term } * \text{ cache } * \text{ end aspect”}]$

$\big\langle * \big\rangle$

$[\langle \mathsf{x} \rangle \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}(\mathbf{tuple}_1(\mathsf{t}),\mathsf{s},\mathsf{c})]$

$[\langle * \rangle \overset{\text{tex}}{\to} \text{“}$
\langle #1.
\rangle ”]

$[\langle \mathsf{x} \rangle \overset{\text{pyk}}{\to} \text{“tuple } * \text{ end tuple”}]$

$\mathbf{tuple}_1(*)$

$$[\mathbf{tuple}_1(\mathsf{t}) \overset{\text{val}}{\rightarrow} [\ \mathsf{t}^1 \overset{\text{r}}{=} \lceil \mathsf{x}, \mathsf{y} \rceil\ ]\ \left\{ \begin{array}{l} \tilde{\mathcal{Q}}(\mathsf{t}, \lceil \mathsf{x} :: \langle \mathsf{y} \rangle \rceil, \mathbf{tuple}_2(\mathsf{t}^1)) \\ \tilde{\mathcal{Q}}(\mathsf{t}, \lceil \mathsf{x} :: \mathsf{T} \rceil,\ [\ \lceil \mathsf{x} \rceil :: [\ \mathsf{t}^1\ ]\ ]\ :: \mathsf{T}) \end{array} \right.\ ]$$

$[\mathbf{tuple}_1(*) \overset{\text{tex}}{\rightarrow} \text{“}$
\mathbf {tuple}_1(#1.
) ”]

$[\mathbf{tuple}_1(\mathsf{t}) \overset{\text{pyk}}{\rightarrow} \text{“tuple one } * \text{ end tuple”}]$

$\mathbf{tuple}_2(*)$

$$[\mathbf{tuple}_2(\mathsf{t}) \overset{\text{val}}{\rightarrow} [\ \lceil \mathsf{x} \rceil :: [\ \mathsf{t}^1\ ]\ ]\ ::\ [\ [\ \lceil \mathsf{y} \rceil :: [\ \mathsf{t}^2\ ]\ ]\ :: \mathsf{T}\ ]\ ]$$

$[\mathbf{tuple}_2(*) \overset{\text{tex}}{\rightarrow} \text{“}$
\mathbf {tuple}_2(#1.
) ”]

$[\mathbf{tuple}_2(\mathsf{t}) \overset{\text{pyk}}{\rightarrow} \text{“tuple two } * \text{ end tuple”}]$

$\mathrm{let}_2(*, *)$

$[\mathrm{let}_2(\mathsf{f}, \mathsf{y}) \overset{\text{val}}{\rightarrow} (\mathsf{y}!\ [\ \mathsf{f}\ '\ \mathsf{y}\ ]\ )^{\mathrm{I}}]$

$[\mathrm{let}_2(\mathsf{f}, \mathsf{y}) \overset{\text{tex}}{\rightarrow} \text{“}$
let_2(#1.
, #2.
)”]

$[\mathrm{let}_2(\mathsf{f}, \mathsf{y}) \overset{\text{pyk}}{\rightarrow} \text{“let two } * \text{ apply } * \text{ end let”}]$

$\mathrm{let}_1(*, *)$

$[\mathrm{let}_1(\mathsf{f}, \mathsf{y}) \overset{\text{val}}{\Rightarrow} \mathrm{let}_2(\mathsf{f}, \mathsf{y}^{\mathrm{M}})^{\mathrm{M}}]$

$[\mathrm{let}_1(\mathsf{f}, \mathsf{y}) \overset{\text{tex}}{\rightarrow} \text{“}$
let_1(#1.
, #2.
)”]

$[\mathrm{let}_1(\mathsf{f}, \mathsf{y}) \overset{\text{pyk}}{\rightarrow} \text{“let one } * \text{ apply } * \text{ end let”}]$

$[* \overset{\text{claim}}{=} *]$

$[[\mathsf{x} \overset{\text{claim}}{=} \mathsf{y}] \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},[[[\mathsf{x} \overset{\text{claim}}{=} \mathsf{y}] \doteq [\mathsf{x} \overset{\text{claim}}{\to} \mathsf{y}]]])]$

$[[* \overset{\text{claim}}{=} *] \overset{\text{tex}}{\to}$ “
[#1/tex name/tex.
\stackrel {claim}{=}#2.
]”]

$[[\mathsf{x} \overset{\text{claim}}{=} \mathsf{y}] \overset{\text{pyk}}{\to}$ “claim define $*$ as $*$ end define”]

checker

$[\text{checker} \overset{\text{val}}{\to} \lambda\mathsf{t}.\lambda\mathsf{c}.\mathbf{check}(\mathsf{t},\mathsf{c})]$

$[\text{checker} \overset{\text{pyk}}{\to}$ “checker”]

$\mathbf{check}(*,*)$

$[\mathbf{check}(\mathsf{t},\mathsf{c}) \overset{\text{val}}{\to} \text{If}(\mathsf{t}^{\text{is}},\mathsf{c}!\mathsf{T},\mathbf{check}_2(\mathsf{t},\mathsf{c},\mathbf{aspect}(\texttt{"claim"},\mathsf{t},\mathsf{c})))]$

$[\mathbf{check}(*,*) \overset{\text{tex}}{\to}$ “
\mathbf{check}(#1.
, #2.
)”]

$[\mathbf{check}(\mathsf{t},\mathsf{c}) \overset{\text{pyk}}{\to}$ “check $*$ cache $*$ end check”]

$\mathbf{check}_2(*,*,*)$

$[\mathbf{check}_2(\mathsf{t},\mathsf{c},\mathsf{d}) \overset{\text{val}}{\to} \mathsf{d} \begin{cases} \mathbf{check}_3(\mathsf{t},\mathsf{c},\mathbf{aspect}(\texttt{"definition"},\mathsf{t},\mathsf{c})) \\ \mathcal{U}^{\text{M}}(\ [\ \mathcal{E}(\mathsf{d}^3,\mathsf{T},\mathsf{c})\ \text{`}\ \mathsf{t}\ ]\ \text{`}\ \mathsf{c}) \end{cases}]$

$[\mathbf{check}_2(*,*,*) \overset{\text{tex}}{\to}$ “
\mathbf{check}_2(#1.
, #2.
, #3.
)”]

$[\mathbf{check}_2(\mathsf{t},\mathsf{c},\mathsf{d}) \overset{\text{pyk}}{\to}$ “check two $*$ cache $*$ def $*$ end check”]

$\mathbf{check}_3(*, *, *)$

$[\mathbf{check}_3(\mathsf{t}, \mathsf{c}, \mathsf{d}) \overset{\text{val}}{\to} \mathrm{If}(\mathsf{d}, \mathbf{check}^*(\mathsf{t}^{\mathsf{t}}, \mathsf{c}), \mathsf{t}!\ [\ \mathsf{c}!\mathsf{T}\ ]\ )]$

$[\mathbf{check}_3(*, *, *) \overset{\text{tex}}{\to}$ “
\mathbf{check}_3(#1.
, #2.
, #3.
)”]

$[\mathbf{check}_3(\mathsf{t}, \mathsf{c}, \mathsf{d}) \overset{\text{pyk}}{\to}$ “check three $*$ cache $*$ def $*$ end check”]

$\mathbf{check}^*(*, *)$

$[\mathbf{check}^*(\mathsf{t}, \mathsf{c}) \overset{\text{val}}{\to} \mathrm{If}(\mathsf{t}, \mathsf{c}!\mathsf{T}, \mathbf{check}_2^*(\mathsf{t}^{\mathsf{t}}, \mathsf{c}, \mathbf{check}(\mathsf{t}^{\mathsf{h}}, \mathsf{c})))]$

$[\mathbf{check}^*(*, *) \overset{\text{tex}}{\to}$ “
\mathbf{check}^*(#1.
, #2.
)”]

$[\mathbf{check}^*(\mathsf{t}, \mathsf{c}) \overset{\text{pyk}}{\to}$ “check list $*$ cache $*$ end check”]

$\mathbf{check}_2^*(*, *, *)$

$[\mathbf{check}_2^*(\mathsf{t}, \mathsf{c}, \mathsf{v}) \overset{\text{val}}{\to} \mathrm{If}(\neg\mathsf{v}, \mathsf{t}!\ [\ \mathsf{c}!\mathsf{v}\ ]\ , \mathbf{check}^*(\mathsf{t}, \mathsf{c}))]$

$[\mathbf{check}_2^*(*, *, *) \overset{\text{tex}}{\to}$ “
\mathbf{check}^*_2(#1.
, #2.
, #3.
)”]

$[\mathbf{check}_2^*(\mathsf{t}, \mathsf{c}, \mathsf{v}) \overset{\text{pyk}}{\to}$ “check list two $*$ cache $*$ value $*$ end check”]

$[*]^{\cdot}$

$[[\mathsf{t}]^{\cdot} \overset{\text{claim}}{\to} \lambda\mathsf{t}.\lambda\mathsf{c}.\mathrm{if}(\mathcal{U}(\mathcal{E}(\mathsf{t}^1, \mathsf{T}, \mathsf{c})), \mathsf{T}, \mathsf{t})]$

$[[*]^{\cdot} \overset{\text{tex}}{\to}$ “
\relax [#1.
\relax]^{\cdot} ”]

$[[\mathsf{t}]^{\cdot} \overset{\text{pyk}}{\to} \text{“test} * \text{end test”}]$

$\left[*\right]^{-}$

$[[\mathsf{x}]^{-} \overset{\text{claim}}{\to} \lambda\mathsf{t}.\lambda\mathsf{c}.\mathrm{if}(\mathcal{U}(\mathcal{E}(\mathsf{t}^1, \mathsf{T}, \mathsf{c})), \mathsf{t}, \mathsf{T})]$

$[[\mathsf{x}]^{-} \overset{\text{tex}}{\to} \text{“}$
\relax [#1.
\relax]^{-} ”]

$[[\mathsf{x}]^{-} \overset{\text{pyk}}{\to} \text{“false test} * \text{end test”}]$

$\left[*\right]^{\circ}$

$[[\mathsf{t}]^{\circ} \overset{\text{claim}}{\to} \lambda\mathsf{t}.\lambda\mathsf{c}.\mathcal{U}(\mathcal{E}(\mathsf{t}^1, \mathsf{T}, \mathsf{c}))]$

$[[*]^{\circ} \overset{\text{tex}}{\to} \text{“}$
\relax [#1.
\relax]^{\circ} ”]

$[[\mathsf{t}]^{\circ} \overset{\text{pyk}}{\to} \text{“raw test} * \text{end test”}]$

msg

Predef: message

$[\text{msg} \overset{\text{tex}}{\to} \text{“}$
msg”]

$[\text{msg} \overset{\text{pyk}}{\to} \text{“message”}]$

$\left[* \overset{\text{msg}}{=} *\right]$

$[[\mathsf{x} \overset{\text{msg}}{=} \mathsf{y}] \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t}, \mathsf{s}, \mathsf{c}, \lceil[[\mathsf{x} \overset{\text{msg}}{=} \mathsf{y}] \doteqdot [(\mathsf{x})^{\mathbf{p}} \overset{\text{msg}}{\to} \mathsf{y}]]\rceil)]$

$[[\mathsf{x} \overset{\text{msg}}{=} \mathsf{y}] \overset{\text{tex}}{\to} \text{“}$
[#1/tex name/tex.
\stackrel {msg}{=} #2.
]”]

$[[\mathsf{x} \overset{\text{msg}}{=} \mathsf{y}] \overset{\text{pyk}}{\to} \text{“message define} * \text{as} * \text{end define”}]$

<stmt>

$[\text{<stmt>} \overset{\text{val}}{\to} \lceil \text{<stmt>} \rceil]$

$[\text{<stmt>} \overset{\text{tex}}{\to} \text{“}$
{<}stmt{>}”]

$[\text{<stmt>} \overset{\text{pyk}}{\to} \text{“the statement aspect”}]$

stmt

$[\text{stmt} \overset{\text{msg}}{\to} \text{<stmt>}]$

$[\text{stmt} \overset{\text{tex}}{\to} \text{“}$
stmt”]

$[\text{stmt} \overset{\text{pyk}}{\to} \text{“statement”}]$

$\left[* \overset{\text{stmt}}{=} *\right]$

$[[\mathsf{x} \overset{\text{stmt}}{=} \mathsf{y}] \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[[\mathsf{x} \overset{\text{stmt}}{=} \mathsf{y}] \ddot{=} [(\mathsf{x})^{\mathbf{P}} \overset{\text{stmt}}{\to} \mathsf{y}]]\rceil)]$

$[[\mathsf{x} \overset{\text{stmt}}{=} \mathsf{y}] \overset{\text{tex}}{\to} \text{“}$
[#1/tex name/tex.
\stackrel {stmt}{=}#2.
]”]

$[[\mathsf{x} \overset{\text{stmt}}{=} \mathsf{y}] \overset{\text{pyk}}{\to} \text{“statement define } * \text{ as } * \text{ end define”}]$

HeadNil′

$[\text{HeadNil}' \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\text{HeadNil}' \ddot{=} \mathsf{T}^{\mathrm{h}} = \mathsf{T}]\rceil)]$

$[\text{HeadNil}' \overset{\text{tex}}{\to} \text{“}$
HeadNil”"]

$[\text{HeadNil}' \overset{\text{pyk}}{\to} \text{“example axiom”}]$

HeadPair′

$[\text{HeadPair}' \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\text{HeadPair}' \ddot{=} \forall\mathcal{A}{:}\forall\mathcal{B}{:}\ [\ (\mathcal{A} :: \mathcal{B})^{\mathrm{h}} = \mathcal{A}\ ]\ ]\rceil)]$

$[\mathrm{HeadPair}' \overset{\mathrm{tex}}{\to} \text{“}$
$\mathrm{HeadPair}\text{”}]$

$[\mathrm{HeadPair}' \overset{\mathrm{pyk}}{\to} \text{“example scheme”}]$

$\mathrm{Transitivity}'$

$[\mathrm{Transitivity}' \overset{\mathrm{macro}}{\to} \lambda \mathsf{t}.\lambda \mathsf{s}.\lambda \mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\mathrm{Transitivity}' \doteq \forall \mathcal{A}\colon \forall \mathcal{B}\colon \forall \mathcal{C}\colon [\ [\ \mathcal{A} = \mathcal{B}\ ] \vdash [\ [\ \mathcal{A} = \mathcal{C}\ ] \vdash [\ \mathcal{B} = \mathcal{C}\ ]\ ]\ ]\rceil)]$

$[\mathrm{Transitivity}' \overset{\mathrm{tex}}{\to} \text{“}$
$\mathrm{Transitivity}\text{”}]$

$[\mathrm{Transitivity}' \overset{\mathrm{pyk}}{\to} \text{“example rule”}]$

$\perp\!\!\!\perp$

$[\perp\!\!\!\perp \overset{\mathrm{val}}{\to} \lceil \perp\!\!\!\perp \rceil^{\mathrm{R}} :: \mathsf{T}]$

$[\perp\!\!\!\perp \overset{\mathrm{tex}}{\to} \text{“}$
{\makebox [0mm][l]{$\bot $}\,{\bot }}”]

$[\perp\!\!\!\perp \overset{\mathrm{pyk}}{\to} \text{“absurdity”}]$

Contra'

$[\mathrm{Contra}' \overset{\mathrm{macro}}{\to} \lambda \mathsf{t}.\lambda \mathsf{s}.\lambda \mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\mathrm{Contra}' \doteq [\ [\ \mathsf{T} :: \mathsf{T}\ ] = \mathsf{T}\ ] \vdash \perp\!\!\!\perp]\rceil)]$

$[\mathrm{Contra}' \overset{\mathrm{tex}}{\to} \text{“}$
$\mathrm{Contra}\text{”}]$

$[\mathrm{Contra}' \overset{\mathrm{pyk}}{\to} \text{“contraexample”}]$

T'_{E}

$[\mathrm{T}'_{\mathrm{E}} \overset{\mathrm{stmt}}{\to} [\ \mathsf{T}^{\mathrm{h}} = \mathsf{T}\ ] \oplus [\ [\ \forall \underline{\mathsf{a}}\colon \forall \underline{\mathsf{b}}\colon [\ [\ \underline{\mathsf{a}} :: \underline{\mathsf{b}}\ ]^{\mathrm{h}} = \underline{\mathsf{a}}\ ]\ ] \oplus [\ [\ \forall \underline{\mathsf{a}}\colon \forall \underline{\mathsf{b}}\colon \forall \underline{\mathsf{c}}\colon [\ [\ \underline{\mathsf{a}} = \underline{\mathsf{b}}\ ] \vdash [\ [\ \underline{\mathsf{a}} = \underline{\mathsf{c}}\ ] \vdash [\ \underline{\mathsf{b}} = \underline{\mathsf{c}}\ ]\ ]\ ]\ ] \oplus [\ [\ [\ \mathsf{T} :: \mathsf{T}\ ] = \mathsf{T}\ ] \vdash \perp\!\!\!\perp\ ]\ ]\ ]\ ]$

$[\mathrm{T}'_{\mathrm{E}} \overset{\mathrm{tex}}{\to} \text{“}$
$\mathrm{T'\_\{E\}}\text{”}]$

$[\mathrm{T}'_{\mathrm{E}} \overset{\mathrm{pyk}}{\to} \text{“example theory primed”}]$

L_1

$[\mathrm{L}_1 \overset{\mathrm{stmt}}{\to} \mathrm{T}'_{\mathrm{E}} \vdash \forall \underline{\mathsf{a}} \colon \forall \underline{\mathsf{b}} \colon \ [\ [\ \underline{\mathsf{a}} = \underline{\mathsf{b}}\ ]\ \vdash\ [\ \underline{\mathsf{b}} = \underline{\mathsf{a}}\ ]\ ]\ ]$

$[\mathrm{L}_1 \overset{\mathrm{tex}}{\to}$ “
L-{1}”]

$[\mathrm{L}_1 \overset{\mathrm{pyk}}{\to}$ “example lemma”]

$\underline{*}$

$[\underline{\mathsf{x}} \overset{\mathrm{tex}}{\to}$ “\underline{#1.}”]

$[\underline{\mathsf{x}} \overset{\mathrm{pyk}}{\to}$ “metavar $*$ end metavar”]

$\mathcal{A}$

$[\mathcal{A} \overset{\mathrm{macro}}{\to} \lambda \mathsf{t}.\lambda \mathsf{s}.\lambda \mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t}, \mathsf{s}, \mathsf{c}, \lceil [\mathcal{A} \doteq \underline{\mathsf{a}}] \rceil)]$

$[\mathcal{A} \overset{\mathrm{tex}}{\to}$ “{\cal A}”]

$[\mathcal{A} \overset{\mathrm{pyk}}{\to}$ “meta a”]

$\mathcal{B}$

$[\mathcal{B} \overset{\mathrm{macro}}{\to} \lambda \mathsf{t}.\lambda \mathsf{s}.\lambda \mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t}, \mathsf{s}, \mathsf{c}, \lceil [\mathcal{B} \doteq \underline{\mathsf{b}}] \rceil)]$

$[\mathcal{B} \overset{\mathrm{tex}}{\to}$ “{\cal B}”]

$[\mathcal{B} \overset{\mathrm{pyk}}{\to}$ “meta b”]

$\mathcal{C}$

$[\mathcal{C} \overset{\mathrm{macro}}{\to} \lambda \mathsf{t}.\lambda \mathsf{s}.\lambda \mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t}, \mathsf{s}, \mathsf{c}, \lceil [\mathcal{C} \doteq \underline{\mathsf{c}}] \rceil)]$

$[\mathcal{C} \overset{\mathrm{tex}}{\to}$ “{\cal C}”]

$[\mathcal{C} \overset{\mathrm{pyk}}{\to}$ “meta c”]

$\mathcal{D}$

$[\mathcal{D} \overset{\mathrm{macro}}{\to} \lambda \mathsf{t}.\lambda \mathsf{s}.\lambda \mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t}, \mathsf{s}, \mathsf{c}, \lceil [\mathcal{D} \doteq \underline{\mathsf{d}}] \rceil)]$

$[\mathcal{D} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal D\}”}]$

$[\mathcal{D} \overset{\text{pyk}}{\to} \text{“meta d”}]$

$\mathcal{E}$

$[\mathcal{E} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\mathcal{E} \doteq \underline{\mathsf{e}}]\rceil)]$

$[\mathcal{E} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal E\}”}]$

$[\mathcal{E} \overset{\text{pyk}}{\to} \text{“meta e”}]$

$\mathcal{F}$

$[\mathcal{F} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\mathcal{F} \doteq \underline{\mathsf{f}}]\rceil)]$

$[\mathcal{F} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal F\}”}]$

$[\mathcal{F} \overset{\text{pyk}}{\to} \text{“meta f”}]$

$\mathcal{G}$

$[\mathcal{G} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\mathcal{G} \doteq \underline{\mathsf{g}}]\rceil)]$

$[\mathcal{G} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal G\}”}]$

$[\mathcal{G} \overset{\text{pyk}}{\to} \text{“meta g”}]$

$\mathcal{H}$

$[\mathcal{H} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\mathcal{H} \doteq \underline{\mathsf{h}}]\rceil)]$

$[\mathcal{H} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal H\}”}]$

$[\mathcal{H} \overset{\text{pyk}}{\to} \text{“meta h”}]$

$\mathcal{I}$

$[\mathcal{I} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\mathcal{I} \doteq \underline{\mathsf{i}}]\rceil)]$

$[\mathcal{I} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal I\}”}]$

$[\mathcal{I} \overset{\text{pyk}}{\to} \text{“meta i”}]$

$\mathcal{J}$

$[\mathcal{J} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\ulcorner[\mathcal{J} \doteq \underline{\mathsf{j}}]\urcorner)]$

$[\mathcal{J} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal J\}”}]$

$[\mathcal{J} \overset{\text{pyk}}{\to} \text{“meta j”}]$

$\mathcal{K}$

$[\mathcal{K} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\ulcorner[\mathcal{K} \doteq \underline{\mathsf{k}}]\urcorner)]$

$[\mathcal{K} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal K\}”}]$

$[\mathcal{K} \overset{\text{pyk}}{\to} \text{“meta k”}]$

$\mathcal{L}$

$[\mathcal{L} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\ulcorner[\mathcal{L} \doteq \underline{\mathsf{l}}]\urcorner)]$

$[\mathcal{L} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal L\}”}]$

$[\mathcal{L} \overset{\text{pyk}}{\to} \text{“meta l”}]$

$\mathcal{M}$

$[\mathcal{M} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\ulcorner[\mathcal{M} \doteq \underline{\mathsf{m}}]\urcorner)]$

$[\mathcal{M} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal M\}”}]$

$[\mathcal{M} \overset{\text{pyk}}{\to} \text{“meta m”}]$

$\mathcal{N}$

$[\mathcal{N} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\ulcorner[\mathcal{N} \doteq \underline{\mathsf{n}}]\urcorner)]$

$[\mathcal{N} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal N\}”}]$

$[\mathcal{N} \overset{\text{pyk}}{\to} \text{“meta n”}]$

$\mathcal{O}$

$[\mathcal{O} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\ulcorner[\mathcal{O} \doteq \underline{\mathsf{o}}]\urcorner)]$

$[\mathcal{O} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal O\}”}]$

$[\mathcal{O} \overset{\text{pyk}}{\to} \text{“meta o”}]$

$\mathcal{P}$

$[\mathcal{P} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t}, \mathsf{s}, \mathsf{c}, \ulcorner[\mathcal{P} \doteqdot \underline{\mathsf{p}}]\urcorner)]$

$[\mathcal{P} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal P\}”}]$

$[\mathcal{P} \overset{\text{pyk}}{\to} \text{“meta p”}]$

$\mathcal{Q}$

$[\mathcal{Q} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t}, \mathsf{s}, \mathsf{c}, \ulcorner[\mathcal{Q} \doteqdot \underline{\mathsf{q}}]\urcorner)]$

$[\mathcal{Q} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal Q\}”}]$

$[\mathcal{Q} \overset{\text{pyk}}{\to} \text{“meta q”}]$

$\mathcal{R}$

$[\mathcal{R} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t}, \mathsf{s}, \mathsf{c}, \ulcorner[\mathcal{R} \doteqdot \underline{\mathsf{r}}]\urcorner)]$

$[\mathcal{R} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal R\}”}]$

$[\mathcal{R} \overset{\text{pyk}}{\to} \text{“meta r”}]$

$\mathcal{S}$

$[\mathcal{S} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t}, \mathsf{s}, \mathsf{c}, \ulcorner[\mathcal{S} \doteqdot \underline{\mathsf{s}}]\urcorner)]$

$[\mathcal{S} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal S\}”}]$

$[\mathcal{S} \overset{\text{pyk}}{\to} \text{“meta s”}]$

$\mathcal{T}$

$[\mathcal{T} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t}, \mathsf{s}, \mathsf{c}, \ulcorner[\mathcal{T} \doteqdot \underline{\mathsf{t}}]\urcorner)]$

$[\mathcal{T} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal T\}”}]$

$[\mathcal{T} \overset{\text{pyk}}{\to} \text{“meta t”}]$

$\mathcal{U}$

$[\mathcal{U} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\mathcal{U} \doteq \underline{\mathsf{u}}]\rceil)]$

$[\mathcal{U} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal U\}”}]$

$[\mathcal{U} \overset{\text{pyk}}{\to} \text{“meta u”}]$

$\mathcal{V}$

$[\mathcal{V} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\mathcal{V} \doteq \underline{\mathsf{v}}]\rceil)]$

$[\mathcal{V} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal V\}”}]$

$[\mathcal{V} \overset{\text{pyk}}{\to} \text{“meta v”}]$

$\mathcal{W}$

$[\mathcal{W} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\mathcal{W} \doteq \underline{\mathsf{w}}]\rceil)]$

$[\mathcal{W} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal W\}”}]$

$[\mathcal{W} \overset{\text{pyk}}{\to} \text{“meta w”}]$

$\mathcal{X}$

$[\mathcal{X} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\mathcal{X} \doteq \underline{\mathsf{x}}]\rceil)]$

$[\mathcal{X} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal X\}”}]$

$[\mathcal{X} \overset{\text{pyk}}{\to} \text{“meta x”}]$

$\mathcal{Y}$

$[\mathcal{Y} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\mathcal{Y} \doteq \underline{\mathsf{y}}]\rceil)]$

$[\mathcal{Y} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal Y\}”}]$

$[\mathcal{Y} \overset{\text{pyk}}{\to} \text{“meta y”}]$

$\mathcal{Z}$

$[\mathcal{Z} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\mathcal{Z} \doteq \underline{\mathsf{z}}]\rceil)]$

$[\mathcal{Z} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal Z\}”}]$

$[\mathcal{Z} \overset{\text{pyk}}{\to} \text{“meta z”}]$

$\langle * \mid * := * \rangle$

$[\langle \mathsf{a} \,|\mathsf{x} := \mathsf{b}\rangle \overset{\text{val}}{\to} \mathsf{x}!\ [\ \mathsf{b}!$
$\mathrm{If}(\mathsf{a}^{\mathcal{V}}, \mathrm{If}(\mathsf{a} \overset{\text{t}}{=} \mathsf{x}, \mathsf{b}, \mathsf{a}),$
$\mathrm{If}(\neg\ [\ \mathsf{a} \overset{\text{r}}{=} \lceil \forall *\colon * \rceil\ ]\ , \mathsf{a}^{\text{h}} :: \langle {}^{*}\mathsf{a}^{\text{t}} \,|\mathsf{x} := \mathsf{b}\rangle,$
$\mathrm{If}(\mathsf{a}^{1} \overset{\text{t}}{=} \mathsf{x}, \mathsf{a},$
$[\ \mathsf{a}^{0} ::\ [\ \mathsf{a}^{1} ::\ [\ \langle \mathsf{a}^{2} \,|\mathsf{x} := \mathsf{b}\rangle :: \mathsf{T}\ ]\ ]\ ]\ ))))\ ]\ ]$

$[\langle \mathsf{a} \,|\mathsf{x} := \mathsf{b}\rangle \overset{\text{tex}}{\to} \text{“}$
$\backslash\text{langle } \#1.$
$\backslash, \{\backslash\text{protect}\backslash\text{vert}\}\#2.$
$\{:=\}\backslash, \#3.$
$\backslash\text{rangle ”}]$

$[\langle \mathsf{a} \,|\mathsf{x} := \mathsf{b}\rangle \overset{\text{pyk}}{\to} \text{“sub } * \text{ set } * \text{ to } * \text{ end sub”}]$

$\langle {}^{*}* \mid * := * \rangle$

$[\langle {}^{*}\mathsf{a} \,|\mathsf{x} := \mathsf{b}\rangle \overset{\text{val}}{\to} \mathsf{x}!\ [\ \mathsf{b}!\mathrm{If}(\mathsf{a}, \mathsf{T}, \langle \mathsf{a}^{\text{h}} \,|\mathsf{x} := \mathsf{b}\rangle :: \langle {}^{*}\mathsf{a}^{\text{t}} \,|\mathsf{x} := \mathsf{b}\rangle)\ ]\ ]$

$[\langle {}^{*}\mathsf{a} \,|\mathsf{x} := \mathsf{b}\rangle \overset{\text{tex}}{\to} \text{“}$
$\backslash\text{langle } \hat{}\ \{\ \backslash\text{ast }\}\ \#1.$
$\backslash, \{\backslash\text{protect}\backslash\text{vert}\}\#2.$
$\{:=\}\backslash, \#3.$
$\backslash\text{rangle ”}]$

$[\langle {}^{*}\mathsf{a} \,|\mathsf{x} := \mathsf{b}\rangle \overset{\text{pyk}}{\to} \text{“sub star } * \text{ set } * \text{ to } * \text{ end sub”}]$

$\emptyset$

$[\emptyset \overset{\text{val}}{\to} \mathsf{T}]$

$[\emptyset \overset{\text{tex}}{\to} \text{“}$
$\backslash\text{emptyset ”}]$

$[\emptyset \overset{\text{pyk}}{\to} \text{“the empty set”}]$

Remainder

$[\text{Remainder} \overset{\text{macro}}{\rightarrow} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\text{Remainder} \ddot{=} \text{HeadPair}' \oplus [\ \text{Transitivity}' \oplus \text{Contra}'\ ]\ ]\rceil)]$

$[\text{Remainder} \overset{\text{tex}}{\rightarrow} \text{“}$
Remainder”]

$[\text{Remainder} \overset{\text{pyk}}{\rightarrow} \text{“example remainder”}]$

$(*)^{\mathbf{v}}$

$[(\mathsf{x})^{\mathbf{v}} \overset{\text{name}}{\rightarrow} \text{“}$
(#1.
)^{\bf v}”]

$[(\mathsf{x})^{\mathbf{v}} \overset{\text{macro}}{\rightarrow} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[(\mathsf{x})^{\mathbf{v}} \ddot{=} \mathsf{x}]\rceil)]$

$[(\mathsf{x})^{\mathbf{v}} \overset{\text{tex}}{\rightarrow} \text{“\#1/tex name.”}]$

$[(\mathsf{x})^{\mathbf{v}} \overset{\text{pyk}}{\rightarrow} \text{“make visible } * \text{ end visible”}]$

$\text{intro}(*,*,*,*)$

$[\text{intro}(\mathsf{x},\mathsf{i},\mathsf{p},\mathsf{t}) \overset{\text{name}}{\rightarrow} \text{“}$
intro(#1.
, #2.
, #3.
, #4.
)”]

$[\text{intro}(\mathsf{x},\mathsf{i},\mathsf{p},\mathsf{t}) \overset{\text{macro}}{\rightarrow} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\text{intro}(\mathsf{x},\mathsf{i},\mathsf{p},\mathsf{t}) \ddot{=}$
math $[\mathsf{x} \overset{\text{pyk}}{=} \mathsf{p}]$ end mathmath $[\mathsf{x} \overset{\text{tex}}{=} \mathsf{t}]$ end math]$\rceil)]$

$[\text{intro}(\mathsf{x},\mathsf{i},\mathsf{p},\mathsf{t}) \overset{\text{tex}}{\rightarrow} \text{“}$\index{#2.: #3. @#2.: $[#1/tex name/tex.]$ #3.}%
\index{pyk: #3. $[#1/tex name/tex.]$}%
\tex{
$[#1/tex name/tex.
\stackrel {\mathrm {tex}}{=} #4/tex name.
]$}$[#1/tex name/tex.%
]$\footnote{$[#1/tex name/tex.
\stackrel {\mathrm {pyk}}{=} #3/tex name.
]$}”]

$[\text{intro}(\mathsf{x},\mathsf{i},\mathsf{p},\mathsf{t}) \overset{\text{pyk}}{\rightarrow} \text{“intro} * \text{index} * \text{pyk} * \text{tex} * \text{end intro”}]$

$\mathrm{intro}(*,*,*)$

$[\mathrm{intro}(\mathsf{x},\mathsf{p},\mathsf{t}) \overset{\mathrm{name}}{\to} \text{“}$
intro(#1.
,#2.
,#3.
)”]

$[\mathrm{intro}(\mathsf{x},\mathsf{p},\mathsf{t}) \overset{\mathrm{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\ulcorner[\mathrm{intro}(\mathsf{x},\mathsf{p},\mathsf{t}) \doteqdot$
math [$\mathsf{x} \overset{\mathrm{pyk}}{=} \mathsf{p}$] end mathmath [$\mathsf{x} \overset{\mathrm{tex}}{=} \mathsf{t}$] end math]$\urcorner)]$

$[\mathrm{intro}(\mathsf{x},\mathsf{p},\mathsf{t}) \overset{\mathrm{tex}}{\to} \text{“}$\index{\alpha #2. @\back \makebox[20mm][l]{$[#1/tex name/tex.]$}#2.}%
\index{pyk: #2. $[#1/tex name/tex.]$}%
\tex{
$[#1/tex name/tex.
\stackrel {\mathrm {tex}}{=} #3/tex name.
]$}$[#1/tex name/tex.%
]$\footnote{$[#1/tex name/tex.
\stackrel {\mathrm {pyk}}{=} #2/tex name.
]$}”]

$[\mathrm{intro}(\mathsf{x},\mathsf{p},\mathsf{t}) \overset{\mathrm{pyk}}{\to} \text{“intro} * \text{pyk} * \text{tex} * \text{end intro”}]$

$\mathrm{error}(*,*)$

$[\mathrm{error}(\mathsf{m},\mathsf{t}) \overset{\mathrm{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\ulcorner[\mathrm{error}(\mathsf{m},\mathsf{t}) \doteqdot \mathrm{error}_2(\ulcorner\mathsf{m}\urcorner,\mathsf{t})]\urcorner)]$

$[\mathrm{error}(\mathsf{m},\mathsf{t}) \overset{\mathrm{tex}}{\to} \text{“}$
error(#1/tex name.
,#2.
)”]

$[\mathrm{error}(\mathsf{m},\mathsf{t}) \overset{\mathrm{pyk}}{\to} \text{“error} * \text{term} * \text{end error”}]$

$\mathrm{error}_2(*,*)$

$[\mathrm{error}_2(\mathsf{m},\mathsf{t}) \overset{\mathrm{val}}{\to} \mathsf{t}\text{-color}(\mathsf{m}^1\ [\ \ulcorner\text{“}$
”$\urcorner^1\mathsf{t}$])$]$

$[\mathrm{error}_2(\mathsf{m},\mathsf{t}) \overset{\mathrm{tex}}{\to} \text{“}$
error_{2}(#1/tex name.
,#2.
)”]

$[\mathrm{error}_2(\mathsf{m},\mathsf{t}) \overset{\mathrm{pyk}}{\rightarrow} \text{“error two } * \text{ term } * \text{ end error”}]$

$\mathrm{proof}(*,*,*)$

$[\mathrm{proof}(\mathsf{p},\mathsf{t},\mathsf{c}) \overset{\mathrm{val}}{\rightarrow} \mathrm{proof}_2(\mathcal{S}(\mathsf{c},\mathsf{p}),\mathsf{t})]$

$[\mathrm{proof}(\mathsf{p},\mathsf{t},\mathsf{c}) \overset{\mathrm{tex}}{\rightarrow} \text{“}$
proof(#1.
, #2.
, #3.
)”]

$[\mathrm{proof}(\mathsf{p},\mathsf{t},\mathsf{c}) \overset{\mathrm{pyk}}{\rightarrow} \text{“proof } * \text{ term } * \text{ cache } * \text{ end proof”}]$

$\mathrm{proof}_2(*,*)$

$[\mathrm{proof}_2(\mathsf{q},\mathsf{t}) \overset{\mathrm{val}}{\rightarrow} \mathsf{t}!$
$\mathrm{If}(\mathsf{q}^{\mathrm{E}},\mathsf{q},$
$\mathrm{If}(\neg\ [\ \mathsf{q}^{0}\ ]\ ,\mathrm{error}_2(\lceil\text{“Proof has at least one unresolved premise. Lemma; premise reads:”}\rceil,\mathsf{t};\ [\ \mathsf{q}^{0\mathrm{h}}\ ]\ ),$
$\mathrm{If}(\neg\ [\ \mathsf{q}^{1}\ ]\ ,\mathrm{error}_2(\lceil\text{“Proof has at least one unresolved side condition. Lemma; condition reads:”}\rceil,\mathsf{t};\ [\ \mathsf{q}^{1\mathrm{h}}\ ]\ ),$
$\mathrm{If}(\mathsf{q}^{2} \overset{\mathrm{t}}{=} \mathsf{t},\mathsf{T},$
$\mathrm{error}_2(\lceil\text{“Lemma does not match conclusion. Lemma; conclusion reads:”}\rceil,\mathsf{t};\ [\ \mathsf{q}^{2}\ ])))))]$

$[\mathrm{proof}_2(\mathsf{q},\mathsf{t}) \overset{\mathrm{tex}}{\rightarrow} \text{“}$
proof_{2}(#1.
, #2.
)”]

$[\mathrm{proof}_2(\mathsf{q},\mathsf{t}) \overset{\mathrm{pyk}}{\rightarrow} \text{“proof two } * \text{ term } * \text{ end proof”}]$

$\mathcal{S}(*,*)$

$[\mathcal{S}(\mathsf{c},\mathsf{t}) \overset{\mathrm{val}}{\rightarrow} \mathsf{c}!$
$\mathrm{If}(\mathsf{t}^{\mathrm{E}},\mathsf{t},$
$\mathrm{If}(\mathsf{t} \overset{\mathrm{r}}{=} \lceil *^{\mathrm{I}} \rceil,\mathcal{S}^{\mathrm{I}}(\mathsf{c},\mathsf{t}),$
$\mathrm{If}(\mathsf{t} \overset{\mathrm{r}}{=} \lceil *^{\triangleright} \rceil,\mathcal{S}^{\triangleright}(\mathsf{c},\mathsf{t}),$
$\mathrm{If}(\mathsf{t} \overset{\mathrm{r}}{=} \lceil *^{\mathrm{V}} \rceil,\mathcal{S}^{\mathrm{E}}(\mathsf{c},\mathsf{t}),$
$\mathrm{If}(\mathsf{t} \overset{\mathrm{r}}{=} \lceil *^{+} \rceil,\mathcal{S}^{+}(\mathsf{c},\mathsf{t}),$

$\mathrm{If}(\mathsf{t} \overset{\mathrm{r}}{=} \lceil * ^{-} \rceil, \mathcal{S}^{-}(\mathsf{c}, \mathsf{t}),$
$\mathrm{If}(\mathsf{t} \overset{\mathrm{r}}{=} \lceil * ^{*} \rceil, \mathcal{S}^{*}(\mathsf{c}, \mathsf{t}),$
$\mathrm{If}(\mathsf{t} \overset{\mathrm{r}}{=} \lceil * \mathbin{@} * \rceil, \mathcal{S}^{@}(\mathsf{c}, \mathsf{t}),$
$\mathrm{If}(\mathsf{t} \overset{\mathrm{r}}{=} \lceil * \vdash * \rceil, \mathcal{S}^{\vdash}(\mathsf{c}, \mathsf{t}),$
$\mathrm{If}(\mathsf{t} \overset{\mathrm{r}}{=} \lceil * \Vdash * \rceil, \mathcal{S}^{\Vdash}(\mathsf{c}, \mathsf{t}),$
$\mathrm{If}(\mathsf{t} \overset{\mathrm{r}}{=} \lceil * \text{ i.e. } * \rceil, \mathcal{S}^{\text{i.e.}}(\mathsf{c}, \mathsf{t}),$
$\mathrm{If}(\mathsf{t} \overset{\mathrm{r}}{=} \lceil \forall * \colon * \rceil, \mathcal{S}^{\forall}(\mathsf{c}, \mathsf{t}),$
$\mathrm{If}(\mathsf{t} \overset{\mathrm{r}}{=} \lceil * ; * \rceil, \mathcal{S}^{;}(\mathsf{c}, \mathsf{t}),$
$\mathrm{error}_2(\lceil \text{“Unknown sequent operator:”} \rceil, \mathsf{t}))))))))))))))]$

$[\mathcal{S}(\mathsf{x}, \mathsf{y}) \overset{\mathrm{tex}}{\to} \text{“}$
{\cal S}(#1.
, #2.
)”]

$[\mathcal{S}(\mathsf{x}, \mathsf{y}) \overset{\mathrm{pyk}}{\to} \text{“sequent eval } * \text{ term } * \text{ end eval”}]$

$\mathcal{S}^{\mathrm{I}}(*, *)$

$[\mathcal{S}^{\mathrm{I}}(\mathsf{c}, \mathsf{t}) \overset{\mathrm{val}}{\to} \mathsf{c!}\ [\ \emptyset :: \ [\ \emptyset :: \ [\ \mathsf{t\text{-}color}(\mathsf{t}^1 \vdash \ [\ \mathsf{t}^1\ ]\ ) :: \mathsf{T}\ ]\ ]\ ]\ ]$

$[\mathcal{S}^{\mathrm{I}}(\mathsf{x}, \mathsf{y}) \overset{\mathrm{tex}}{\to} \text{“}$
{\cal S}^{I}(#1.
, #2.
)”]

$[\mathcal{S}^{\mathrm{I}}(\mathsf{x}, \mathsf{y}) \overset{\mathrm{pyk}}{\to} \text{“seqeval init } * \text{ term } * \text{ end eval”}]$

$\mathcal{S}^{\triangleright}(*, *)$

$[\mathcal{S}^{\triangleright}(\mathsf{c}, \mathsf{t}) \overset{\mathrm{val}}{\to} \mathcal{S}_1^{\triangleright}(\mathsf{c}, \mathsf{t}, \mathcal{S}(\mathsf{c}, \mathsf{t}^1))]$

$[\mathcal{S}^{\triangleright}(\mathsf{x}, \mathsf{y}) \overset{\mathrm{tex}}{\to} \text{“}$
{\cal S}^{\rhd}(#1.
, #2.
)”]

$[\mathcal{S}^{\triangleright}(\mathsf{x}, \mathsf{y}) \overset{\mathrm{pyk}}{\to} \text{“seqeval modus } * \text{ term } * \text{ end eval”}]$

$\mathcal{S}_1^{\triangleright}(*,*,*)$

$[\mathcal{S}_1^{\triangleright}(\mathsf{c},\mathsf{t},\mathsf{q}) \overset{\text{val}}{\to} \mathsf{c}!\ [\ \mathsf{t}!$
$\text{If}(\mathsf{q}^{\text{E}},\mathsf{q},$
$\text{If}(\mathsf{q}^2 \overset{\text{r}}{=} \ulcorner * \vdash * \urcorner, \mathsf{q}^0 \cup \{\mathsf{q}^{21}\} :: [\ \mathsf{q}^1 :: [\ \mathsf{q}^{22} :: \mathsf{T}\ ]\ ],$
$\text{If}(\mathsf{q}^2 \overset{\text{r}}{=} \ulcorner * \Vdash * \urcorner, \mathsf{q}^0 :: [\ \mathsf{q}^1 \cup \{\mathsf{q}^{21}\} :: [\ \mathsf{q}^{22} :: \mathsf{T}\ ]\ ],$
$\text{error}_2(\ulcorner \text{“The modus operation requires the conclusion of its argument to be an inference or an endorsement”} \urcorner, \mathsf{t}))))\ ]\ ]$

$[\mathcal{S}_1^{\triangleright}(\mathsf{x},\mathsf{y},\mathsf{z}) \overset{\text{tex}}{\to} \text{“}$
{\cal S}_{1}^{\rhd}(#1.
, #2.
, #3.
)”]

$[\mathcal{S}_1^{\triangleright}(\mathsf{x},\mathsf{y},\mathsf{z}) \overset{\text{pyk}}{\to} \text{“seqeval modus one } * \text{ term } * \text{ sequent } * \text{ end eval”}]$

$\mathcal{S}^{\text{E}}(*,*)$

$[\mathcal{S}^{\text{E}}(\mathsf{c},\mathsf{t}) \overset{\text{val}}{\to} \mathcal{S}_1^{\text{E}}(\mathsf{c},\mathsf{t},\mathcal{S}(\mathsf{c},\mathsf{t}^1))]$

$[\mathcal{S}^{\text{E}}(\mathsf{x},\mathsf{y}) \overset{\text{tex}}{\to} \text{“}$
{\cal S}^{E}(#1.
, #2.
)”]

$[\mathcal{S}^{\text{E}}(\mathsf{x},\mathsf{y}) \overset{\text{pyk}}{\to} \text{“seqeval verify } * \text{ term } * \text{ end eval”}]$

$\mathcal{S}_1^{\text{E}}(*,*,*)$

$[\mathcal{S}_1^{\text{E}}(\mathsf{c},\mathsf{t},\mathsf{q}) \overset{\text{val}}{\to} \mathsf{c}!\ [\ \mathsf{t}!$
$\text{If}(\mathsf{q}^{\text{E}},\mathsf{q},$
$\text{If}(\neg\ [\ \mathsf{q}^2 \overset{\text{r}}{=} \ulcorner * \Vdash * \urcorner\ ], \text{error}_2(\ulcorner \text{“The verify operation requires the conclusion of its argument to be an endorsement:”} \urcorner, \mathsf{t}),$
$\text{If}(\neg\ [\ \mathsf{q}^{21\mathcal{C}}\ ], \text{error}_2(\ulcorner \text{“The verify operation requires the side condition to contain no metavariables. Term; condition:”} \urcorner, \mathsf{t};\ [\ \mathsf{q}^{21}\ ]),$
$\text{If}(\mathcal{U}^{\text{M}}(\mathcal{U}^{\text{M}}(\mathcal{E}(\mathsf{q}^{21},\mathsf{T},\mathsf{c}))\ \text{`}\ \mathsf{c}), \mathsf{q}^0 :: [\ \mathsf{q}^1 :: [\ \mathsf{q}^{22} :: \mathsf{T}\ ]\ ],$
$\text{error}_2(\ulcorner \text{“False side condition:”} \urcorner, \mathsf{t})))))\ ]\ ]$

$[\mathcal{S}_1^{\text{E}}(\mathsf{x},\mathsf{y},\mathsf{z}) \overset{\text{tex}}{\to} \text{“}$
{\cal S}_{1}^{E}(#1.
, #2.
, #3.

)”]

$[\mathcal{S}_1^{\mathrm{E}}(\mathsf{x},\mathsf{y},\mathsf{z}) \overset{\mathrm{pyk}}{\to} \text{“seqeval verify one } * \text{ term } * \text{ sequent } * \text{ end eval”}]$

$\mathcal{S}^{+}(*,*)$

$[\mathcal{S}^{+}(\mathsf{c},\mathsf{t}) \overset{\mathrm{val}}{\to} \mathcal{S}_1^{+}(\mathsf{c},\mathsf{t},\mathcal{S}(\mathsf{c},\mathsf{t}^1))]$

$[\mathcal{S}^{+}(\mathsf{x},\mathsf{y}) \overset{\mathrm{tex}}{\to} \text{“}$
{\cal S}^{+}(#1.
, #2.
)”]

$[\mathcal{S}^{+}(\mathsf{x},\mathsf{y}) \overset{\mathrm{pyk}}{\to} \text{“sequent eval plus } * \text{ term } * \text{ end eval”}]$

$\mathcal{S}_1^{+}(*,*,*)$

$[\mathcal{S}_1^{+}(\mathsf{c},\mathsf{t},\mathsf{q}) \overset{\mathrm{val}}{\to} \mathsf{c}!\ [\ \mathsf{t}!$
$\mathrm{If}(\mathsf{q}^{\mathrm{E}},\mathsf{q},$
$\mathrm{If}(\ [\ \mathsf{q}^2 \overset{\mathrm{r}}{=} \lceil * \vdash * \rceil\ ]\ \wedge\ [\ \mathsf{q}^{22} \overset{\mathrm{r}}{=} \lceil * \vdash * \rceil\ ]\ ,$
$[\ \mathsf{q}^0 :: [\ \mathsf{q}^1 :: [\ \mathsf{t}\text{-color}(\ [\ \mathsf{q}^{21} \oplus [\ \mathsf{q}^{221}\ ]\ ]\ \vdash\ [\ \mathsf{q}^{222}\ ]\ ) :: \mathsf{T}\ ]\ ]\ ]\ ,$
$\mathrm{error}_2(\lceil \text{“Term; conclusion not fit for decurrying:”} \rceil, \mathsf{t};\ [\ \mathsf{q}^2\ ]\ )))\ ]\ ]$

$[\mathcal{S}_1^{+}(\mathsf{x},\mathsf{y},\mathsf{z}) \overset{\mathrm{tex}}{\to} \text{“}$
{\cal S}_{1}^{+}(#1.
, #2.
, #3.
)”]

$[\mathcal{S}_1^{+}(\mathsf{x},\mathsf{y},\mathsf{z}) \overset{\mathrm{pyk}}{\to} \text{“seqeval plus one } * \text{ term } * \text{ sequent } * \text{ end eval”}]$

$\mathcal{S}^{-}(*,*)$

$[\mathcal{S}^{-}(\mathsf{c},\mathsf{t}) \overset{\mathrm{val}}{\to} \mathcal{S}_1^{-}(\mathsf{c},\mathsf{t},\mathcal{S}(\mathsf{c},\mathsf{t}^1))]$

$[\mathcal{S}^{-}(\mathsf{x},\mathsf{y}) \overset{\mathrm{tex}}{\to} \text{“}$
{\cal S}^{-}(#1.
, #2.
)”]

$[\mathcal{S}^{-}(\mathsf{x},\mathsf{y}) \overset{\mathrm{pyk}}{\to} \text{“seqeval minus } * \text{ term } * \text{ end eval”}]$

$\mathcal{S}_1^-(*,*,*)$

$[\mathcal{S}_1^-(\mathsf{c},\mathsf{t},\mathsf{q}) \overset{\text{val}}{\to} \mathsf{c}!\ [\ \mathsf{t}!$
$\text{If}(\mathsf{q}^{\text{E}},\mathsf{q},$
$\text{If}(\ [\ \mathsf{q}^2 \overset{\text{r}}{=} \lceil * \vdash * \rceil\ ]\ \wedge\ [\ \mathsf{q}^{21} \overset{\text{r}}{=} \lceil * \oplus * \rceil\ ]\ ],$
$[\ \mathsf{q}^0 :: [\ \mathsf{q}^1 :: [\ \mathsf{t}\text{-color}(\mathsf{q}^{211} \vdash [\ \mathsf{q}^{212} \vdash [\ \mathsf{q}^{22}\ ]\ ]\ ) :: \mathsf{T}\ ]\ ]\ ],$
$\text{error}_2(\lceil \text{“Term; conclusion not fit for decurrying:”} \rceil, \mathsf{t};\ [\ \mathsf{q}^2\ ]\ )))\ ]\ ]$

$[\mathcal{S}_1^-(\mathsf{x},\mathsf{y},\mathsf{z}) \overset{\text{tex}}{\to} \text{“}$
{\cal S}_{1}^{-}(#1.
, #2.
, #3.
)”]

$[\mathcal{S}_1^-(\mathsf{x},\mathsf{y},\mathsf{z}) \overset{\text{pyk}}{\to} \text{“seqeval minus one } * \text{ term } * \text{ sequent } * \text{ end eval”}]$

$\mathcal{S}^*(*,*)$

$[\mathcal{S}^*(\mathsf{c},\mathsf{t}) \overset{\text{val}}{\to} \mathcal{S}_1^*(\mathsf{c},\mathsf{t},\mathcal{S}(\mathsf{c},\mathsf{t}^1))]$

$[\mathcal{S}^*(\mathsf{x},\mathsf{y}) \overset{\text{tex}}{\to} \text{“}$
{\cal S}^{\ast}(#1.
, #2.
)”]

$[\mathcal{S}^*(\mathsf{x},\mathsf{y}) \overset{\text{pyk}}{\to} \text{“seqeval deref } * \text{ term } * \text{ end eval”}]$

$\mathcal{S}_1^*(*,*,*)$

$[\mathcal{S}_1^*(\mathsf{c},\mathsf{t},\mathsf{q}) \overset{\text{val}}{\to} \mathsf{c}!\ [\ \mathsf{t}!$
$\text{If}(\mathsf{q}^{\text{E}},\mathsf{q},$
$\mathcal{S}_2^*(\mathsf{c},\mathsf{t},\mathsf{q},\textbf{aspect}(<\text{stmt}>,\mathsf{q}^2,\mathsf{c})))\ ]\ ]$

$[\mathcal{S}_1^*(\mathsf{x},\mathsf{y},\mathsf{z}) \overset{\text{tex}}{\to} \text{“}$
{\cal S}_{1}^{\ast}(#1.
, #2.
, #3.
)”]

$[\mathcal{S}_1^*(\mathsf{x},\mathsf{y},\mathsf{z}) \overset{\text{pyk}}{\to} \text{“seqeval deref one } * \text{ term } * \text{ sequent } * \text{ end eval”}]$

$\mathcal{S}_2^*(*,*,*,*)$

$[\mathcal{S}_2^*(\mathsf{c},\mathsf{t},\mathsf{q},\mathsf{d}) \overset{\text{val}}{\to} \mathsf{c}!\ [\ \mathsf{t}!\ [\ \mathsf{q}!$
If$(\mathsf{d}, \text{error}_2(\ulcorner\text{“Dereferencing construct that has no statement def:”}\urcorner, \mathsf{t})$,
$[\ \mathsf{q}^0 :: [\ \mathsf{q}^1 :: [\ \mathsf{d}^3 :: \mathsf{T}\ ]\ ]\ ]\ )\ ]\ ]$

$[\mathcal{S}_2^*(\mathsf{c},\mathsf{t},\mathsf{q},\mathsf{d}) \overset{\text{tex}}{\to}$ “
{\cal S}_{2}^{\ast}(#1.
, #2.
, #3.
, #4.
)”]

$[\mathcal{S}_2^*(\mathsf{c},\mathsf{t},\mathsf{q},\mathsf{d}) \overset{\text{pyk}}{\to}$ “seqeval deref two ∗ term ∗ sequent ∗ def ∗ end eval”]

$\mathcal{S}^{@}(*,*)$

$[\mathcal{S}^{@}(\mathsf{c},\mathsf{t}) \overset{\text{val}}{\to} \mathcal{S}_1^{@}(\mathsf{c},\mathsf{t},\mathcal{S}(\mathsf{c},\mathsf{t}^1))]$

$[\mathcal{S}^{@}(\mathsf{x},\mathsf{y}) \overset{\text{tex}}{\to}$ “
{\cal S}^{\char64}(#1.
, #2.
)”]

$[\mathcal{S}^{@}(\mathsf{x},\mathsf{y}) \overset{\text{pyk}}{\to}$ “seqeval at ∗ term ∗ end eval”]

$\mathcal{S}_1^{@}(*,*,*)$

$[\mathcal{S}_1^{@}(\mathsf{c},\mathsf{t},\mathsf{q}) \overset{\text{val}}{\to} \mathsf{c}!\ [\ \mathsf{t}!$
If$(\mathsf{q}^{\mathrm{E}}, \mathsf{q},$
If$(\neg\ [\ \mathsf{q}^2 \overset{\mathrm{r}}{=} \lceil\forall *: *\rceil\ ]\ , \text{error}_2(\ulcorner\text{“Quantifier elimination requires the conclusion of its argument to be a quantifier:”}\urcorner, \mathsf{t})$,
If$(\neg\ [\ \mathsf{t}^2$ free for q^{21} in $[\ \mathsf{q}^{22}\ ]\ ]\ , \text{error}_2(\ulcorner\text{“Quantifier elimination leads to variable clash:”}\urcorner, \mathsf{t})$,
$[\ \mathsf{q}^0 :: [\ \mathsf{q}^1 :: [\ \langle \mathsf{q}^{22} | \mathsf{q}^{21} := \mathsf{t}^2 \rangle :: \mathsf{T}\ ]\ ]\ ]\ ))))\ ]\ ]$

$[\mathcal{S}_1^{@}(\mathsf{c},\mathsf{t},\mathsf{q}) \overset{\text{tex}}{\to}$ “
{\cal S}_{1}^{\char64}(#1.
, #2.
, #3.
)”]

$[\mathcal{S}_1^{@}(\mathsf{c},\mathsf{t},\mathsf{q}) \overset{\text{pyk}}{\to}$ “seqeval at one ∗ term ∗ sequent ∗ end eval”]

$\mathcal{S}^{\vdash}(*,*)$

$[\mathcal{S}^{\vdash}(\mathsf{c},\mathsf{t}) \overset{\text{val}}{\to} \mathcal{S}_1^{\vdash}(\mathsf{c},\mathsf{t},\mathsf{t}^1,\mathcal{S}(\mathsf{c},\mathsf{t}^2))]$

$[\mathcal{S}^{\vdash}(\mathsf{x},\mathsf{y}) \overset{\text{tex}}{\to}$ “
{\cal S}^{\vdash}(#1.
, #2.
)”]

$[\mathcal{S}^{\vdash}(\mathsf{x},\mathsf{y}) \overset{\text{pyk}}{\to}$ “seqeval infer ∗ term ∗ end eval”]

$\mathcal{S}_1^{\vdash}(*,*,*,*)$

$[\mathcal{S}_1^{\vdash}(\mathsf{c},\mathsf{t},\mathsf{p},\mathsf{q}) \overset{\text{val}}{\to} \mathsf{c}!\ [\ \mathsf{t}!\ [\ \mathsf{p}!$
$\mathrm{If}(\mathsf{q}^{\mathrm{E}},\mathsf{q},$
$[\ \mathsf{q}^0\backslash\{\mathsf{p}\} :: [\ \mathsf{q}^1 :: [\ \text{t-color}(\mathsf{p} \vdash [\ \mathsf{q}^2\ ]\ ) :: \mathsf{T}\ ]\ ]\ ]\ )\ ]\ ]\ ]$

$[\mathcal{S}_1^{\vdash}(\mathsf{x},\mathsf{y},\mathsf{z},\mathsf{u}) \overset{\text{tex}}{\to}$ “
{\cal S}_{1}^{\vdash}(#1.
, #2.
, #3.
, #4.
)”]

$[\mathcal{S}_1^{\vdash}(\mathsf{x},\mathsf{y},\mathsf{z},\mathsf{u}) \overset{\text{pyk}}{\to}$ “seqeval infer one ∗ term ∗ premise ∗ sequent ∗ end eval”]

$\mathcal{S}^{\Vdash}(*,*)$

$[\mathcal{S}^{\Vdash}(\mathsf{c},\mathsf{t}) \overset{\text{val}}{\to} \mathcal{S}_1^{\Vdash}(\mathsf{c},\mathsf{t},\mathsf{t}^1,\mathcal{S}(\mathsf{c},\mathsf{t}^2))]$

$[\mathcal{S}^{\Vdash}(\mathsf{x},\mathsf{y}) \overset{\text{tex}}{\to}$ “
{\cal S}^{\makebox [0mm][l]{\scriptsize $\vdash $}\,{\vdash }}(#1.
, #2.
)”]

$[\mathcal{S}^{\Vdash}(\mathsf{x},\mathsf{y}) \overset{\text{pyk}}{\to}$ “seqeval endorse ∗ term ∗ end eval”]

$\mathcal{S}_1^{\Vdash}(*,*,*,*)$

$[\mathcal{S}_1^{\Vdash}(\mathsf{c},\mathsf{t},\mathsf{p},\mathsf{q}) \overset{\text{val}}{\to} \mathsf{c}!\ [\ \mathsf{t}!\ [\ \mathsf{p}!$
$\mathrm{If}(\mathsf{q}^{\mathrm{E}},\mathsf{q},$
$[\ \mathsf{q}^0 :: [\ \mathsf{q}^1\backslash\{\mathsf{p}\} :: [\ \text{t-color}(\mathsf{p} \Vdash [\ \mathsf{q}^2\ ]\ ) :: \mathsf{T}\ ]\ ]\ ]\ )\ ]\ ]\ ]$

$[\mathcal{S}_1^{\vdash}(\mathsf{x},\mathsf{y},\mathsf{z},\mathsf{u}) \overset{\text{tex}}{\to} \text{“}$
{\cal S}_{1}^{\vdash}(#1.
, #2.
, #3.
, #4.
)”]

$[\mathcal{S}_1^{\vdash}(\mathsf{x},\mathsf{y},\mathsf{z},\mathsf{u}) \overset{\text{pyk}}{\to} \text{“seqeval endorse one} * \text{term} * \text{side} * \text{sequent} * \text{end eval”}]$

$\mathcal{S}^{\text{i.e.}}(*,*)$

$[\mathcal{S}^{\text{i.e.}}(\mathsf{c},\mathsf{t}) \overset{\text{val}}{\to} \mathcal{S}_1^{\text{i.e.}}(\mathsf{c},\mathsf{t},\mathsf{t}^2,\mathcal{S}(\mathsf{c},\mathsf{t}^1))]$

$[\mathcal{S}^{\text{i.e.}}(\mathsf{x},\mathsf{y}) \overset{\text{tex}}{\to} \text{“}$
{\cal S}^{i.e.}(#1.
, #2.
)”]

$[\mathcal{S}^{\text{i.e.}}(\mathsf{x},\mathsf{y}) \overset{\text{pyk}}{\to} \text{“seqeval est} * \text{term} * \text{end eval”}]$

$\mathcal{S}_1^{\text{i.e.}}(*,*,*,*)$

$[\mathcal{S}_1^{\text{i.e.}}(\mathsf{c},\mathsf{t},\mathsf{a},\mathsf{q}) \overset{\text{val}}{\to} \mathsf{c}!\ [\ \mathsf{t}!\ [\ \mathsf{a}!$
$\text{If}(\mathsf{q}^{\text{E}},\mathsf{q},\mathcal{S}_2^{\text{i.e.}}(\mathsf{c},\mathsf{t},\mathsf{a},\mathsf{q},\textbf{aspect}(\text{<stmt>},\mathsf{a},\mathsf{c})))\ ]\ ]\ ]$

$[\mathcal{S}_1^{\text{i.e.}}(\mathsf{x},\mathsf{y},\mathsf{z},\mathsf{u}) \overset{\text{tex}}{\to} \text{“}$
{\cal S}_{1}^{i.e.}(#1.
, #2.
, #3.
, #4.
)”]

$[\mathcal{S}_1^{\text{i.e.}}(\mathsf{x},\mathsf{y},\mathsf{z},\mathsf{u}) \overset{\text{pyk}}{\to} \text{“seqeval est one} * \text{term} * \text{name} * \text{sequent} * \text{end eval”}]$

$\mathcal{S}_2^{\text{i.e.}}(*,*,*,*,*)$

$[\mathcal{S}_2^{\text{i.e.}}(\mathsf{c},\mathsf{t},\mathsf{a},\mathsf{q},\mathsf{d}) \overset{\text{val}}{\to} \mathsf{c}!\ [\ \mathsf{t}!\ [\ \mathsf{a}!\ [\ \mathsf{q}!$
$\text{If}(\mathsf{d},\text{error}_2(\lceil\text{“Referencing construct that has no statement def:”}\rceil,\mathsf{t}),$
$\text{If}(\neg\ [\ \mathsf{d}^3 \overset{\mathsf{t}}{=}\ [\ \mathsf{q}^2\ ]\ ]\ ,\text{error}_2(\lceil\text{“Reference; conclusion do not match:”}\rceil,\mathsf{a};\ [\ \mathsf{q}^2\ ]\ ),$
$[\ \mathsf{q}^0 :: [\ \mathsf{q}^1 :: [\ \mathsf{a} :: \mathsf{T}\ ]\ ]\ ]\ ))\ ]\ ]\ ]\ ]$

$[\mathcal{S}_2^{\text{i.e.}}(\mathsf{c},\mathsf{t},\mathsf{a},\mathsf{q},\mathsf{d}) \overset{\text{tex}}{\to} \text{“}$
{\cal S}_{2}^{i.e.}(#1.

, #2.
, #3.
, #4.
, #5.
)"]

$[\mathcal{S}_2^{\text{i.e.}}(\mathsf{c},\mathsf{t},\mathsf{a},\mathsf{q},\mathsf{d}) \overset{\text{pyk}}{\to}$ "seqeval est two ∗ term ∗ name ∗ sequent ∗ def ∗ end eval"]

$\mathcal{S}^{\forall}(*,*)$

$[\mathcal{S}^{\forall}(\mathsf{c},\mathsf{t}) \overset{\text{val}}{\to} \mathcal{S}_1^{\forall}(\mathsf{c},\mathsf{t},\mathsf{t}^1,\mathcal{S}(\mathsf{c},\mathsf{t}^2))]$

$[\mathcal{S}^{\forall}(\mathsf{x},\mathsf{y}) \overset{\text{tex}}{\to}$ "
{\cal S}^{\forall}(#1.
, #2.
)"]

$[\mathcal{S}^{\forall}(\mathsf{x},\mathsf{y}) \overset{\text{pyk}}{\to}$ "seqeval all ∗ term ∗ end eval"]

$\mathcal{S}_1^{\forall}(*,*,*,*)$

$[\mathcal{S}_1^{\forall}(\mathsf{c},\mathsf{t},\mathsf{v},\mathsf{q}) \overset{\text{val}}{\to} \mathsf{c}!\ [\ \mathsf{t}!\ [\ \mathsf{v}!$
$\text{If}(\mathsf{q}^{\text{E}},\mathsf{q},$
$\text{If}(\neg\ [\ \mathsf{v}^{\mathcal{V}}\ ]\ ,\text{error}_2(\lceil\text{"Metageneralization over non-metavariable:"}\rceil,\mathsf{t}),$
$\text{If}(\mathsf{v}\text{ free in }\ [\ \mathsf{q}^0\ ]\ ,\text{error}_2(\lceil\text{"Metageneralization over metavariable that occurs free in some premise:"}\rceil,\mathsf{t}),$
$\text{If}(\mathsf{v}\text{ free in }\ [\ \mathsf{q}^1\ ]\ ,\text{error}_2(\lceil\text{"Metageneralization over metavariable that occurs free in some side condition:"}\rceil,\mathsf{t}),$
$[\ \mathsf{q}^0 ::\ [\ \mathsf{q}^1 ::\ [\ \mathsf{t}\text{-color}(\forall\mathsf{v}:\ [\ \mathsf{q}^2\ ]\ ) :: \mathsf{T}\ ]\ ]\ ]\ ))))\ ]\ ]\ ]$

$[\mathcal{S}_1^{\forall}(\mathsf{c},\mathsf{t},\mathsf{v},\mathsf{q}) \overset{\text{tex}}{\to}$ "
{\cal S}_{1}^{\forall}(#1.
, #2.
, #3.
, #4.
)"]

$[\mathcal{S}_1^{\forall}(\mathsf{c},\mathsf{t},\mathsf{v},\mathsf{q}) \overset{\text{pyk}}{\to}$ "seqeval all one ∗ term ∗ variable ∗ sequent ∗ end eval"]

$\mathcal{S}^{;}(*,*)$

$[\mathcal{S}^{;}(\mathsf{c},\mathsf{t}) \overset{\text{val}}{\to} \mathcal{S}_1^{;}(\mathsf{c},\mathsf{t},\mathcal{S}(\mathsf{c},\mathsf{t}^1))]$

$[\mathcal{S}^{;}(x,y) \overset{\text{tex}}{\to} \text{“}$
{\cal S}^{;}(#1.
, #2.
)”]

$[\mathcal{S}^{;}(x,y) \overset{\text{pyk}}{\to} \text{“seqeval cut} * \text{term} * \text{end eval”}]$

$\mathcal{S}_1^{;}(*,*,*)$

$[\mathcal{S}_1^{;}(c,t,p) \overset{\text{val}}{\to} c!\ [\ t!$
$\text{If}(p^{E}, p, \mathcal{S}_2^{;}(c,t,p,\mathcal{S}(c,t^2)))\ ]\ ]$

$[\mathcal{S}_1^{;}(x,y,z) \overset{\text{tex}}{\to} \text{“}$
{\cal S}_{1}^{;}(#1.
, #2.
, #3.
)”]

$[\mathcal{S}_1^{;}(c,t,p) \overset{\text{pyk}}{\to} \text{“seqeval cut one} * \text{term} * \text{forerunner} * \text{end eval”}]$

$\mathcal{S}_2^{;}(*,*,*,*)$

$[\mathcal{S}_2^{;}(c,t,p,q) \overset{\text{val}}{\to} c!\ [\ t!\ [\ p!$
$\text{If}(q^{E}, q,\ [\ p^{0} \cup [\ q^{0} \backslash \{p^{2}\}\ ]\ ]\ ::\ [\ [\ p^{1} \cup [\ q^{1}\ ]\ ]\ ::\ [\ q^{2} :: \mathsf{T}\ ]\ ]\ )\ ]\ ]\ ]$

$[\mathcal{S}_2^{;}(c,t,p,q) \overset{\text{tex}}{\to} \text{“}$
{\cal S}_{2}^{;}(#1.
, #2.
, #3.
, #4.
)”]

$[\mathcal{S}_2^{;}(x,y,z,u) \overset{\text{pyk}}{\to} \text{“seqeval cut two} * \text{term} * \text{forerunner} * \text{sequent} * \text{end eval”}]$

$\mathcal{T}(*)$

$[\mathcal{T}(x) \overset{\text{val}}{\to} x!\Lambda\lambda c.x]$

$[\mathcal{T}(x) \overset{\text{tex}}{\to} \text{“}$
{\cal T}(#1.
)”]

$[\mathcal{T}(x) \overset{\text{pyk}}{\to} \text{“computably true} * \text{end true”}]$

claims(∗, ∗, ∗)

[claims(t, c, r) $\overset{\text{val}}{\to}$
If(claims$_2$(t, c, r), T, claims$_2$(t, c, c[r]["bibliography"][1]))]

[claims(t, c, r) $\overset{\text{tex}}{\to}$ “
claims(#1.
, #2.
, #3.
)”]

[claims(t, c, r) $\overset{\text{pyk}}{\to}$ “claims ∗ cache ∗ ref ∗ end claims”]

claims$_2$(∗, ∗, ∗)

[claims$_2$(t, c, r) $\overset{\text{val}}{\to}$ If(¬ [r$^{\text{c}}$] , t! [c!F] , t $\in_{\text{c}}$ [c[r]["codex"][r][0][0]["claim"][3]])]

[claims$_2$(t, c, r) $\overset{\text{tex}}{\to}$ “
claims_2(#1.
, #2.
, #3.
)”]

[claims$_2$(t, c, r) $\overset{\text{pyk}}{\to}$ “claims two ∗ cache ∗ ref ∗ end claims”]

<proof>

[<proof> $\overset{\text{val}}{\to}$ ⌈<proof>⌉]

[<proof> $\overset{\text{tex}}{\to}$ “
{<}proof{>}”]

[<proof> $\overset{\text{pyk}}{\to}$ “the proof aspect”]

proof

[proof $\overset{\text{msg}}{\to}$ <proof>]

[proof $\overset{\text{tex}}{\to}$ “
proof”]

[proof $\overset{\text{pyk}}{\to}$ “proof”]

$[\textbf{Lemma } *\colon *]$

$[[\textbf{Lemma } \mathsf{x}\colon \mathsf{y}] \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\ulcorner[[\textbf{Lemma } \mathsf{x}\colon \mathsf{y}] \doteqdot [\mathsf{x} \overset{\text{stmt}}{\to} \mathsf{y}]]\urcorner)]$

$[[\textbf{Lemma } \mathsf{x}\colon \mathsf{y}] \overset{\text{tex}}{\to}$ “
[\mathbf{Lemma\ } #1.
\colon #2.
]”]

$[[\textbf{Lemma } \mathsf{x}\colon \mathsf{y}] \overset{\text{pyk}}{\to}$ “lemma $*$ says $*$ end lemma”]

$[\textbf{Proof of } *\colon *]$

$[[\textbf{Proof of } \mathsf{x}\colon \mathsf{y}] \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\ulcorner[[\textbf{Proof of } \mathsf{x}\colon \mathsf{y}] \doteqdot [\mathsf{x} \overset{\text{proof}}{\to} \mathsf{y}]]\urcorner)]$

$[[\textbf{Proof of } \mathsf{x}\colon \mathsf{y}] \overset{\text{tex}}{\to}$ “
[\mathbf{Proof\ of\ }#1/tex name/tex.
\colon #2.
]”]

$[[\textbf{Proof of } \mathsf{x}\colon \mathsf{y}] \overset{\text{pyk}}{\to}$ “proof of $*$ reads $*$ end proof”]

$[* \textbf{ lemma } *\colon *]$

$[[\mathsf{x} \textbf{ lemma } \mathsf{y}\colon \mathsf{z}] \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\ulcorner[[\mathsf{x} \textbf{ lemma } \mathsf{y}\colon \mathsf{z}] \doteqdot [\mathsf{y} \overset{\text{stmt}}{=} \mathsf{x} \vdash \mathsf{z}]]\urcorner)]$

$[[\mathsf{x} \textbf{ lemma } \mathsf{y}\colon \mathsf{z}] \overset{\text{tex}}{\to}$ “
[#1.
\mathbf{\ lemma\ } #2.
\colon #3.
]”]

$[[\mathsf{x} \textbf{ lemma } \mathsf{y}\colon \mathsf{z}] \overset{\text{pyk}}{\to}$ “in theory $*$ lemma $*$ says $*$ end lemma”]

$[* \textbf{ antilemma } *\colon *]$

$[[\mathsf{x} \textbf{ antilemma } \mathsf{y}\colon \mathsf{z}] \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\ulcorner[[\mathsf{x} \textbf{ antilemma } \mathsf{y}\colon \mathsf{z}] \doteqdot$
$[\mathsf{x} \textbf{ lemma } \mathsf{y}\colon \mathsf{z} \vdash \perp\!\!\!\perp]]\urcorner)]$

$[[\mathsf{x} \textbf{ antilemma } \mathsf{y}\colon \mathsf{z}] \overset{\text{tex}}{\to}$ “
[#1.
\mathbf{\ antilemma\ } #2.

\colon #3.
]”]

[[x **antilemma** y: z] $\overset{\text{pyk}}{\to}$ “in theory ∗ antilemma ∗ says ∗ end antilemma”]

[∗ **rule** ∗: ∗]

[[x **rule** y: z] $\overset{\text{macro}}{\to}$ λt.λs.λc.$\tilde{\mathcal{M}}_4$(t, s, c, ⌈[[x **rule** y: z] ⩴
[x **lemma** y: z][**Proof of** y: Rule tactic]]⌉)]

[[x **rule** y: z] $\overset{\text{tex}}{\to}$ “
[#1.
\mathbf{\ rule\ } #2.
\colon #3.
]”]

[[x **rule** y: z] $\overset{\text{pyk}}{\to}$ “in theory ∗ rule ∗ says ∗ end rule”]

[∗ **antirule** ∗: ∗]

[[x **antirule** y: z] $\overset{\text{macro}}{\to}$ λt.λs.λc.$\tilde{\mathcal{M}}_4$(t, s, c, ⌈[[x **antirule** y: z] ⩴ [x **rule** y: z ⊢
⫫]]⌉)]

[[x **antirule** y: z] $\overset{\text{tex}}{\to}$ “
[#1.
\mathbf{\ antirule\ } #2.
\colon #3.
]”]

[[x **antirule** y: z] $\overset{\text{pyk}}{\to}$ “in theory ∗ antirule ∗ says ∗ end antirule”]

verifier

[verifier $\overset{\text{val}}{\to}$ λt.λc.$\mathcal{V}_1$(c)]

[verifier $\overset{\text{pyk}}{\to}$ “verifier”]

$\mathcal{V}_1(*)$

[$\mathcal{V}_1$(c) $\overset{\text{val}}{\to}$
let$_1$(λr.
let$_1$(λx.

$\mathrm{let}_1(\lambda \mathsf{p}.$
$\mathrm{let}_1(\lambda \mathsf{d}.$
$\mathrm{If}(\neg \mathsf{d}, \mathsf{d},$
$\mathrm{let}_1(\lambda \mathsf{i}.$
$\mathrm{If}(\neg\ [\ \mathsf{i}^{\mathrm{c}}\ ]\ , \mathsf{T},$
$\mathrm{error}_2(\lceil$"Circular proof. Circle includes:"$\rceil, \mathsf{p}[\mathsf{i}]^{0\mathrm{h}})), \mathcal{V}_5(\mathsf{c}, \mathsf{r}, \mathsf{p}, \mathsf{p}))), \mathcal{V}_3(\mathsf{c}, \mathsf{r}, \mathsf{p}, \mathsf{T})), \mathcal{V}_2(\mathsf{c}, \mathsf{x})), \mathsf{c}[\mathsf{r}]["\mathrm{codex}"][\mathsf{r}]), \mathsf{c}[0])]$

$[\mathcal{V}_1(\mathsf{c}) \overset{\mathrm{tex}}{\to}$ "
{\cal V}_1(#1.
)"$]$

$[\mathcal{V}_1(\mathsf{c}) \overset{\mathrm{pyk}}{\to}$ "verify one $*$ end verify"$]$

$\mathcal{V}_2(*, *)$

$[\mathcal{V}_2(\mathsf{c}, \mathsf{p}) \overset{\mathrm{val}}{\to} \mathsf{c}!$
$\mathrm{If}(\mathsf{p}, \mathsf{T},$
$\mathrm{If}(\neg\ [\ \mathsf{p}^{\mathrm{hc}}\ ]\ , \mathcal{V}_2(\mathsf{c}, \mathsf{p}^{\mathrm{h}}) :: \mathcal{V}_2(\mathsf{c}, \mathsf{p}^{\mathrm{t}}), \mathsf{p}^{\mathrm{h}} ::$
$\mathrm{let}_1(\lambda \mathsf{d}.$
$\mathrm{If}(\mathsf{d}, \mathsf{T},$
$\mathrm{let}_1(\lambda \mathsf{r}.$
$\mathrm{If}(\mathsf{r}^{\mathrm{E}}, \mathrm{error}_2(\lceil$"Error in proof of"$\rceil, \mathsf{d}^2\ [\ \lceil$"
"$\rceil^1 \mathsf{r}\ ]\ ), \mathsf{r}), \mathcal{S}(\mathsf{c}, \mathcal{U}^{\mathrm{M}}(\ [\ \mathcal{E}(\mathsf{d}^3, \mathsf{T}, \mathsf{c})\ `\ \mathsf{c}\ ]\ `\ \mathsf{p})))), \mathbf{aspect}(<\mathrm{proof}>, \mathsf{p}^{\mathrm{t}})))))]$

$[\mathcal{V}_2(\mathsf{c}, \mathsf{p}) \overset{\mathrm{tex}}{\to}$ "
{\cal V}_2(#1.
, #2.
)"$]$

$[\mathcal{V}_2(\mathsf{c}, \mathsf{p}) \overset{\mathrm{pyk}}{\to}$ "verify two $*$ proofs $*$ end verify"$]$

$\mathcal{V}_3(*, *, *, *)$

$[\mathcal{V}_3(\mathsf{c}, \mathsf{r}, \mathsf{p}, \mathsf{d}) \overset{\mathrm{val}}{\to} \mathsf{c}!\ [\ \mathsf{r}!\ [\ \mathsf{p}!$
$\mathrm{If}(\neg \mathsf{d}, \mathsf{d},$
$\mathrm{If}(\mathsf{p}, \mathsf{T},$
$\mathrm{If}(\neg\ [\ \mathsf{p}^{\mathrm{hc}}\ ]\ , \mathcal{V}_3(\mathsf{c}, \mathsf{r}, \mathsf{p}^{\mathrm{t}}, \mathcal{V}_3(\mathsf{c}, \mathsf{r}, \mathsf{p}^{\mathrm{h}}, \mathsf{T})),$
$\mathrm{let}_1(\lambda \mathsf{i}.$
$\mathrm{let}_1(\lambda \mathsf{q}.$
$\mathrm{If}(\mathsf{q}, \mathsf{T},$
$\mathrm{If}(\mathsf{q}^{\mathrm{E}}, \mathsf{q},$
$\mathrm{If}(\neg\ [\ \mathsf{q}^1\ ]\ , \mathrm{error}_2(\lceil$"Unchecked sidecondition:"$\rceil, \mathsf{q}^{1\mathrm{h}}),$
$\mathrm{let}_1(\lambda \mathsf{d}.$

$\mathsf{If}(\mathsf{d}, \mathrm{error}_2(\lceil \text{“Proof of non-existent lemma:”} \rceil, \mathsf{q}^2),$
$\mathsf{If}(\neg\ [\ \mathsf{q}^2 \stackrel{\mathrm{t}}{=}\ [\ \mathsf{d}^3\ ]\ ]\ , \mathrm{error}_2(\lceil \text{“Lemma/proof mismatch:”} \rceil, \mathsf{d}^2;\ [\ \mathsf{q}^2\ ]\ ),$
$\mathcal{V}_4(\mathsf{c}, \mathsf{q}^0))), \mathbf{aspect}(\text{<stmt>}, \mathsf{c}[\mathsf{r}][\text{"codex"}][\mathsf{r}][\mathsf{i}])))))), \mathsf{p}^{\mathrm{t}}), \mathsf{p}^{\mathrm{h}}))))\ ]\ ]\ ]$

$[\mathcal{V}_3(\mathsf{c}, \mathsf{r}, \mathsf{p}, \mathsf{d}) \stackrel{\mathrm{tex}}{\rightarrow} \text{“}$
{\cal V}_3(#1.
, #2.
, #3.
, #4.
)”]

$[\mathcal{V}_3(\mathsf{c}, \mathsf{r}, \mathsf{p}, \mathsf{d}) \stackrel{\mathrm{pyk}}{\rightarrow} \text{“verify three} * \text{ref} * \text{sequents} * \text{diagnose} * \text{end verify”}]$

$\mathcal{V}_4(*, *)$

$[\mathcal{V}_4(\mathsf{c}, \mathsf{p}) \stackrel{\mathrm{val}}{\rightarrow} \mathsf{c}!$
$\mathsf{If}(\mathsf{p}, \mathsf{T},$
$\mathrm{let}_1(\lambda \mathsf{d}.$
$\mathsf{If}(\neg \mathsf{d}, \mathsf{d},$
$\mathrm{let}_1(\lambda \mathsf{p}.$
$\mathrm{let}_1(\lambda \mathsf{r}.$
$\mathrm{let}_1(\lambda \mathsf{i}.$
$\mathsf{If}(\neg\ [\ \mathsf{c}[\mathsf{r}][\text{"diagnose"}]\ ]\ ,$
$\mathrm{error}_2(\lceil \text{“Reference to erroneous page”} \rceil, \mathsf{p}),$
$\mathsf{If}(\neg \mathrm{claims}(\lceil \mathrm{verifier} \rceil, \mathsf{c}, \mathsf{r}),$
$\mathrm{error}_2(\lceil \text{“Reference to unchecked lemma”} \rceil, \mathsf{p}),$
$\mathsf{If}(\mathbf{aspect}(\text{<proof>}, \mathsf{p}, \mathsf{c}),$
$\mathrm{error}_2(\lceil \text{“Reference to unproved lemma”} \rceil, \mathsf{p}), \mathsf{T}))), \mathsf{p}^{\mathrm{i}}), \mathsf{p}^{\mathrm{r}}), \mathsf{p}^{\mathrm{h}})), \mathcal{V}_4(\mathsf{c}, \mathsf{p}^{\mathrm{t}})))]$

$[\mathcal{V}_4(\mathsf{c}, \mathsf{p}) \stackrel{\mathrm{tex}}{\rightarrow} \text{“}$
{\cal V}_4(#1.
, #2.
)”]

$[\mathcal{V}_4(\mathsf{c}, \mathsf{p}) \stackrel{\mathrm{pyk}}{\rightarrow} \text{“verify four} * \text{premises} * \text{end verify”}]$

$\mathcal{V}_5(*, *, *, *)$

$[\mathcal{V}_5(\mathsf{c}, \mathsf{r}, \mathsf{a}, \mathsf{q}) \stackrel{\mathrm{val}}{\rightarrow} \mathsf{c}!\ [\ \mathsf{r}!\ [\ \mathsf{a}!$
$\mathsf{If}(\mathsf{q}^{\mathrm{c}}, \mathsf{q},$
$\mathsf{If}(\mathsf{a}, \mathsf{q},$
$\mathsf{If}(\neg\ [\ \mathsf{a}^{\mathrm{hc}}\ ]\ , \mathcal{V}_5(\mathsf{c}, \mathsf{r}, \mathsf{a}^{\mathrm{t}}, \mathcal{V}_5(\mathsf{c}, \mathsf{r}, \mathsf{a}^{\mathrm{h}}, \mathsf{q})),$
$\mathcal{V}_7(\mathsf{c}, \mathsf{r}, \mathsf{a}^{\mathrm{h}}, \mathsf{q}))))\ ]\ ]\ ]$

$[\mathcal{V}_5(\mathsf{c},\mathsf{r},\mathsf{a},\mathsf{q}) \overset{\text{tex}}{\to} \text{“}$
{\cal V}_5(#1.
, #2.
, #3.
, #4.
)”]

$[\mathcal{V}_5(\mathsf{c},\mathsf{r},\mathsf{a},\mathsf{q}) \overset{\text{pyk}}{\to} \text{“verify five} * \text{ref} * \text{array} * \text{sequents} * \text{end verify”}]$

$\mathcal{V}_6(*,*,*,*)$

$[\mathcal{V}_6(\mathsf{c},\mathsf{r},\mathsf{p},\mathsf{q}) \overset{\text{val}}{\to} \mathsf{c}!\ [\ \mathsf{r}!\ [\ \mathsf{p}!$
$\text{If}(\mathsf{q}^{\mathsf{c}},\mathsf{q},$
$\text{If}(\mathsf{p},\mathsf{q},$
$\text{let}_1(\lambda\mathsf{q}.$
$\text{If}(\mathsf{q}^{\mathsf{c}},\mathsf{q},$
$\text{If}(\neg\ [\ \mathsf{r} \approx\ [\ \mathsf{p}^{\mathrm{hr}}\ ]\ ]\ ,\mathsf{q},$
$\mathcal{V}_7(\mathsf{c},\mathsf{r},\mathsf{p}^{\mathrm{hi}},\mathsf{q}))),\mathcal{V}_6(\mathsf{c},\mathsf{r},\mathsf{p}^{\mathrm{t}},\mathsf{q}))))\ ]\ ]\ ]$

$[\mathcal{V}_6(\mathsf{c},\mathsf{r},\mathsf{p},\mathsf{q}) \overset{\text{tex}}{\to} \text{“}$
{\cal V}_6(#1.
, #2.
, #3.
, #4.
)”]

$[\mathcal{V}_6(\mathsf{c},\mathsf{r},\mathsf{p},\mathsf{q}) \overset{\text{pyk}}{\to} \text{“verify six} * \text{ref} * \text{list} * \text{sequents} * \text{end verify”}]$

$\mathcal{V}_7(*,*,*,*)$

$[\mathcal{V}_7(\mathsf{c},\mathsf{r},\mathsf{i},\mathsf{q}) \overset{\text{val}}{\to} \mathsf{c}!\ [\ \mathsf{r}!$
$\text{let}_1(\lambda\mathsf{v}.$
$\text{If}(\mathsf{v},\mathsf{q},$
$\text{If}(\mathsf{v} \approx 0,\mathsf{i},$
$\text{If}(\mathsf{v} \approx 1,\mathsf{q},$
$\text{let}_1(\lambda\mathsf{q}.$
$\text{If}(\mathsf{q}^{\mathsf{c}},\mathsf{q},\mathsf{q}[\mathsf{i}{\to}1]),\mathcal{V}_6(\mathsf{c},\mathsf{r},\mathsf{v}^0,\mathsf{q}[\mathsf{i}{\to}0])))))),\mathsf{q}[\mathsf{i}])\ ]\ ]$

$[\mathcal{V}_7(\mathsf{c},\mathsf{r},\mathsf{i},\mathsf{q}) \overset{\text{tex}}{\to} \text{“}$
{\cal V}_7(#1.
, #2.
, #3.
, #4.
)”]

$[\mathcal{V}_7(\mathsf{c},\mathsf{r},\mathsf{i},\mathsf{q}) \overset{\text{pyk}}{\to} \text{“verify seven } * \text{ ref } * \text{ id } * \text{ sequents } * \text{ end verify”}]$

$\mathrm{Cut}(*,*)$

$[\mathrm{Cut}(\mathsf{a},\mathsf{b}) \overset{\text{val}}{\to} \mathrm{If}(\mathsf{b},\mathsf{a},\mathsf{a};\mathsf{b})]$

$[\mathrm{Cut}(\mathsf{a},\mathsf{b}) \overset{\text{tex}}{\to} \text{“}$
Cut(#1.
, #2.
)”]

$[\mathrm{Cut}(\mathsf{a},\mathsf{b}) \overset{\text{pyk}}{\to} \text{“cut } * \text{ and } * \text{ end cut”}]$

$\mathrm{Head}_{\oplus}(*)$

$[\mathrm{Head}_{\oplus}(\mathsf{s}) \overset{\text{val}}{\to} [\ \mathsf{s}^1 \vdash [\ \mathsf{s}^2 \vdash [\ \mathsf{s}^{1\mathrm{I}\triangleright}\ ]\ ]\ ]^{+\triangleright}]$

$[\mathrm{Head}_{\oplus}(\mathsf{s}) \overset{\text{tex}}{\to} \text{“}$
Head_{\oplus} (#1.
)”]

$[\mathrm{Head}_{\oplus}(\mathsf{s}) \overset{\text{pyk}}{\to} \text{“head } * \text{ end head”}]$

$\mathrm{Tail}_{\oplus}(*)$

$[\mathrm{Tail}_{\oplus}(\mathsf{s}) \overset{\text{val}}{\to} [\ \mathsf{s}^1 \vdash [\ \mathsf{s}^{2\mathrm{I}}\ ]\ ]^{+\triangleright}]$

$[\mathrm{Tail}_{\oplus}(\mathsf{s}) \overset{\text{tex}}{\to} \text{“}$
Tail_{\oplus} (#1.
)”]

$[\mathrm{Tail}_{\oplus}(\mathsf{s}) \overset{\text{pyk}}{\to} \text{“tail } * \text{ end tail”}]$

$\mathrm{rule}_1(*,*)$

$[\mathrm{rule}_1(\mathsf{s},\mathsf{t}) \overset{\text{val}}{\to}$
$\mathrm{If}(\mathsf{s} \overset{\mathsf{t}}{=} \mathsf{t}, \mathsf{T},$
$\mathrm{If}(\neg\ [\ \mathsf{t} \overset{\mathsf{r}}{=} \lceil \mathsf{x} \oplus \mathsf{y} \rceil\ ]\ , 0,$
$\mathrm{let}_1(\lambda \mathsf{p}.$
$\mathrm{If}(\neg\ [\ \mathsf{p}^{\mathsf{c}}\ ]\ , \mathrm{Cut}(\mathrm{Head}_{\oplus}(\mathsf{t}), \mathsf{p}),$

$\mathrm{let}_1(\lambda \mathsf{p}.$
$\mathrm{If}(\neg\ [\ \mathsf{p}^{\mathsf{c}}\ ]\ , \mathrm{Cut}(\mathrm{Tail}_{\oplus}(\mathsf{t}), \mathsf{p}), 0), \mathrm{rule}_1(\mathsf{s}, \mathsf{t}^2))), \mathrm{rule}_1(\mathsf{s}, \mathsf{t}^1))))]$

$[\mathrm{rule}_1(\mathsf{s}, \mathsf{t}) \overset{\mathrm{tex}}{\to}$ “
rule_1(#1.
, #2.
)”]

$[\mathrm{rule}_1(\mathsf{s}, \mathsf{t}) \overset{\mathrm{pyk}}{\to}$ “rule one $*$ theory $*$ end rule”]

$\mathrm{rule}(*, *)$

$[\mathrm{rule}(\mathsf{c}, \mathsf{p}) \overset{\mathrm{val}}{\to} \mathsf{c}!$
$\mathrm{let}_1(\lambda \mathsf{s}.$
$\mathrm{If}(\mathsf{s}, \lceil$“Rule has no statement aspect”$\rceil,$
$\mathrm{If}(\neg\ [\ \mathsf{s} \overset{\mathrm{r}}{=} \lceil \mathsf{x} \vdash \mathsf{y} \rceil\ ]\ , \mathrm{error}_2(\lceil$“Rule has invalid statement aspect”$\rceil, \mathsf{s}),$
$\mathrm{let}_1(\lambda \mathsf{t}.$
$\mathrm{If}(\mathsf{t}, \lceil$“Theory has no statement aspect”$\rceil,$
$\mathrm{let}_1(\lambda \mathsf{r}.$
$\mathrm{If}(\mathsf{r}^{\mathsf{c}}, \mathrm{error}_2(\lceil$“The theory does not assert the given rule”$\rceil, \mathsf{s}; \mathsf{t}),$
$[\ \mathsf{s}^1 \vdash \mathrm{Cut}(\mathsf{s}^{1\mathrm{I}\triangleright *}, \mathsf{r})\ ]$
$), \mathrm{rule}_1(\mathsf{s}^2, \mathsf{t}))), \mathbf{aspect}(<\mathrm{stmt}>, \mathsf{s}^1, \mathsf{c})^3))), \mathbf{aspect}(<\mathrm{stmt}>, \mathsf{p}^{\mathsf{t}})^3)]$

$[\mathrm{rule}(\mathsf{c}, \mathsf{p}) \overset{\mathrm{tex}}{\to}$ “
rule(#1.
, #2.
)”]

$[\mathrm{rule}(\mathsf{c}, \mathsf{p}) \overset{\mathrm{pyk}}{\to}$ “rule $*$ subcodex $*$ end rule”]

Rule tactic

$[\text{Rule tactic} \overset{\mathrm{val}}{\to} \lambda \mathsf{c}.\lambda \mathsf{p}.\mathrm{rule}(\mathsf{c}, \mathsf{p})]$

[Rule tactic $\overset{\mathrm{tex}}{\to}$ “
Rule\ tactic”]

[Rule tactic $\overset{\mathrm{pyk}}{\to}$ “rule tactic”]

$\mathrm{Plus}(*, *)$

$[\mathrm{Plus}(\mathsf{a}, \mathsf{b}) \overset{\mathrm{val}}{\to} \mathrm{If}(\mathsf{b}, \mathsf{a}, \mathsf{a} \oplus \mathsf{b})]$

$[\mathrm{Plus}(\mathsf{a}, \mathsf{b}) \overset{\mathrm{tex}}{\to}$ “

Plus(#1.
, #2.
)”]

[Plus(a, b) $\overset{\text{pyk}}{\to}$ “plus ∗ and ∗ end plus”]

[**Theory** ∗]

[[**Theory** n] $\overset{\text{macro}}{\to}$ λt.λs.λc.theory$_2$(t, c)]

[[**Theory** n] $\overset{\text{tex}}{\to}$ “
[\mathbf{Theory\ } #1.
]”]

[[**Theory** n] $\overset{\text{pyk}}{\to}$ “theory ∗ end theory”]

theory$_2$(∗, ∗)

[theory$_2$(t, c) $\overset{\text{val}}{\to}$
let$_1$(λn.
let$_1$(λs.
$\tilde{\mathcal{Q}}$(t, ⌈[n $\overset{\text{stmt}}{\to}$ x]⌉, s), [⌈n⌉ :: n] :: [[⌈x⌉ :: theory$_3$(c, n)] :: T]), t^1)]

[theory$_2$(t, c) $\overset{\text{tex}}{\to}$ “
theory_2(#1.
, #2.
)”]

[theory$_2$(t, c) $\overset{\text{pyk}}{\to}$ “theory two ∗ cache ∗ end theory”]

theory$_3$(∗, ∗)

[theory$_3$(c, n) $\overset{\text{val}}{\to}$ n!
let$_1$(λr.
theory$_4$(c[r]["codex"][r], n, T), c[0])]

[theory$_3$(c, n) $\overset{\text{tex}}{\to}$ “
theory_3(#1.
, #2.
)”]

[theory$_3$(c, n) $\overset{\text{pyk}}{\to}$ “theory three ∗ name ∗ end theory”]

$\mathrm{theory}_4(*, *, *)$

$[\mathrm{theory}_4(\mathsf{c}, \mathsf{n}, \mathsf{s}) \overset{\mathrm{val}}{\rightarrow} \mathsf{n}!$
$\mathrm{If}(\mathsf{c}, \mathsf{s},$
$\mathrm{If}(\neg\ [\ \mathsf{c}^{\mathrm{hc}}\ ]\ , \mathrm{theory}_4(\mathsf{c}^{\mathrm{t}}, \mathsf{n}, \mathrm{theory}_4(\mathsf{c}^{\mathrm{h}}, \mathsf{n}, \mathsf{s})),$
$\mathrm{If}(\neg\ [\ \mathbf{aspect}(<\mathrm{proof}>, \mathsf{c}^{\mathrm{t}})^3 \overset{\mathrm{t}}{=} \lceil \mathrm{Rule\ tactic} \rceil\ ]\ , \mathsf{s},$
$\mathrm{let}_1(\lambda \mathsf{d}.$
$\mathrm{If}(\neg\ [\ \mathsf{d}^1 \overset{\mathrm{t}}{=} \mathsf{n}\ ]\ , \mathsf{s},$
$\mathrm{Plus}(\mathsf{d}^2, \mathsf{s})), \mathbf{aspect}(<\mathrm{stmt}>, \mathsf{c}^{\mathrm{t}})^3))))]$

$[\mathrm{theory}_4(\mathsf{c}, \mathsf{n}, \mathsf{s}) \overset{\mathrm{tex}}{\rightarrow}$ “
theory_4(#1.
, #2.
, #3.
)”]

$[\mathrm{theory}_4(\mathsf{c}, \mathsf{n}, \mathsf{s}) \overset{\mathrm{pyk}}{\rightarrow}$ “theory four $*$ name $*$ sum $*$ end theory”]

HeadNil″

[HeadNil″ $\overset{\mathrm{proof}}{\rightarrow}$ Rule tactic]

[HeadNil″ $\overset{\mathrm{stmt}}{\rightarrow} \mathrm{T}'_{\mathrm{E}} \vdash\ [\ \mathsf{T}^{\mathrm{h}} = \mathsf{T}\ ]\ ]$

[HeadNil″ $\overset{\mathrm{tex}}{\rightarrow}$ “
HeadNil’””]

[HeadNil″ $\overset{\mathrm{pyk}}{\rightarrow}$ “example axiom lemma primed”]

HeadPair″

[HeadPair″ $\overset{\mathrm{proof}}{\rightarrow}$ Rule tactic]

[HeadPair″ $\overset{\mathrm{stmt}}{\rightarrow} \mathrm{T}'_{\mathrm{E}} \vdash \forall \underline{\mathsf{a}}{:}\, \forall \underline{\mathsf{b}}{:}\ [\ [\ \underline{\mathsf{a}} :: \underline{\mathsf{b}}\ ]^{\mathrm{h}} = \underline{\mathsf{a}}\ ]\ ]$

[HeadPair″ $\overset{\mathrm{tex}}{\rightarrow}$ “
HeadPair’””]

[HeadPair″ $\overset{\mathrm{pyk}}{\rightarrow}$ “example scheme lemma primed”]

Transitivity″

[Transitivity″ $\overset{\mathrm{proof}}{\rightarrow}$ Rule tactic]

[Transitivity″ $\overset{\text{stmt}}{\longrightarrow}$ $\mathrm{T}'_{\mathrm{E}} \vdash \forall \underline{\mathsf{a}} \colon \forall \underline{\mathsf{b}} \colon \forall \underline{\mathsf{c}} \colon [\ [\ \underline{\mathsf{a}} = \underline{\mathsf{b}}\ ] \vdash [\ [\ \underline{\mathsf{a}} = \underline{\mathsf{c}}\ ] \vdash [\ \underline{\mathsf{b}} = \underline{\mathsf{c}}\ ]\ ]\ ]$]

[Transitivity″ $\overset{\text{tex}}{\longrightarrow}$ “
Transitivity’’”]

[Transitivity″ $\overset{\text{pyk}}{\longrightarrow}$ “example rule lemma primed”]

Contra″

[Contra″ $\overset{\text{proof}}{\longrightarrow}$ Rule tactic]

[Contra″ $\overset{\text{stmt}}{\longrightarrow}$ $\mathrm{T}'_{\mathrm{E}} \vdash [\ [\ [\ \mathsf{T} :: \mathsf{T}\ ] = \mathsf{T}\ ] \vdash \perp\!\!\!\perp\ ]$]

[Contra″ $\overset{\text{tex}}{\longrightarrow}$ “
Contra’’”]

[Contra″ $\overset{\text{pyk}}{\longrightarrow}$ “contraexample lemma primed”]

HeadNil

[HeadNil $\overset{\text{proof}}{\longrightarrow}$ Rule tactic]

[HeadNil $\overset{\text{stmt}}{\longrightarrow}$ $\mathrm{T}_{\mathrm{E}} \vdash [\ \mathsf{T}^{\mathrm{h}} = \mathsf{T}\ ]$]

[HeadNil $\overset{\text{tex}}{\longrightarrow}$ “
HeadNil”]

[HeadNil $\overset{\text{pyk}}{\longrightarrow}$ “example axiom lemma”]

HeadPair

[HeadPair $\overset{\text{proof}}{\longrightarrow}$ Rule tactic]

[HeadPair $\overset{\text{stmt}}{\longrightarrow}$ $\mathrm{T}_{\mathrm{E}} \vdash \forall \underline{\mathsf{a}} \colon \forall \underline{\mathsf{b}} \colon [\ [\ \underline{\mathsf{a}} :: \underline{\mathsf{b}}\ ]^{\,\mathrm{h}} = \underline{\mathsf{a}}\ ]$]

[HeadPair $\overset{\text{tex}}{\longrightarrow}$ “
HeadPair”]

[HeadPair $\overset{\text{pyk}}{\longrightarrow}$ “example scheme lemma”]

Transitivity

[Transitivity $\overset{\text{proof}}{\longrightarrow}$ Rule tactic]

[Transitivity $\overset{\text{stmt}}{\longrightarrow}$ $\mathrm{T}_{\mathrm{E}} \vdash \forall \underline{\mathsf{a}} \colon \forall \underline{\mathsf{b}} \colon \forall \underline{\mathsf{c}} \colon [\ [\ \underline{\mathsf{a}} = \underline{\mathsf{b}}\ ] \vdash [\ [\ \underline{\mathsf{a}} = \underline{\mathsf{c}}\ ] \vdash [\ \underline{\mathsf{b}} = \underline{\mathsf{c}}\ ]\ ]\ ]$]

[Transitivity $\overset{\text{tex}}{\to}$ “
Transitivity”]

[Transitivity $\overset{\text{pyk}}{\to}$ “example rule lemma”]

Contra

[Contra $\overset{\text{proof}}{\to}$ Rule tactic]

[Contra $\overset{\text{stmt}}{\to}$ $\mathrm{T_E} \vdash [\,[\,[\,[\,\mathsf{T} :: \mathsf{T}\,]\,=\mathsf{T}\,]\,\vdash \perp\!\!\!\perp\,]\,]$

[Contra $\overset{\text{tex}}{\to}$ “
Contra”]

[Contra $\overset{\text{pyk}}{\to}$ “contraexample lemma”]

$\mathrm{T_E}$

[$\mathrm{T_E} \overset{\text{stmt}}{\to} [\,[\,[\,\mathsf{T} :: \mathsf{T}\,]\,=\mathsf{T}\,]\,\vdash \perp\!\!\!\perp\,]\,\oplus\,[\,[\,\forall \underline{\mathsf{a}}\colon \forall \underline{\mathsf{b}}\colon [\,[\,\underline{\mathsf{a}} :: \underline{\mathsf{b}}\,]^{\,\mathrm{h}} = \underline{\mathsf{a}}\,]\,]\,\oplus\,[\,[\,\forall \underline{\mathsf{a}}\colon \forall \underline{\mathsf{b}}\colon \forall \underline{\mathsf{c}}\colon [\,[\,\underline{\mathsf{a}} = \underline{\mathsf{b}}\,]\,\vdash\,[\,[\,\underline{\mathsf{a}} = \underline{\mathsf{c}}\,]\,\vdash\,[\,\underline{\mathsf{b}} = \underline{\mathsf{c}}\,]\,]\,]\,]\,\oplus\,[\,\mathsf{T}^{\mathrm{h}} = \mathsf{T}\,]\,]\,]$

[$\mathrm{T_E} \overset{\text{tex}}{\to}$ “
T_E”]

[$\mathrm{T_E} \overset{\text{pyk}}{\to}$ “example theory”]

ragged right

[ragged right $\overset{\text{name}}{\to}$ “
ragged\ right”]

[ragged right $\overset{\text{tex}}{\to}$ “
\raggedright”]

[ragged right $\overset{\text{pyk}}{\to}$ “ragged right”]

ragged right expansion

[ragged right expansion $\overset{\text{name}}{\to}$ “
ragged\ right\ expansion\ ”]

[ragged right expansion $\overset{\text{macro}}{\to}$ $\lambda \mathsf{t}.\lambda \mathsf{s}.\lambda \mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t}, \mathsf{s}, \mathsf{c}, \lceil[\text{ragged right expansion } \doteq \text{ ragged right}]\rceil)$]

[ragged right expansion $\overset{\text{tex}}{\to}$ “”]

[ragged right expansion $\overset{\text{pyk}}{\to}$ “ragged right expansion”]

$\mathrm{parm}(*, *, *)$

[$\mathrm{parm}(\mathsf{t}, \mathsf{s}, \mathsf{n}) \overset{\text{val}}{\to} \mathsf{n}!$
$\mathrm{If}(\mathsf{t} \overset{\text{r}}{=} \lceil \forall \mathsf{x} \colon \mathsf{y} \rceil, \forall \mathsf{n} \colon \mathrm{parm}(\mathsf{t}^2,\ [\ \mathsf{t}^1 :: \mathsf{n}\ ] :: \mathsf{s}, \mathsf{T} + 2 * \mathsf{n}),$
$\mathrm{let}_1(\lambda \mathsf{m}.$
$\mathrm{If}(\neg \mathsf{m}, \mathsf{m}, \mathsf{t}^{\mathrm{R}} :: \mathrm{parm}^*(\mathsf{t}^{\mathrm{t}}, \mathsf{s}, \mathsf{n})), \mathbf{lookup}(\mathsf{t}, \mathsf{s}, \mathsf{T})))]$

[$\mathrm{parm}(\mathsf{t}, \mathsf{s}, \mathsf{n}) \overset{\text{tex}}{\to}$ “
parm(#1.
,#2.
,#3.
)”]

[$\mathrm{parm}(\mathsf{t}, \mathsf{s}, \mathsf{n}) \overset{\text{pyk}}{\to}$ “parameter term $*$ stack $*$ seed $*$ end parameter”]

$\mathrm{parm}^*(*, *, *)$

[$\mathrm{parm}^*(\mathsf{t}, \mathsf{s}, \mathsf{n}) \overset{\text{val}}{\to} \mathsf{s}!\ [\ \mathsf{n}!\mathrm{If}(\mathsf{t}^{\mathrm{a}}, \mathsf{T}, \mathrm{parm}(\mathsf{t}^{\mathrm{h}}, \mathsf{s}, \mathsf{n}) :: \mathrm{parm}^*(\mathsf{t}^{\mathrm{t}}, \mathsf{s}, \mathsf{n}))\ ]\ ]$

[$\mathrm{parm}^*(\mathsf{t}, \mathsf{s}, \mathsf{n}) \overset{\text{tex}}{\to}$ “
parm^$*$(#1.
,#2.
,#3.
)”]

[$\mathrm{parm}^*(\mathsf{t}, \mathsf{s}, \mathsf{n}) \overset{\text{pyk}}{\to}$ “parameter term star $*$ stack $*$ seed $*$ end parameter”]

$\mathrm{inst}(*, *)$

[$\mathrm{inst}(\mathsf{t}, \mathsf{s}) \overset{\text{val}}{\to} \mathrm{If}(\mathsf{t}^{\mathrm{c}}, \mathrm{inst}(\mathsf{s}[\mathsf{t}], \mathsf{s}), \mathsf{t}^{\mathrm{R}} :: \mathrm{inst}^*(\mathsf{t}^{\mathrm{t}}, \mathsf{s}))$]

[$\mathrm{inst}(\mathsf{t}, \mathsf{s}) \overset{\text{tex}}{\to}$ “
inst(#1.
,#2.
)”]

[$\mathrm{inst}(\mathsf{t}, \mathsf{s}) \overset{\text{pyk}}{\to}$ “instantiate $*$ with $*$ end instantiate”]

$\mathrm{inst}^*(*,*)$

$[\mathrm{inst}^*(\mathsf{t},\mathsf{s}) \overset{\mathrm{val}}{\to} \mathsf{s}!\mathrm{If}(\mathsf{t}^{\mathrm{a}},\mathsf{T},\mathrm{inst}(\mathsf{t}^{\mathrm{h}},\mathsf{s}) :: \mathrm{inst}^*(\mathsf{t}^{\mathrm{t}},\mathsf{s}))]$

$[\mathrm{inst}^*(\mathsf{t},\mathsf{s}) \overset{\mathrm{tex}}{\to}$ “
inst^*(#1.
,#2.
)”]

$[\mathrm{inst}^*(\mathsf{t},\mathsf{s}) \overset{\mathrm{pyk}}{\to}$ “instantiate star $*$ with $*$ end instantiate”]

$\mathrm{occur}(*,*,*)$

$[\mathrm{occur}(\mathsf{t},\mathsf{u},\mathsf{s}) \overset{\mathrm{val}}{\to} \mathsf{s}!\mathrm{If}(\mathsf{u}^{\mathrm{c}},\mathrm{If}(\mathsf{t} \approx \mathsf{u},\mathsf{T},\mathrm{occur}(\mathsf{t},\mathsf{s}[\mathsf{u}],\mathsf{s})),\mathrm{occur}^*(\mathsf{t},\mathsf{u}^{\mathrm{t}},\mathsf{s}))]$

$[\mathrm{occur}(\mathsf{t},\mathsf{u},\mathsf{s}) \overset{\mathrm{tex}}{\to}$ “
occur(#1.
,#2.
,#3.
)”]

$[\mathrm{occur}(\mathsf{t},\mathsf{u},\mathsf{s}) \overset{\mathrm{pyk}}{\to}$ “occur $*$ in $*$ substitution $*$ end occur”]

$\mathrm{occur}^*(*,*,*)$

$[\mathrm{occur}^*(\mathsf{t},\mathsf{u},\mathsf{s}) \overset{\mathrm{val}}{\to} \mathsf{t}!\ [\ \mathsf{s}!\mathrm{If}(\mathsf{u}^{\mathrm{a}},\mathsf{F},\mathrm{If}(\mathrm{occur}(\mathsf{t},\mathsf{u}^{\mathrm{h}},\mathsf{s}),\mathsf{T},\mathrm{occur}^*(\mathsf{t},\mathsf{u}^{\mathrm{t}},\mathsf{s})))\ ]\ ]$

$[\mathrm{occur}^*(\mathsf{t},\mathsf{u},\mathsf{s}) \overset{\mathrm{tex}}{\to}$ “
occur^*(#1.
,#2.
,#3.
)”]

$[\mathrm{occur}^*(\mathsf{t},\mathsf{u},\mathsf{s}) \overset{\mathrm{pyk}}{\to}$ “occur star $*$ in $*$ substitution $*$ end occur”]

$\mathrm{unify}(* = *,*)$

$[\mathrm{unify}(\mathsf{t} = \mathsf{u},\mathsf{s}) \overset{\mathrm{val}}{\to} \mathsf{t}!\ [\ \mathsf{u}!$
$\mathrm{If}(\mathsf{s}^{\mathrm{c}},\mathsf{s},$
$\mathrm{If}(\mathsf{t}^{\mathrm{c}},\mathrm{unify}_2(\mathsf{t} = \mathsf{u},\mathsf{s}),$
$\mathrm{If}(\mathsf{u}^{\mathrm{c}},\mathrm{unify}_2(\mathsf{u} = \mathsf{t},\mathsf{s}),$
$\mathrm{If}(\mathsf{t} \overset{\mathrm{r}}{=} \mathsf{u},\mathrm{unify}^*(\mathsf{t}^{\mathrm{t}} = \mathsf{u}^{\mathrm{t}},\mathsf{s}),0))))\ ]\ ]$

$[\mathrm{unify}(\mathsf{t} = \mathsf{u}, \mathsf{s}) \overset{\mathrm{tex}}{\to} \text{“}$
unify(#1.
=#2.
,#3.
)”]

$[\mathrm{unify}(\mathsf{t} = \mathsf{u}, \mathsf{s}) \overset{\mathrm{pyk}}{\to} \text{“unify} * \text{with} * \text{substitution} * \text{end unify”}]$

$\mathrm{unify}^*(* = *, *)$

$[\mathrm{unify}^*(\mathsf{t} = \mathsf{u}, \mathsf{s}) \overset{\mathrm{val}}{\to} \mathsf{u}!\mathrm{If}(\mathsf{t}^{\mathrm{a}}, \mathsf{s}, \mathrm{unify}^*(\mathsf{t}^{\mathrm{t}} = \mathsf{u}^{\mathrm{t}}, \mathrm{unify}(\mathsf{t}^{\mathrm{h}} = \mathsf{u}^{\mathrm{h}}, \mathsf{s}))))]$

$[\mathrm{unify}^*(\mathsf{t} = \mathsf{u}, \mathsf{s}) \overset{\mathrm{tex}}{\to} \text{“}$
unify^*(#1.
=#2.
,#3.
)”]

$[\mathrm{unify}^*(\mathsf{t} = \mathsf{u}, \mathsf{s}) \overset{\mathrm{pyk}}{\to} \text{“unify star} * \text{with} * \text{substitution} * \text{end unify”}]$

$\mathrm{unify}_2(* = *, *)$

$[\mathrm{unify}_2(\mathsf{t} = \mathsf{u}, \mathsf{s}) \overset{\mathrm{val}}{\to}$
$\mathrm{If}(\mathsf{t} \approx \mathsf{u}, \mathsf{s},$
$\mathrm{let}_1(\lambda \mathsf{t}'.$
$\mathrm{If}(\neg\ [\ \mathsf{t}'\ ]\ , \mathrm{unify}(\mathsf{t}' = \mathsf{u}, \mathsf{s}),$
$\mathrm{If}(\mathrm{occur}(\mathsf{t}, \mathsf{u}, \mathsf{s}), 0, \mathsf{s}[\mathsf{t} \to \mathsf{u}])), \mathsf{s}[\mathsf{t}]))]$

$[\mathrm{unify}_2(\mathsf{t} = \mathsf{u}, \mathsf{s}) \overset{\mathrm{tex}}{\to} \text{“}$
unify_2(#1.
=#2.
,#3.
)”]

$[\mathrm{unify}_2(\mathsf{t} = \mathsf{u}, \mathsf{s}) \overset{\mathrm{pyk}}{\to} \text{“unify two} * \text{with} * \text{substitution} * \text{end unify”}]$

$\mathrm{L_a}$

$[\mathrm{L_a} \overset{\mathrm{name}}{\to} \text{“L\_a”}]$

$[\mathrm{L_a} \overset{\mathrm{tex}}{\to} \text{“}$
\if \relax \csname lgwprooflinep\endcsname L_a \else
\if \relax \csname lgwella\endcsname

\global \advance \lgwproofline by 1
\xdef \lgwella {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwella \fi ”]

[$L_a \overset{pyk}{\to}$ “ell a”]

L_b

[$L_b \overset{name}{\to}$ “L_b”]

[$L_b \overset{tex}{\to}$ “
\if \relax \csname lgwprooflinep\endcsname L_b \else
\if \relax \csname lgwellb\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellb {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellb \fi ”]

[$L_b \overset{pyk}{\to}$ “ell b”]

L_c

[$L_c \overset{name}{\to}$ “L_c”]

[$L_c \overset{tex}{\to}$ “
\if \relax \csname lgwprooflinep\endcsname L_c \else
\if \relax \csname lgwellc\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellc {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellc \fi ”]

[$L_c \overset{pyk}{\to}$ “ell c”]

L_d

[$L_d \overset{name}{\to}$ “L_d”]

[$L_d \overset{tex}{\to}$ “
\if \relax \csname lgwprooflinep\endcsname L_d \else
\if \relax \csname lgwelld\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwelld {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwelld \fi ”]

[$L_d \overset{pyk}{\to}$ “ell d”]

L_e

$[L_e \overset{\text{name}}{\to} \text{“L\_e”}]$

$[L_e \overset{\text{tex}}{\to} \text{“}$
\if \relax \csname lgwprooflinep\endcsname L_e \else
\if \relax \csname lgwelle\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwelle {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwelle \fi ”$]$

$[L_e \overset{\text{pyk}}{\to} \text{“ell e”}]$

L_f

$[L_f \overset{\text{name}}{\to} \text{“L\_f”}]$

$[L_f \overset{\text{tex}}{\to} \text{“}$
\if \relax \csname lgwprooflinep\endcsname L_f \else
\if \relax \csname lgwellf\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellf {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellf \fi ”$]$

$[L_f \overset{\text{pyk}}{\to} \text{“ell f”}]$

L_g

$[L_g \overset{\text{name}}{\to} \text{“L\_g”}]$

$[L_g \overset{\text{tex}}{\to} \text{“}$
\if \relax \csname lgwprooflinep\endcsname L_g \else
\if \relax \csname lgwellg\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellg {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellg \fi ”$]$

$[L_g \overset{\text{pyk}}{\to} \text{“ell g”}]$

L_h

$[L_h \overset{\text{name}}{\to} \text{“L\_h”}]$

$[L_h \overset{\text{tex}}{\to} \text{“}$

\if \relax \csname lgwprooflinep\endcsname L_h \else
\if \relax \csname lgwellh\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellh {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellh \fi "]

[$L_h \overset{pyk}{\to}$ "ell h"]

L_i

[$L_i \overset{name}{\to}$ "L_i"]

[$L_i \overset{tex}{\to}$ "
\if \relax \csname lgwprooflinep\endcsname L_i \else
\if \relax \csname lgwelli\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwelli {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwelli \fi "]

[$L_i \overset{pyk}{\to}$ "ell i"]

L_j

[$L_j \overset{name}{\to}$ "L_j"]

[$L_j \overset{tex}{\to}$ "
\if \relax \csname lgwprooflinep\endcsname L_j \else
\if \relax \csname lgwellj\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellj {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellj \fi "]

[$L_j \overset{pyk}{\to}$ "ell j"]

L_k

[$L_k \overset{name}{\to}$ "L_k"]

[$L_k \overset{tex}{\to}$ "
\if \relax \csname lgwprooflinep\endcsname L_k \else
\if \relax \csname lgwellk\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellk {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellk \fi "]

[$L_k \overset{pyk}{\to}$ “ell k”]

L_l

[$L_l \overset{name}{\to}$ “L_l”]

[$L_l \overset{tex}{\to}$ “
\if \relax \csname lgwprooflinep\endcsname L_l \else
\if \relax \csname lgwelll\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwelll {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwelll \fi ”]

[$L_l \overset{pyk}{\to}$ “ell l”]

L_m

[$L_m \overset{name}{\to}$ “L_m”]

[$L_m \overset{tex}{\to}$ “
\if \relax \csname lgwprooflinep\endcsname L_m \else
\if \relax \csname lgwellm\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellm {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellm \fi ”]

[$L_m \overset{pyk}{\to}$ “ell m”]

L_n

[$L_n \overset{name}{\to}$ “L_n”]

[$L_n \overset{tex}{\to}$ “
\if \relax \csname lgwprooflinep\endcsname L_n \else
\if \relax \csname lgwelln\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwelln {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwelln \fi ”]

[$L_n \overset{pyk}{\to}$ “ell n”]

L_o

$[L_o \overset{\text{name}}{\to} \text{“L\_o”}]$

$[L_o \overset{\text{tex}}{\to} \text{“}$
\if \relax \csname lgwprooflinep\endcsname L_o \else
\if \relax \csname lgwello\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwello {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwello \fi ”$]$

$[L_o \overset{\text{pyk}}{\to} \text{“ell o”}]$

L_p

$[L_p \overset{\text{name}}{\to} \text{“L\_p”}]$

$[L_p \overset{\text{tex}}{\to} \text{“}$
\if \relax \csname lgwprooflinep\endcsname L_p \else
\if \relax \csname lgwellp\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellp {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellp \fi ”$]$

$[L_p \overset{\text{pyk}}{\to} \text{“ell p”}]$

L_q

$[L_q \overset{\text{name}}{\to} \text{“L\_q”}]$

$[L_q \overset{\text{tex}}{\to} \text{“}$
\if \relax \csname lgwprooflinep\endcsname L_q \else
\if \relax \csname lgwellq\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellq {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellq \fi ”$]$

$[L_q \overset{\text{pyk}}{\to} \text{“ell q”}]$

L_r

$[L_r \overset{\text{name}}{\to} \text{“L\_r”}]$

$[L_r \overset{\text{tex}}{\to} \text{“}$

\if \relax \csname lgwprooflinep\endcsname L_r \else
\if \relax \csname lgwellr\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellr {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellr \fi "]

[$L_r \overset{pyk}{\longrightarrow}$ "ell r"]

L_s

[$L_s \overset{name}{\longrightarrow}$ "L_s"]

[$L_s \overset{tex}{\longrightarrow}$ "
\if \relax \csname lgwprooflinep\endcsname L_s \else
\if \relax \csname lgwells\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwells {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwells \fi "]

[$L_s \overset{pyk}{\longrightarrow}$ "ell s"]

L_t

[$L_t \overset{name}{\longrightarrow}$ "L_t"]

[$L_t \overset{tex}{\longrightarrow}$ "
\if \relax \csname lgwprooflinep\endcsname L_t \else
\if \relax \csname lgwellt\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellt {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellt \fi "]

[$L_t \overset{pyk}{\longrightarrow}$ "ell t"]

L_u

[$L_u \overset{name}{\longrightarrow}$ "L_u"]

[$L_u \overset{tex}{\longrightarrow}$ "
\if \relax \csname lgwprooflinep\endcsname L_u \else
\if \relax \csname lgwellu\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellu {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellu \fi "]

[$L_u \overset{\text{pyk}}{\to}$ “ell u”]

L_v

[$L_v \overset{\text{name}}{\to}$ “L_v”]

[$L_v \overset{\text{tex}}{\to}$ “
\if \relax \csname lgwprooflinep\endcsname L_v \else
\if \relax \csname lgwellv\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellv {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellv \fi ”]

[$L_v \overset{\text{pyk}}{\to}$ “ell v”]

L_w

[$L_w \overset{\text{name}}{\to}$ “L_w”]

[$L_w \overset{\text{tex}}{\to}$ “
\if \relax \csname lgwprooflinep\endcsname L_w \else
\if \relax \csname lgwellw\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellw {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellw \fi ”]

[$L_w \overset{\text{pyk}}{\to}$ “ell w”]

L_x

[$L_x \overset{\text{name}}{\to}$ “L_x”]

[$L_x \overset{\text{tex}}{\to}$ “
\if \relax \csname lgwprooflinep\endcsname L_x \else
\if \relax \csname lgwellx\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellx {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellx \fi ”]

[$L_x \overset{\text{pyk}}{\to}$ “ell x”]

L_y

$[L_y \overset{\text{name}}{\rightarrow} \text{“L\_y”}]$

$[L_y \overset{\text{tex}}{\rightarrow} \text{“}$
\if \relax \csname lgwprooflinep\endcsname L_y \else
\if \relax \csname lgwelly\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwelly {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwelly \fi ”$]$

$[L_y \overset{\text{pyk}}{\rightarrow} \text{“ell y”}]$

L_z

$[L_z \overset{\text{name}}{\rightarrow} \text{“L\_z”}]$

$[L_z \overset{\text{tex}}{\rightarrow} \text{“}$
\if \relax \csname lgwprooflinep\endcsname L_z \else
\if \relax \csname lgwellz\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellz {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellz \fi ”$]$

$[L_z \overset{\text{pyk}}{\rightarrow} \text{“ell z”}]$

L_A

$[L_A \overset{\text{name}}{\rightarrow} \text{“L\_A”}]$

$[L_A \overset{\text{tex}}{\rightarrow} \text{“}$
\if \relax \csname lgwprooflinep\endcsname L_A \else
\if \relax \csname lgwellbiga\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellbiga {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellbiga \fi ”$]$

$[L_A \overset{\text{pyk}}{\rightarrow} \text{“ell big a”}]$

L_B

$[L_B \overset{\text{name}}{\rightarrow} \text{“L\_B”}]$

$[L_B \overset{\text{tex}}{\rightarrow} \text{“}$

\if \relax \csname lgwprooflinep\endcsname L_B \else
\if \relax \csname lgwellbigb\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellbigb {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellbigb \fi "]

[$L_B \overset{pyk}{\to}$ "ell big b"]

L_C

[$L_C \overset{name}{\to}$ "L_C"]

[$L_C \overset{tex}{\to}$ "
\if \relax \csname lgwprooflinep\endcsname L_C \else
\if \relax \csname lgwellbigc\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellbigc {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellbigc \fi "]

[$L_C \overset{pyk}{\to}$ "ell big c"]

L_D

[$L_D \overset{name}{\to}$ "L_D"]

[$L_D \overset{tex}{\to}$ "
\if \relax \csname lgwprooflinep\endcsname L_D \else
\if \relax \csname lgwellbigd\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellbigd {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellbigd \fi "]

[$L_D \overset{pyk}{\to}$ "ell big d"]

L_E

[$L_E \overset{name}{\to}$ "L_E"]

[$L_E \overset{tex}{\to}$ "
\if \relax \csname lgwprooflinep\endcsname L_E \else
\if \relax \csname lgwellbige\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellbige {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellbige \fi "]

[$L_E \overset{pyk}{\to}$ “ell big e”]

L_F

[$L_F \overset{name}{\to}$ “L_F”]

[$L_F \overset{tex}{\to}$ “
\if \relax \csname lgwprooflinep\endcsname L_F \else
\if \relax \csname lgwellbigf\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellbigf {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellbigf \fi ”]

[$L_F \overset{pyk}{\to}$ “ell big f”]

L_G

[$L_G \overset{name}{\to}$ “L_G”]

[$L_G \overset{tex}{\to}$ “
\if \relax \csname lgwprooflinep\endcsname L_G \else
\if \relax \csname lgwellbigg\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellbigg {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellbigg \fi ”]

[$L_G \overset{pyk}{\to}$ “ell big g”]

L_H

[$L_H \overset{name}{\to}$ “L_H”]

[$L_H \overset{tex}{\to}$ “
\if \relax \csname lgwprooflinep\endcsname L_H \else
\if \relax \csname lgwellbigh\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellbigh {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellbigh \fi ”]

[$L_H \overset{pyk}{\to}$ “ell big h”]

L_I

[$L_I \overset{name}{\rightarrow}$ “L_I”]

[$L_I \overset{tex}{\rightarrow}$ “
\if \relax \csname lgwprooflinep\endcsname L_I \else
\if \relax \csname lgwellbigi\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellbigi {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellbigi \fi ”]

[$L_I \overset{pyk}{\rightarrow}$ “ell big i”]

L_J

[$L_J \overset{name}{\rightarrow}$ “L_J”]

[$L_J \overset{tex}{\rightarrow}$ “
\if \relax \csname lgwprooflinep\endcsname L_J \else
\if \relax \csname lgwellbigj\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellbigj {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellbigj \fi ”]

[$L_J \overset{pyk}{\rightarrow}$ “ell big j”]

L_K

[$L_K \overset{name}{\rightarrow}$ “L_K”]

[$L_K \overset{tex}{\rightarrow}$ “
\if \relax \csname lgwprooflinep\endcsname L_K \else
\if \relax \csname lgwellbigk\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellbigk {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellbigk \fi ”]

[$L_K \overset{pyk}{\rightarrow}$ “ell big k”]

L_L

[$L_L \overset{name}{\rightarrow}$ “L_L”]

[$L_L \overset{tex}{\rightarrow}$ “

\if \relax \csname lgwprooflinep\endcsname L_L \else
\if \relax \csname lgwellbigl\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellbigl {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellbigl \fi ”]

[$L_L \overset{pyk}{\to}$ “ell big l”]

L_M

[$L_M \overset{name}{\to}$ “L_M”]

[$L_M \overset{tex}{\to}$ “
\if \relax \csname lgwprooflinep\endcsname L_M \else
\if \relax \csname lgwellbigm\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellbigm {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellbigm \fi ”]

[$L_M \overset{pyk}{\to}$ “ell big m”]

L_N

[$L_N \overset{name}{\to}$ “L_N”]

[$L_N \overset{tex}{\to}$ “
\if \relax \csname lgwprooflinep\endcsname L_N \else
\if \relax \csname lgwellbign\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellbign {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellbign \fi ”]

[$L_N \overset{pyk}{\to}$ “ell big n”]

L_O

[$L_O \overset{name}{\to}$ “L_O”]

[$L_O \overset{tex}{\to}$ “
\if \relax \csname lgwprooflinep\endcsname L_O \else
\if \relax \csname lgwellbigo\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellbigo {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellbigo \fi ”]

[$L_O \overset{pyk}{\to}$ “ell big o”]

L_P

[$L_P \overset{name}{\to}$ “L_P”]

[$L_P \overset{tex}{\to}$ “
\if \relax \csname lgwprooflinep\endcsname L_P \else
\if \relax \csname lgwellbigp\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellbigp {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellbigp \fi ”]

[$L_P \overset{pyk}{\to}$ “ell big p”]

L_Q

[$L_Q \overset{name}{\to}$ “L_Q”]

[$L_Q \overset{tex}{\to}$ “
\if \relax \csname lgwprooflinep\endcsname L_Q \else
\if \relax \csname lgwellbigq\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellbigq {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellbigq \fi ”]

[$L_Q \overset{pyk}{\to}$ “ell big q”]

L_R

[$L_R \overset{name}{\to}$ “L_R”]

[$L_R \overset{tex}{\to}$ “
\if \relax \csname lgwprooflinep\endcsname L_R \else
\if \relax \csname lgwellbigr\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellbigr {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellbigr \fi ”]

[$L_R \overset{pyk}{\to}$ “ell big r”]

L_S

[$L_S \overset{\text{name}}{\to}$ “L_S”]

[$L_S \overset{\text{tex}}{\to}$ “
\if \relax \csname lgwprooflinep\endcsname L_S \else
\if \relax \csname lgwellbigs\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellbigs {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellbigs \fi ”]

[$L_S \overset{\text{pyk}}{\to}$ “ell big s”]

L_T

[$L_T \overset{\text{name}}{\to}$ “L_T”]

[$L_T \overset{\text{tex}}{\to}$ “
\if \relax \csname lgwprooflinep\endcsname L_T \else
\if \relax \csname lgwellbigt\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellbigt {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellbigt \fi ”]

[$L_T \overset{\text{pyk}}{\to}$ “ell big t”]

L_U

[$L_U \overset{\text{name}}{\to}$ “L_U”]

[$L_U \overset{\text{tex}}{\to}$ “
\if \relax \csname lgwprooflinep\endcsname L_U \else
\if \relax \csname lgwellbigu\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellbigu {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellbigu \fi ”]

[$L_U \overset{\text{pyk}}{\to}$ “ell big u”]

L_V

[$L_V \overset{\text{name}}{\to}$ “L_V”]

[$L_V \overset{\text{tex}}{\to}$ “

\if \relax \csname lgwprooflinep\endcsname L_V \else
\if \relax \csname lgwellbigv\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellbigv {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellbigv \fi "]

[$L_V \overset{pyk}{\to}$ "ell big v"]

L_W

[$L_W \overset{name}{\to}$ "L_W"]

[$L_W \overset{tex}{\to}$ "
\if \relax \csname lgwprooflinep\endcsname L_W \else
\if \relax \csname lgwellbigw\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellbigw {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellbigw \fi "]

[$L_W \overset{pyk}{\to}$ "ell big w"]

L_X

[$L_X \overset{name}{\to}$ "L_X"]

[$L_X \overset{tex}{\to}$ "
\if \relax \csname lgwprooflinep\endcsname L_X \else
\if \relax \csname lgwellbigx\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellbigx {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellbigx \fi "]

[$L_X \overset{pyk}{\to}$ "ell big x"]

L_Y

[$L_Y \overset{name}{\to}$ "L_Y"]

[$L_Y \overset{tex}{\to}$ "
\if \relax \csname lgwprooflinep\endcsname L_Y \else
\if \relax \csname lgwellbigy\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellbigy {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellbigy \fi "]

[$\mathrm{L_Y} \overset{\mathrm{pyk}}{\to}$ “ell big y”]

$\mathrm{L_Z}$

[$\mathrm{L_Z} \overset{\mathrm{name}}{\to}$ “L_Z”]

[$\mathrm{L_Z} \overset{\mathrm{tex}}{\to}$ “
\if \relax \csname lgwprooflinep\endcsname L_Z \else
\if \relax \csname lgwellbigz\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellbigz {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellbigz \fi ”]

[$\mathrm{L_Z} \overset{\mathrm{pyk}}{\to}$ “ell big z”]

$\mathrm{L_?}$

[$\mathrm{L_?} \overset{\mathrm{name}}{\to}$ “L_?”]

[$\mathrm{L_?} \overset{\mathrm{tex}}{\to}$ “
\if \relax \csname lgwprooflinep\endcsname L_? \else
\global \advance \lgwproofline by 1
L\ifnum \lgwproofline <10 0\fi \number \lgwproofline
\fi ”]

[$\mathrm{L_?} \overset{\mathrm{pyk}}{\to}$ “ell dummy”]

Reflexivity

[Reflexivity $\overset{\mathrm{proof}}{\to}$ $\lceil \mathrm{T_E} \vdash \forall \underline{\mathrm{a}}\colon [\ [\ [\ \mathrm{HeadPair}^{\mathrm{I}\triangleright * \triangleright}\ @\ \underline{\mathrm{a}}\ ]\ @\ \underline{\mathrm{a}}\ ]\ ;\ [\ [\ [\ [\ \mathrm{Transitivity}^{\mathrm{I}\triangleright * \triangleright}\ @\ [\ [\ \underline{\mathrm{a}} :: \underline{\mathrm{a}}\ ]^{\mathrm{h}}\ ]\ ]\ @\ \underline{\mathrm{a}}\ ]\ @\ \underline{\mathrm{a}}\ ]^{\triangleright\triangleright}\ ]\ ]\ ]\rceil$]

[Reflexivity $\overset{\mathrm{stmt}}{\to}$ $\mathrm{T_E} \vdash \forall \underline{\mathrm{a}}\colon [\ \underline{\mathrm{a}} = \underline{\mathrm{a}}\ ]$]

[Reflexivity $\overset{\mathrm{tex}}{\to}$ “
Reflexivity”]

[Reflexivity $\overset{\mathrm{pyk}}{\to}$ “sequent reflexivity”]

$\mathrm{Reflexivity_1}$

[$\mathrm{Reflexivity_1} \overset{\mathrm{proof}}{\to} \lambda \mathrm{c}.\lambda \mathrm{x}.\mathcal{P}(\lceil \mathrm{T_E} \vdash \forall \underline{\mathrm{a}}\colon [\ [\ \mathrm{HeadPair} \gg [\ [\ \underline{\mathrm{a}} :: \underline{\mathrm{a}}\ ]^{\mathrm{h}} = \underline{\mathrm{a}}\ ]\ ]\ ;\ [\ [\ [\ \mathrm{Transitivity} \triangleright [\ [\ \underline{\mathrm{a}} :: \underline{\mathrm{a}}\ ]^{\mathrm{h}} = \underline{\mathrm{a}}\ ]\ ]\ \triangleright [\ [\ \underline{\mathrm{a}} :: \underline{\mathrm{a}}\ ]^{\mathrm{h}} = \underline{\mathrm{a}}\ ]\ ]\ \gg [\ \underline{\mathrm{a}} = \underline{\mathrm{a}}\ ]\ ]\ ]$

$\rceil, \mathsf{p}_0, \mathsf{c})]$

$[\text{Reflexivity}_1 \overset{\text{stmt}}{\rightarrow} \mathrm{T_E} \vdash \forall \underline{\mathsf{a}}\colon [\ \underline{\mathsf{a}} = \underline{\mathsf{a}}\ ]\ ]$

$[\text{Reflexivity}_1 \overset{\text{tex}}{\rightarrow}$ “
Reflexivity_1”$]$

$[\text{Reflexivity}_1 \overset{\text{pyk}}{\rightarrow}$ “tactic reflexivity”$]$

Commutativity

$[\text{Commutativity} \overset{\text{proof}}{\rightarrow} \lceil \mathrm{T_E} \vdash \forall \underline{\mathsf{a}}\colon \forall \underline{\mathsf{b}}\colon [\ [\ \underline{\mathsf{a}} = \underline{\mathsf{b}}\ ]\ \vdash\ [\ [\ \text{Reflexivity}^{\mathrm{I} \triangleright * \triangleright}\ @\ \underline{\mathsf{a}}\ ]\ ;\ [\ [\ [\ [\ \text{Transitivity}^{\mathrm{I} \triangleright * \triangleright}\ @\ \underline{\mathsf{a}}\ ]\ @\ \underline{\mathsf{b}}\ ]\ @\ \underline{\mathsf{a}}\ ]^{\triangleright \triangleright}\ ]\ ]\ ]\ ]]$

$[\text{Commutativity} \overset{\text{stmt}}{\rightarrow} \mathrm{T_E} \vdash \forall \underline{\mathsf{a}}\colon \forall \underline{\mathsf{b}}\colon [\ [\ \underline{\mathsf{a}} = \underline{\mathsf{b}}\ ]\ \vdash\ [\ \underline{\mathsf{b}} = \underline{\mathsf{a}}\ ]\ ]\ ]$

$[\text{Commutativity} \overset{\text{tex}}{\rightarrow}$ “
Commutativity”$]$

$[\text{Commutativity} \overset{\text{pyk}}{\rightarrow}$ “sequent commutativity”$]$

Commutativity_1

$[\text{Commutativity}_1 \overset{\text{proof}}{\rightarrow} \lambda \mathsf{c}.\lambda \mathsf{x}.\mathcal{P}(\lceil \mathrm{T_E} \vdash \forall \underline{\mathsf{a}}\colon \forall \underline{\mathsf{b}}\colon [\ [\ \underline{\mathsf{a}} = \underline{\mathsf{b}}\ ]\ \vdash\ [\ [\ \text{Reflexivity}_1 \gg [\ \underline{\mathsf{a}} = \underline{\mathsf{a}}\ ]\ ]\ ;\ [\ [\ [\ \text{Transitivity} \triangleright\ [\ \underline{\mathsf{a}} = \underline{\mathsf{b}}\ ]\ ]\ \triangleright\ [\ \underline{\mathsf{a}} = \underline{\mathsf{a}}\ ]\ ]\ \gg\ [\ \underline{\mathsf{b}} = \underline{\mathsf{a}}\ ]\ ]\ ]\ ]\ \rceil, \mathsf{p}_0, \mathsf{c})]$

$[\text{Commutativity}_1 \overset{\text{stmt}}{\rightarrow} \mathrm{T_E} \vdash \forall \underline{\mathsf{a}}\colon \forall \underline{\mathsf{b}}\colon [\ [\ \underline{\mathsf{a}} = \underline{\mathsf{b}}\ ]\ \vdash\ [\ \underline{\mathsf{b}} = \underline{\mathsf{a}}\ ]\ ]\ ]$

$[\text{Commutativity}_1 \overset{\text{tex}}{\rightarrow}$ “
Commutativity_1”$]$

$[\text{Commutativity}_1 \overset{\text{pyk}}{\rightarrow}$ “tactic commutativity”$]$

<tactic>

[<tactic> $\overset{\text{val}}{\rightarrow} \lceil$<tactic>$\rceil]$

[<tactic> $\overset{\text{tex}}{\rightarrow}$ “
{<}tactic{>}”$]$

[<tactic> $\overset{\text{pyk}}{\rightarrow}$ “the tactic aspect”$]$

tactic

$[\text{tactic} \overset{\text{msg}}{\to} \text{<tactic>}]$

$[\text{tactic} \overset{\text{tex}}{\to} \text{“}$
$\text{tactic”}]$

$[\text{tactic} \overset{\text{pyk}}{\to} \text{“tactic”}]$

$\left[* \overset{\text{tactic}}{=} *\right]$

$[[\mathsf{x} \overset{\text{tactic}}{=} \mathsf{y}] \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[[\mathsf{x} \overset{\text{tactic}}{=} \mathsf{y}] \doteqdot [(\mathsf{x})^{\mathbf{p}} \overset{\text{tactic}}{\to} \mathsf{y}]]\rceil)]$

$[[\mathsf{x} \overset{\text{tactic}}{=} \mathsf{y}] \overset{\text{tex}}{\to} \text{“}$
$\text{[\#1/tex name/tex.}$
$\text{\textbackslash stackrel \{tactic\}\{=\}\#2.}$
$\text{]”}]$

$[[\mathsf{x} \overset{\text{tactic}}{=} \mathsf{y}] \overset{\text{pyk}}{\to} \text{“tactic define } * \text{ as } * \text{ end define”}]$

$\mathcal{P}(*,*,*)$

$[\mathcal{P}(\mathsf{t},\mathsf{s},\mathsf{c}) \overset{\text{val}}{\to} \mathsf{s}!$
$\text{let}_1(\lambda\mathsf{d}.$
$\text{If}(\mathsf{d},\mathsf{t}^{\mathrm{h}} :: \mathcal{P}^*(\mathsf{t}^{\mathrm{t}},\mathsf{s},\mathsf{c}),$
$\mathcal{U}^{\mathrm{M}}(\ [\ [\ \mathcal{E}(\mathsf{d}^3,\mathsf{T},\mathsf{c})\ \text{`}\ \mathsf{t}\ ]\ \text{`}\ \mathsf{s}\ ]\ \text{`}\ \mathsf{c})), \mathbf{aspect}(\text{<tactic>},\mathsf{t},\mathsf{c}))]$

$[\mathcal{P}(\mathsf{t},\mathsf{s},\mathsf{c}) \overset{\text{tex}}{\to} \text{“}$
$\text{\{\textbackslash cal P\}(\#1.}$
$\text{, \#2.}$
$\text{, \#3.}$
$\text{)”}]$

$[\mathcal{P}(\mathsf{t},\mathsf{s},\mathsf{c}) \overset{\text{pyk}}{\to} \text{“proof expand } * \text{ state } * \text{ cache } * \text{ end expand”}]$

$\mathcal{P}^*(*,*,*)$

$[\mathcal{P}^*(\mathsf{t},\mathsf{s},\mathsf{c}) \overset{\text{val}}{\to} \mathsf{s}!\ [\ \mathsf{c}!\text{If}(\mathsf{t},\mathsf{T},\mathcal{P}(\mathsf{t}^{\mathrm{h}},\mathsf{s},\mathsf{c}) :: \mathcal{P}^*(\mathsf{t}^{\mathrm{t}},\mathsf{s},\mathsf{c}))\ ]\ ]$

$[\mathcal{P}^*(\mathsf{t},\mathsf{s},\mathsf{c}) \overset{\text{tex}}{\to} \text{“}$
$\text{\{\textbackslash cal P\}\^{}*(\#1.}$
$\text{, \#2.}$
$\text{, \#3.}$

)”]

$[\mathcal{P}^*(\mathsf{t},\mathsf{s},\mathsf{c}) \overset{\text{pyk}}{\to} \text{“proof expand list } * \text{ state } * \text{ cache } * \text{ end expand”}]$

p_0

$[\mathrm{p}_0 \overset{\text{val}}{\to} \mathcal{M}(\lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\mathcal{P}(\mathsf{t},\mathsf{s},\mathsf{c})) :: \mathsf{T}]$

$[\mathrm{p}_0 \overset{\text{tex}}{\to} \text{“}$
p_0”]

$[\mathrm{p}_0 \overset{\text{pyk}}{\to} \text{“proof state”}]$

$\mathrm{conclude}_1(*,*)$

$[\mathrm{conclude}_1(\mathsf{t},\mathsf{c}) \overset{\text{val}}{\to}$
$\mathrm{let}_1(\lambda\mathsf{r}.$
$\mathrm{If}(\mathsf{r}^{\mathsf{c}}, \mathrm{error}_2(\lceil\text{“Unification failed”}\rceil, \mathsf{t}), \mathsf{r}), \mathrm{conclude}_2(\mathsf{t}^1, \mathsf{t}^2, \mathsf{c}))]$

$[\mathrm{conclude}_1(\mathsf{t},\mathsf{c}) \overset{\text{tex}}{\to} \text{“}$
conclude_1 (#1.
, #2.
)”]

$[\mathrm{conclude}_1(\mathsf{t},\mathsf{c}) \overset{\text{pyk}}{\to} \text{“conclude one } * \text{ cache } * \text{ end conclude”}]$

$\mathrm{conclude}_2(*,*,*)$

$[\mathrm{conclude}_2(\mathsf{a},\mathsf{t},\mathsf{c}) \overset{\text{val}}{\to} \mathsf{t}!$
$\mathrm{If}(\mathsf{a} \overset{\text{r}}{=} \lceil \mathsf{x} \triangleright \mathsf{y} \rceil, \mathrm{conclude}_2(\mathsf{a}^1, \mathsf{a}\text{-color}(\mathsf{t} \triangleright\ [\ \mathsf{a}^2\ ]), \mathsf{c}),$
$\mathrm{If}(\mathsf{a} \overset{\text{r}}{=} \lceil \mathsf{x} \mathbb{\triangleright} \mathsf{y} \rceil, \mathrm{conclude}_2(\mathsf{a}^1, \mathsf{a}\text{-color}(\mathsf{t} \mathbb{\triangleright}\ [\ \mathsf{a}^2\ ]), \mathsf{c}),$
$\mathrm{If}(\mathsf{a} \overset{\text{r}}{=} \lceil \mathsf{x} @ \mathsf{y} \rceil, \mathrm{conclude}_2(\mathsf{a}^1, \mathsf{a}\text{-color}(\mathsf{t} @\ [\ \mathsf{a}^2\ ]), \mathsf{c}),$
$\mathrm{If}(\mathbf{aspect}(\text{<proof>}, \mathsf{a}, \mathsf{c}), \mathrm{error}_2(\lceil\text{“Lemma expected”}\rceil, \mathsf{a}),$
$\mathrm{let}_1(\lambda\mathsf{d}.$
$\mathrm{conclude}_3(\mathsf{a}\text{-color}(\mathrm{conclude}_4(\mathsf{a}^{\mathrm{I}\triangleright * \triangleright}, \mathsf{d}^{32})), \mathsf{t}, \mathrm{parm}(\mathsf{d}^{32}, \mathsf{T}, 1), \mathsf{T}), \mathbf{aspect}(\text{<stmt>}, \mathsf{a},$

$[\mathrm{conclude}_2(\mathsf{a},\mathsf{t},\mathsf{c}) \overset{\text{tex}}{\to} \text{“}$
conclude_2 (#1.
, #2.
, #3.
)”]

$[\mathrm{conclude}_2(\mathsf{a},\mathsf{t},\mathsf{c}) \overset{\text{pyk}}{\to} \text{“conclude two } * \text{ proves } * \text{ cache } * \text{ end conclude”}]$

$\mathrm{conclude}_3(*,*,*,*)$

$[\mathrm{conclude}_3(\mathsf{a},\mathsf{t},\mathsf{l},\mathsf{s}) \overset{\mathrm{val}}{\to} \mathsf{a}!\ [\ \mathsf{t}!\ [\ \mathsf{l}!\ [\ \mathsf{s}!$
$\mathrm{If}(\mathsf{l} \overset{\mathrm{r}}{=} \lceil \mathsf{x} \vdash \mathsf{y} \rceil,\ [\ [$
$\mathsf{t}\ ]\ \overset{\mathrm{r}}{=} \lceil \mathsf{x} \rhd \mathsf{y} \rceil\ ]\ ]\ \begin{cases} \mathrm{conclude}_3(\mathsf{a}^{\rhd}, \mathsf{t}^1, \mathsf{l}^2, \mathrm{unify}(\mathsf{l}^1 = \mathsf{t}^2, \mathsf{s})) \\ \mathrm{conclude}_3(\mathsf{a}^{\rhd}, \mathsf{t}, \mathsf{l}^2, \mathsf{s}) \end{cases},$
$\mathrm{If}(\mathsf{l} \overset{\mathrm{r}}{=} \lceil \mathsf{x} \Vdash \mathsf{y} \rceil,\ [\ [$
$\mathsf{t}\ ]\ \overset{\mathrm{r}}{=} \lceil \mathsf{x} \Rrightarrow \mathsf{y} \rceil\ ]\ ]\ \begin{cases} \mathrm{conclude}_3(\mathsf{a}^{\rhd}, \mathsf{t}^1, \mathsf{l}^2, \mathrm{unify}(\mathsf{l}^1 = \mathsf{t}^2, \mathsf{s})) \\ \mathrm{conclude}_3(\mathsf{a}^{\mathrm{V}}, \mathsf{t}, \mathsf{l}^2, \mathsf{s}) \end{cases},$
$\mathrm{If}(\mathsf{l} \overset{\mathrm{r}}{=} \lceil \forall \mathsf{x}\colon \mathsf{y} \rceil,\ [\ [$
$\mathsf{t}\ ]\ \overset{\mathrm{r}}{=} \lceil \mathsf{x} @ \mathsf{y} \rceil\ ]\ ]\ \begin{cases} \mathrm{conclude}_3(\mathsf{a} @\ [\ \mathsf{t}^2\ ]\ , \mathsf{t}^1, \mathsf{l}^2, \mathrm{unify}(\mathsf{l}^1 = \mathsf{t}^2, \mathsf{s})) \\ \mathrm{conclude}_3(\mathsf{a} @\ [\ \mathsf{l}^1\ ]\ , \mathsf{t}, \mathsf{l}^2, \mathsf{s}) \end{cases},$
$\mathrm{let}_1(\lambda \mathsf{s}.$
$\mathrm{If}(\mathsf{s}^{\mathrm{c}}, \mathsf{s},$
$\mathrm{inst}(\mathsf{a},\mathsf{s})), \mathrm{unify}(\mathsf{l} = \mathsf{t}, \mathsf{s}))))\ ]\ ]\ ]\ ]$

$[\mathrm{conclude}_3(\mathsf{a},\mathsf{t},\mathsf{l},\mathsf{s}) \overset{\mathrm{tex}}{\to}$ “
conclude_3 (#1.
, #2.
, #3.
, #4.
)”]

$[\mathrm{conclude}_3(\mathsf{a},\mathsf{t},\mathsf{l},\mathsf{s}) \overset{\mathrm{pyk}}{\to}$ “conclude three $*$ proves $*$ lemma $*$ substitution $*$ end conclude”]

$\mathrm{conclude}_4(*,*)$

$[\mathrm{conclude}_4(\mathsf{a},\mathsf{l}) \overset{\mathrm{val}}{\to} \mathsf{a}!\ [\ \mathsf{l}!$
$\mathrm{If}(\neg\ [\ \mathsf{l} \overset{\mathrm{r}}{=} \lceil \forall \mathsf{x}\colon \mathsf{y} \rceil\ ]\ , \mathsf{a},$
$\mathrm{let}_1(\lambda \mathsf{v}.\forall \mathsf{v}\colon \mathrm{conclude}_4(\mathsf{a} @ \mathsf{v}, \mathsf{l}^2), \lceil \underline{*} \rceil^{\mathrm{R}} ::\ [\ \mathsf{l}^1 :: \mathsf{T}\ ]\ ))\ ]\ ]$

$[\mathrm{conclude}_4(\mathsf{a},\mathsf{l}) \overset{\mathrm{tex}}{\to}$ “
conclude_4 (#1.
, #2.
)”]

$[\mathrm{conclude}_4(\mathsf{a},\mathsf{l}) \overset{\mathrm{pyk}}{\to}$ “conclude four $*$ lemma $*$ end conclude”]

$*\_\{*\}$

$[*\_\{*\} \overset{\mathrm{name}}{\to}$ “#1.
_\{#2.

\}”]

[$*$_{$*$}$\overset{\text{tex}}{\to}$“#1.
_{#2.
}”]

[$*$_{$*$}$\overset{\text{pyk}}{\to}$“$*$ sub $*$ end sub”]

$*'$

[x′$\overset{\text{tex}}{\to}$“#1.””]

[x′$\overset{\text{pyk}}{\to}$“$*$ prime”]

$*\big[\ *\ \big]$

[a[k]$\overset{\text{val}}{\to}$ $\mathbf{assoc}_1(\mathsf{a},\mathsf{k},\mathsf{k})$]

[$*$[$*$]$\overset{\text{tex}}{\to}$“#1.
{[}#2.
{]}”]

[$*$[$*$]$\overset{\text{pyk}}{\to}$“$*$ assoc $*$ end assoc”]

$*\big[*\longrightarrow*\big]$

$$[\mathsf{a}[\mathsf{i}\to\mathsf{v}]\overset{\text{val}}{\to}\mathsf{i}^{\mathrm{c}}\left\{\begin{array}{ll}\mathsf{v}\left\{\begin{array}{l}\text{array-remove}(\mathsf{i},\mathsf{a},0)\\ \text{array-put}(\mathsf{i},\mathsf{v},\mathsf{a},0)\end{array}\right. &]\\ \mathsf{v}!\mathsf{a}\end{array}\right.$$

[a[i→v]$\overset{\text{tex}}{\to}$“#1.
[#2.
{\rightarrow} #3.
]”]

[a[i→v]$\overset{\text{pyk}}{\to}$“$*$ set $*$ to $*$ end set”]

$*\big[*\Rightarrow*\big]$

$$[\mathsf{a}[\mathsf{i}\Rightarrow\mathsf{v}]\overset{\text{val}}{\to}\mathsf{i}^{\mathrm{a}}\left\{\begin{array}{l}\mathsf{a}!\mathsf{v}\\ \mathsf{a}[\mathsf{i}^{\mathrm{h}}\to\mathsf{a}[\mathsf{i}^{\mathrm{h}}][\mathsf{i}^{\mathrm{t}}\Rightarrow\mathsf{v}]]\end{array}\right.\ ]$$

[a[i⇒v]$\overset{\text{tex}}{\to}$“#1.

[#2.
{\Rightarrow} #3.
]”]

[a[i⇒v] $\overset{\text{pyk}}{\to}$ “∗ set multi ∗ to ∗ end set”]

newline ∗

[newline x $\overset{\text{name}}{\to}$ “
newline\ #1.”]

[newline x $\overset{\text{val}}{\to}$ x^{M}]

[newline x $\overset{\text{tex}}{\to}$ “
\newline #1.”]

[newline x $\overset{\text{pyk}}{\to}$ “newline ∗”]

macro newline ∗

[macro newline x $\overset{\text{name}}{\to}$ “
macro\ newline\ #1.”]

[macro newline x $\overset{\text{macro}}{\to}$ $\lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\text{macro newline x} \ddot{=} \mathsf{x}]\rceil)$]

[macro newline x $\overset{\text{tex}}{\to}$ “
\newline #1.”]

[macro newline x $\overset{\text{pyk}}{\to}$ “macro newline ∗”]

∗0

[x0 $\overset{\text{val}}{\to}$ T +2∗ x]

[∗0 $\overset{\text{tex}}{\to}$ “#1.
0”]

[∗0 $\overset{\text{pyk}}{\to}$ “∗ bit nil”]

∗1

[x1 $\overset{\text{val}}{\to}$ F +2∗ x]

[∗1 $\overset{\text{tex}}{\to}$ “#1.
1”]

[$*1 \overset{\text{pyk}}{\to}$ “$*$ bit one”]

0b

[0b $\overset{\text{val}}{\to}$ 0]

[0b $\overset{\text{tex}}{\to}$ “
0 \mathrm {b}”]

[0b $\overset{\text{pyk}}{\to}$ “binary”]

$*$-color$(*)$

[a-color(t) $\overset{\text{val}}{\to}$ t^{d} $\left\{ \begin{array}{l} [\ \mathsf{t}^{\mathrm{r}} :: [\ \mathsf{t}^{\mathrm{i}} :: [\ \mathsf{a}^{\mathrm{d}}\ ]\ ]\ ] :: [\ \mathsf{a\text{-}color}^{*}(\mathsf{t}^{\mathrm{t}})\ ] \\ \mathsf{a!t} \end{array} \right.$]

[x-color(y) $\overset{\text{tex}}{\to}$ “#1.
\mbox {-color}(#2.
)”]

[x-color(y) $\overset{\text{pyk}}{\to}$ “$*$ color $*$ end color”]

$*$-color$^{*}(*)$

[a-color*(t) $\overset{\text{val}}{\to}$ t $\left\{ \begin{array}{l} \mathsf{a!T} \\ \mathsf{a\text{-}color}(\mathsf{t}^{\mathrm{h}}) :: [\ \mathsf{a\text{-}color}^{*}(\mathsf{t}^{\mathrm{t}})\ ] \end{array} \right.$]

[x-color*(y) $\overset{\text{tex}}{\to}$ “#1.
\mbox {-color}^{\ast}(#2.
)”]

[x-color*(y) $\overset{\text{pyk}}{\to}$ “$*$ color star $*$ end color”]

$*$ ’ $*$

Predef: apply

[$*$ ’ $*$ $\overset{\text{tex}}{\to}$ “#1.
\mathbin {\mbox {’}}#2.”]

[$*$ ’ $*$ $\overset{\text{pyk}}{\to}$ “$*$ apply $*$”]

$* \text{`} *$

$[\mathsf{f} \text{`} \mathsf{x} \overset{\text{val}}{\to} \mathbf{apply}(\mathsf{f}, \mathsf{x})]$

$[* \text{`} * \overset{\text{tex}}{\to} \text{“\#1.}$
$\text{\textbackslash mathbin \{\textbackslash mbox \{`\}\}\#2.”}]$

$[* \text{`} * \overset{\text{pyk}}{\to} \text{“}* \text{ tagged apply }*\text{”}]$

$*^{\mathrm{H}}$

$[\mathsf{x}^{\mathrm{H}} \overset{\text{val}}{\to} \mathsf{x} \text{ ' } \mathsf{T}]$

$[*^{\mathrm{H}} \overset{\text{tex}}{\to} \text{“\#1.}$
$\text{\{\}\^{}H”}]$

$[*^{\mathrm{H}} \overset{\text{pyk}}{\to} \text{“}* \text{ raw head”}]$

$*^{\mathrm{T}}$

$[\mathsf{x}^{\mathrm{T}} \overset{\text{val}}{\to} \mathsf{x} \text{ ' } \mathsf{F}]$

$[*^{\mathrm{T}} \overset{\text{tex}}{\to} \text{“\#1.}$
$\text{\{\}\^{}T”}]$

$[*^{\mathrm{T}} \overset{\text{pyk}}{\to} \text{“}* \text{ raw tail”}]$

$*^{\mathrm{U}}$

$[\mathsf{x}^{\mathrm{U}} \overset{\text{val}}{\to} \mathrm{if}(\mathsf{x}^{\mathrm{H}}, \mathsf{x}^{\mathrm{T}}, \mathsf{T})]$

$[*^{\mathrm{U}} \overset{\text{tex}}{\to} \text{“\#1.}$
$\text{\{\}\^{}U”}]$

$[*^{\mathrm{U}} \overset{\text{pyk}}{\to} \text{“}* \text{ cardinal untag”}]$

$*^{\mathrm{h}}$

$[\mathsf{x}^{\mathrm{h}} \overset{\text{val}}{\Rightarrow} \mathsf{x}^{\mathrm{MTH}}]$

$[*^{\mathrm{h}} \overset{\text{tex}}{\to} \text{“\#1.}$
$\text{\{\}\^{}h”}]$

$[*^{\mathrm{h}} \overset{\text{pyk}}{\to} \text{“}* \text{ head”}]$

$*^{\mathrm{t}}$

$[\mathsf{x}^{\mathrm{t}} \overset{\mathrm{val}}{\Rightarrow} \mathrm{if}(\mathsf{x}^{\mathrm{d}}, \mathrm{if}(\mathsf{x}^{\mathrm{c}}, \mathsf{T} \mathrel{\underline{\therefore}} [\ \mathsf{x}^{\mathrm{MTT}}\ ], \mathsf{x}^{\mathrm{MTT}}), \mathsf{T})]$

$[*^{\mathrm{t}} \overset{\mathrm{tex}}{\rightarrow}$ "#1.
{}^t"]

$[*^{\mathrm{t}} \overset{\mathrm{pyk}}{\rightarrow}$ "* tail"]

$*^{\mathrm{s}}$

$[\mathsf{x}^{\mathrm{s}} \overset{\mathrm{val}}{\Rightarrow} \mathsf{x}^{\mathrm{MTB}}]$

$[*^{\mathrm{s}} \overset{\mathrm{tex}}{\rightarrow}$ "#1.
{}^s"]

$[*^{\mathrm{s}} \overset{\mathrm{pyk}}{\rightarrow}$ "* is singular"]

$*^{\mathrm{c}}$

$[\mathsf{x}^{\mathrm{c}} \overset{\mathrm{val}}{\Rightarrow} \mathrm{if}(\mathsf{x}, \mathsf{F}, \mathsf{x}^{\mathrm{MHB}})]$

$[*^{\mathrm{c}} \overset{\mathrm{tex}}{\rightarrow}$ "#1.
{}^c"]

$[*^{\mathrm{c}} \overset{\mathrm{pyk}}{\rightarrow}$ "* is cardinal"]

$*^{\mathrm{d}}$

$[\mathsf{x}^{\mathrm{d}} \overset{\mathrm{val}}{\Rightarrow} \mathsf{x}^{\mathrm{MHTHB}}]$

$[*^{\mathrm{d}} \overset{\mathrm{tex}}{\rightarrow}$ "#1.
{}^d"]

$[*^{\mathrm{d}} \overset{\mathrm{pyk}}{\rightarrow}$ "* is data"]

$*^{\mathrm{a}}$

$[\mathsf{x}^{\mathrm{a}} \overset{\mathrm{val}}{\rightarrow}\ [\ [\ \neg\ [\ \mathsf{x}^{\mathrm{d}}\ ]\ ]\ \vee\ [\ \mathsf{x}^{\mathrm{c}}\ ]\ ]\ \vee\ [\ \mathsf{x}^{\mathrm{s}}\ ]\ ]$

$[*^{\mathrm{a}} \overset{\mathrm{tex}}{\rightarrow}$ "#1.
{}^a"]

$[*^{\mathrm{a}} \overset{\mathrm{pyk}}{\rightarrow}$ "* is atomic"]

$*^{\mathrm{C}}$

$[\mathsf{x}^{\mathrm{C}} \overset{\mathrm{val}}{\to} \mathrm{if}(\mathsf{x}, \mathsf{T}, \mathsf{x}^{\mathrm{HB}} \underline{+2*} [\, \mathsf{x}^{\mathrm{TC}} \,])]$

$[*^{\mathrm{C}} \overset{\mathrm{tex}}{\to} \text{“\#1.}$
$\{\}\hat{}\mathrm{C}\text{”}]$

$[*^{\mathrm{C}} \overset{\mathrm{pyk}}{\to} \text{“}* \text{ cardinal retract”}]$

$*^{\mathrm{M}}$

$[\mathsf{x}^{\mathrm{M}} \overset{\mathrm{val}}{\Rightarrow} \mathrm{if}(\mathsf{x}, \mathsf{T}, \mathrm{if}(\mathsf{x}^{\mathrm{H}}, \mathsf{T} \underline{\therefore} [\, \mathsf{x}^{\mathrm{TC}} \,], \mathrm{if}(\mathsf{x}^{\mathrm{HTH}}, \mathsf{x}^{\mathrm{THM}} \underline{::} [\, \mathsf{x}^{\mathrm{TTM}} \,], \mathcal{M}(\mathsf{x}^{\mathrm{T}}))))]$

$[*^{\mathrm{M}} \overset{\mathrm{tex}}{\to} \text{“\#1.}$
$\{\}\hat{}\mathrm{M}\text{”}]$

$[*^{\mathrm{M}} \overset{\mathrm{pyk}}{\to} \text{“}* \text{ tagged retract”}]$

$*^{\mathrm{B}}$

$[\mathsf{x}^{\mathrm{B}} \overset{\mathrm{val}}{\to} \mathrm{if}(\mathsf{x}, \mathsf{T}, \mathsf{F})]$

$[*^{\mathrm{B}} \overset{\mathrm{tex}}{\to} \text{“\#1.}$
$\{\}\hat{}\mathrm{B}\text{”}]$

$[*^{\mathrm{B}} \overset{\mathrm{pyk}}{\to} \text{“}* \text{ boolean retract”}]$

$*^{\mathrm{r}}$

$[\mathsf{x}^{\mathrm{r}} \overset{\mathrm{val}}{\to} \mathsf{x}^{\mathrm{hh}}]$

$[\mathsf{x}^{\mathrm{r}} \overset{\mathrm{tex}}{\to} \text{“\#1.}$
$\{\}\hat{}\{\mathrm{r}\}\text{”}]$

$[\mathsf{x}^{\mathrm{r}} \overset{\mathrm{pyk}}{\to} \text{“}* \text{ ref”}]$

$*^{\mathrm{i}}$

$[\mathsf{x}^{\mathrm{i}} \overset{\mathrm{val}}{\to} \mathsf{x}^{\mathrm{hth}}]$

$[\mathsf{x}^{\mathrm{i}} \overset{\mathrm{tex}}{\to} \text{“\#1.}$
$\{\}\hat{}\{\mathrm{i}\}\text{”}]$

$[\mathsf{x}^{\mathrm{i}} \overset{\mathrm{pyk}}{\to} \text{“}* \text{ id”}]$

$*^{\mathrm{d}}$

$[\mathsf{x}^{\mathrm{d}} \overset{\mathrm{val}}{\to} \mathsf{x}^{\mathrm{htt}}]$

$[\mathsf{x}^{\mathrm{d}} \overset{\mathrm{tex}}{\to} \text{“\#1.}$
$\text{\{\}\^{}\{d\}”}]$

$[\mathsf{x}^{\mathrm{d}} \overset{\mathrm{pyk}}{\to} \text{“}* \text{ debug”}]$

$*^{\mathrm{R}}$

$[\mathsf{x}^{\mathrm{R}} \overset{\mathrm{val}}{\to} \mathsf{x}^{\mathrm{r}} :: [\, \mathsf{x}^{\mathrm{i}} :: \mathsf{T} \,]\,]$

$[\mathsf{x}^{\mathrm{R}} \overset{\mathrm{tex}}{\to} \text{“\#1.}$
$\text{\{\}\^{}\{R\}”}]$

$[\mathsf{x}^{\mathrm{R}} \overset{\mathrm{pyk}}{\to} \text{“}* \text{ root”}]$

$*^{0}$

$[\mathsf{x}^{0} \overset{\mathrm{val}}{\to} \mathsf{x}^{\mathrm{h}}]$

$[\mathsf{x}^{0} \overset{\mathrm{tex}}{\to} \text{“\#1.}$
$\text{\{\}\^{}\{0\}”}]$

$[\mathsf{x}^{0} \overset{\mathrm{pyk}}{\to} \text{“}* \text{ zeroth”}]$

$*^{1}$

$[\mathsf{x}^{1} \overset{\mathrm{val}}{\to} \mathsf{x}^{\mathrm{t}0}]$

$[\mathsf{x}^{1} \overset{\mathrm{tex}}{\to} \text{“\#1.}$
$\text{\{\}\^{}\{1\}”}]$

$[\mathsf{x}^{1} \overset{\mathrm{pyk}}{\to} \text{“}* \text{ first”}]$

$*^{2}$

$[\mathsf{x}^{2} \overset{\mathrm{val}}{\to} \mathsf{x}^{\mathrm{t}1}]$

$[\mathsf{x}^{2} \overset{\mathrm{tex}}{\to} \text{“\#1.}$
$\text{\{\}\^{}\{2\}”}]$

$[\mathsf{x}^{2} \overset{\mathrm{pyk}}{\to} \text{“}* \text{ second”}]$

$*^{3}$

$[x^{3} \overset{\text{val}}{\to} x^{t2}]$

$[x^{3} \overset{\text{tex}}{\to} \text{“\#1.}$
$\text{\{\}\^{}\{3\}”}]$

$[x^{3} \overset{\text{pyk}}{\to} \text{“}* \text{ third”}]$

$*^{4}$

$[x^{4} \overset{\text{val}}{\to} x^{t3}]$

$[x^{4} \overset{\text{tex}}{\to} \text{“\#1.}$
$\text{\{\}\^{}\{4\}”}]$

$[x^{4} \overset{\text{pyk}}{\to} \text{“}* \text{ fourth”}]$

$*^{5}$

$[x^{5} \overset{\text{val}}{\to} x^{t4}]$

$[x^{5} \overset{\text{tex}}{\to} \text{“\#1.}$
$\text{\{\}\^{}\{5\}”}]$

$[x^{5} \overset{\text{pyk}}{\to} \text{“}* \text{ fifth”}]$

$*^{6}$

$[x^{6} \overset{\text{val}}{\to} x^{t5}]$

$[x^{6} \overset{\text{tex}}{\to} \text{“\#1.}$
$\text{\{\}\^{}\{6\}”}]$

$[x^{6} \overset{\text{pyk}}{\to} \text{“}* \text{ sixth”}]$

$*^{7}$

$[x^{7} \overset{\text{val}}{\to} x^{t6}]$

$[x^{7} \overset{\text{tex}}{\to} \text{“\#1.}$
$\text{\{\}\^{}\{7\}”}]$

$[x^{7} \overset{\text{pyk}}{\to} \text{“}* \text{ seventh”}]$

$*^{8}$

$[\mathsf{x}^{8} \overset{\text{val}}{\to} \mathsf{x}^{\mathsf{t}7}]$

$[\mathsf{x}^{8} \overset{\text{tex}}{\to} \text{“\#1.}$
$\{\}\hat{}\{8\}\text{”}]$

$[\mathsf{x}^{8} \overset{\text{pyk}}{\to} \text{“}* \text{ eighth”}]$

$*^{9}$

$[\mathsf{x}^{9} \overset{\text{val}}{\to} \mathsf{x}^{\mathsf{t}8}]$

$[\mathsf{x}^{9} \overset{\text{tex}}{\to} \text{“\#1.}$
$\{\}\hat{}\{9\}\text{”}]$

$[\mathsf{x}^{9} \overset{\text{pyk}}{\to} \text{“}* \text{ ninth”}]$

$*^{\mathrm{E}}$

$[\mathsf{x}^{\mathrm{E}} \overset{\text{val}}{\to} \mathsf{x} \overset{\text{r}}{=} \lceil \mathsf{xy} \rceil]$

$[\mathsf{x}^{\mathrm{E}} \overset{\text{tex}}{\to} \text{“\#1.}$
$\{\} \hat{} \{ \text{ E } \}\text{”}]$

$[\mathsf{x}^{\mathrm{E}} \overset{\text{pyk}}{\to} \text{“}* \text{ is error”}]$

$*^{\mathcal{V}}$

$[\mathsf{t}^{\mathcal{V}} \overset{\text{val}}{\to} \mathsf{t} \overset{\text{r}}{=} \lceil \underline{\mathsf{a}} \rceil]$

$[\mathsf{t}^{\mathcal{V}} \overset{\text{tex}}{\to} \text{“\#1.}$
$\{\} \hat{} \{\backslash\text{cal V}\}\text{”}]$

$[\mathsf{t}^{\mathcal{V}} \overset{\text{pyk}}{\to} \text{“}* \text{ is metavar”}]$

$*^{\mathcal{C}}$

$[\mathsf{t}^{\mathcal{C}} \overset{\text{val}}{\to} \mathrm{If}(\mathsf{t}^{\mathcal{V}}, \mathsf{F}, \mathsf{t}^{\mathsf{t}\mathcal{C}^{*}})]$

$[\mathsf{t}^{\mathcal{C}} \overset{\text{tex}}{\to} \text{“\#1.}$
$\{\} \hat{} \{\backslash\text{cal C}\}\text{”}]$

$[\mathsf{t}^{\mathcal{C}} \overset{\text{pyk}}{\to} \text{“}* \text{ is metaclosed”}]$

$*^{\mathcal{C}^*}$

$[\mathsf{t}^{\mathcal{C}^*} \overset{\text{val}}{\to} \mathrm{If}(\mathsf{t}, \mathsf{T}, \mathrm{If}(\mathsf{t}^{\mathrm{h}\mathcal{C}}, \mathsf{t}^{\mathrm{t}\mathcal{C}^*}, \mathsf{F}))]$

$[\mathsf{t}^{\mathcal{C}^*} \overset{\text{tex}}{\to}$ “#1.
{} ^ {{\cal C} ^ { \ast }}”]

$[\mathsf{t}^{\mathcal{C}^*} \overset{\text{pyk}}{\to}$ “$*$ is metaclosed star”]

$* \cdot *$

$[\mathsf{x} \cdot \mathsf{y} \overset{\text{val}}{\to} \mathrm{If}(\mathsf{x}^{\mathrm{c}} \wedge [\, \mathsf{y}^{\mathrm{c}} \,], \mathsf{x} \cdot_0 \mathsf{y}, \mathsf{T})]$

$[\mathsf{x} \cdot \mathsf{y} \overset{\text{tex}}{\to}$ “#1.
\cdot #2.”]

$[\mathsf{x} \cdot \mathsf{y} \overset{\text{pyk}}{\to}$ “$*$ times $*$”]

$* \cdot_0 *$

$$[\mathsf{x} \cdot_0 \mathsf{y} \overset{\text{val}}{\to} \mathsf{y}^{\mathrm{s}} \begin{cases} \mathsf{x}!0 \\ \mathsf{y}^{\mathrm{h}} \begin{cases} \mathsf{T} +2* [\, \mathsf{x} \cdot_0 [\, \mathsf{y}^{\mathrm{t}} \,] \,] &] \\ (\mathsf{T} +2* [\, \mathsf{x} \cdot_0 [\, \mathsf{y}^{\mathrm{t}} \,] \,])^{\mathrm{M}} +_0 \mathsf{x} \end{cases} \end{cases}$$

$[\mathsf{x} \cdot_0 \mathsf{y} \overset{\text{tex}}{\to}$ “#1.
\cdot_0 #2.”]

$[\mathsf{x} \cdot_0 \mathsf{y} \overset{\text{pyk}}{\to}$ “$*$ times zero $*$”]

$* + *$

$[\mathsf{x} + \mathsf{y} \overset{\text{val}}{\to} \mathrm{If}(\mathsf{x}^{\mathrm{c}} \wedge [\, \mathsf{y}^{\mathrm{c}} \,], \mathsf{x} +_0 \mathsf{y}, \mathsf{T})]$

$[\mathsf{x} + \mathsf{y} \overset{\text{tex}}{\to}$ “#1.
+ #2.”]

$[\mathsf{x} + \mathsf{y} \overset{\text{pyk}}{\to}$ “$*$ plus $*$”]

$* +_0 *$

$$[\mathsf{x} +_0 \mathsf{y} \overset{\text{val}}{\to} \mathsf{x}^{\mathsf{s}} \begin{cases} \mathsf{y} \\ \mathsf{y}^{\mathsf{s}} \begin{cases} \mathsf{x} \\ \mathsf{x}^{\mathsf{h}} \begin{cases} \mathsf{y}^{\mathsf{h}} \begin{cases} \mathsf{T} +2* [\, \mathsf{x}^{\mathsf{t}} +_0 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \\ \mathsf{F} +2* [\, \mathsf{x}^{\mathsf{t}} +_0 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \end{cases} \\ \mathsf{y}^{\mathsf{h}} \begin{cases} \mathsf{F} +2* [\, \mathsf{x}^{\mathsf{t}} +_0 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \\ \mathsf{T} +2* [\, \mathsf{x}^{\mathsf{t}} +_1 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \end{cases} \end{cases} \end{cases} \end{cases}]$$

$[\mathsf{x} +_0 \mathsf{y} \overset{\text{tex}}{\to} \text{“\#1.}$
$\backslash\text{mathop}\{+\_0\}\ \#2.\text{”}]$

$[\mathsf{x} +_0 \mathsf{y} \overset{\text{pyk}}{\to} \text{“}* \text{ plus zero } *\text{”}]$

$* +_1 *$

$$[\mathsf{x} +_1 \mathsf{y} \overset{\text{val}}{\to} \mathsf{x}^{\mathsf{s}} \begin{cases} \mathsf{y} +_0 1 \\ \mathsf{y}^{\mathsf{s}} \begin{cases} \mathsf{x} +_0 1 \\ \mathsf{x}^{\mathsf{h}} \begin{cases} \mathsf{y}^{\mathsf{h}} \begin{cases} \mathsf{F} +2* [\, \mathsf{x}^{\mathsf{t}} +_0 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \\ \mathsf{T} +2* [\, \mathsf{x}^{\mathsf{t}} +_1 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \end{cases} \\ \mathsf{y}^{\mathsf{h}} \begin{cases} \mathsf{T} +2* [\, \mathsf{x}^{\mathsf{t}} +_1 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \\ \mathsf{F} +2* [\, \mathsf{x}^{\mathsf{t}} +_1 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \end{cases} \end{cases} \end{cases} \end{cases}]$$

$[\mathsf{x} +_1 \mathsf{y} \overset{\text{tex}}{\to} \text{“\#1.}$
$\backslash\text{mathop}\{+\_1\}\ \#2.\text{”}]$

$[\mathsf{x} +_1 \mathsf{y} \overset{\text{pyk}}{\to} \text{“}* \text{ plus one } *\text{”}]$

$* - *$

$[\mathsf{x} - \mathsf{y} \overset{\text{val}}{\to} \text{If}(\mathsf{x}^{\mathsf{c}} \wedge [\, \mathsf{y}^{\mathsf{c}} \,], \text{If}(\mathsf{x} < \mathsf{y}, 0, \mathsf{x} -_0 \mathsf{y}), \mathsf{T})]$

$[\mathsf{x} - \mathsf{y} \overset{\text{tex}}{\to} \text{“\#1.}$
$\text{- \#2.”}]$

$[\mathsf{x} - \mathsf{y} \overset{\text{pyk}}{\to} \text{“}* \text{ minus } *\text{”}]$

$* -_0 *$

$$[\mathsf{x} -_0 \mathsf{y} \overset{\text{val}}{\to} \mathsf{y}^{\mathsf{s}} \begin{cases} \mathsf{x} \\ \mathsf{x}^{\mathsf{h}} \begin{cases} \mathsf{y}^{\mathsf{h}} \begin{cases} \mathsf{T} +2* [\, \mathsf{x}^{\mathsf{t}} -_0 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \\ \mathsf{F} +2* [\, \mathsf{x}^{\mathsf{t}} -_1 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \end{cases} \\ \mathsf{y}^{\mathsf{h}} \begin{cases} \mathsf{F} +2* [\, \mathsf{x}^{\mathsf{t}} -_0 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \\ \mathsf{T} +2* [\, \mathsf{x}^{\mathsf{t}} -_0 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \end{cases} \end{cases} \end{cases}]$$

$[\mathsf{x} -_0 \mathsf{y} \overset{\text{tex}}{\rightarrow} \text{“\#1.}$
$\backslash\text{mathop\{-\_0\} \#2.”}]$

$[\mathsf{x} -_0 \mathsf{y} \overset{\text{pyk}}{\rightarrow} \text{“}* \text{ minus zero } *\text{”}]$

$* -_1 *$

$$[\mathsf{x} -_1 \mathsf{y} \overset{\text{val}}{\rightarrow} \mathsf{y}^{\mathsf{s}} \begin{cases} \mathsf{x} -_0 1 \\ \mathsf{x}^{\mathsf{h}} \begin{cases} \mathsf{y}^{\mathsf{h}} \begin{cases} \mathsf{F} +2* [\, \mathsf{x}^{\mathsf{t}} -_1 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \\ \mathsf{T} +2* [\, \mathsf{x}^{\mathsf{t}} -_1 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \end{cases} \\ \mathsf{y}^{\mathsf{h}} \begin{cases} \mathsf{T} +2* [\, \mathsf{x}^{\mathsf{t}} -_0 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \\ \mathsf{F} +2* [\, \mathsf{x}^{\mathsf{t}} -_1 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \end{cases} \end{cases} \end{cases}]$$

$[\mathsf{x} -_1 \mathsf{y} \overset{\text{tex}}{\rightarrow} \text{“\#1.}$
$\backslash\text{mathop\{-\_1\} \#2.”}]$

$[\mathsf{x} -_1 \mathsf{y} \overset{\text{pyk}}{\rightarrow} \text{“}* \text{ minus one } *\text{”}]$

$* \cup \{*\}$

$[\mathsf{x} \cup \{\mathsf{y}\} \overset{\text{val}}{\rightarrow} \text{If}(\mathsf{y} \in_{\mathsf{t}} \mathsf{x}, \mathsf{x}, \mathsf{y} :: \mathsf{x})]$

$[\mathsf{x} \cup \{\mathsf{y}\} \overset{\text{tex}}{\rightarrow} \text{“\#1.}$
$\backslash\text{cup } \backslash\{ \#2.}$
$\backslash\}\text{”}]$

$[\mathsf{x} \cup \{\mathsf{y}\} \overset{\text{pyk}}{\rightarrow} \text{“}* \text{ term plus } * \text{ end plus”}]$

$* \bigcup *$

$[\mathsf{x} \cup \mathsf{y} \overset{\text{val}}{\rightarrow} \text{If}(\mathsf{x}^{\mathsf{a}}, \mathsf{y}, [\, \mathsf{x}^{\mathsf{t}} \cup \mathsf{y} \,] \cup \{\mathsf{x}^{\mathsf{h}}\})]$

$[\mathsf{x} \cup \mathsf{y} \overset{\text{tex}}{\rightarrow} \text{“\#1.}$
$\backslash\text{cup \#2.”}]$

$[\mathsf{x} \cup \mathsf{y} \overset{\text{pyk}}{\rightarrow} \text{“}* \text{ term union } *\text{”}]$

$*\backslash\{*\}$

$[\mathsf{x}\backslash\{\mathsf{y}\} \overset{\text{val}}{\rightarrow} \text{If}(\mathsf{x}^{\mathsf{a}}, \mathsf{y}!\emptyset, \text{If}(\mathsf{y} \overset{\text{t}}{=} [\, \mathsf{x}^{\mathsf{h}} \,], \mathsf{x}^{\mathsf{t}}, \mathsf{x}^{\mathsf{h}} :: [\, \mathsf{x}^{\mathsf{t}}\backslash\{\mathsf{y}\} \,]))]$

$[\mathsf{x}\backslash\{\mathsf{y}\} \overset{\text{tex}}{\rightarrow} \text{“\#1.}$
$\backslash\text{backslash } \backslash\{ \#2.}$

\}”]

[x\{y} $\overset{\text{pyk}}{\to}$ “∗ term minus ∗ end minus”]

∗ ∴̇ ∗

[y ∴ z $\overset{\text{val}}{\Rightarrow}$ λx.if(x, y, z)]

[∗ ∴̇ ∗ $\overset{\text{tex}}{\to}$ “#1.
\mathrel { \dot { . \, . } }#2.”]

[∗ ∴̇ ∗ $\overset{\text{pyk}}{\to}$ “∗ raw pair ∗”]

∗ $\underline{∴̇}$ ∗

[x $\underline{∴}$ y $\overset{\text{val}}{\to}$ x : [y : [x ∴̇ y]]]

[∗ $\underline{∴}$ ∗ $\overset{\text{tex}}{\to}$ “#1.
\mathrel { \underline { \dot { . \, . } } }#2.”]

[∗ $\underline{∴}$ ∗ $\overset{\text{pyk}}{\to}$ “∗ eager pair ∗”]

∗ $\underline{∶∶}$ ∗

[x $\underline{∶∶}$ y $\overset{\text{val}}{\to}$ ($\underline{0}$ $\underline{∴}$ [$\underline{0}$ $\underline{∴}$ ⊤])$^{\text{I}}$ $\underline{∴}$ [x $\underline{∴}$ y]]

[∗ $\underline{∶∶}$ ∗ $\overset{\text{tex}}{\to}$ “#1.
\mathrel { \underline { : \, : } }#2.”]

[∗ $\underline{∶∶}$ ∗ $\overset{\text{pyk}}{\to}$ “∗ tagged pair ∗”]

∗ $\underline{+2∗}$ ∗

[x $\underline{+2∗}$ y $\overset{\text{val}}{\to}$ if(x, if(y, ⊤, x $\underline{∴}$ y), x $\underline{∴}$ y)]

[∗ $\underline{+2∗}$ ∗ $\overset{\text{tex}}{\to}$ “#1.
\mathrel { \underline { {+} 2 \ast } }#2.”]

[∗ $\underline{+2∗}$ ∗ $\overset{\text{pyk}}{\to}$ “∗ untagged double ∗”]

$$* :: *$$

$$[\mathsf{x} :: \mathsf{y} \overset{\text{val}}{\Rightarrow} \mathsf{x}^{\mathrm{M}} \mathbin{::} [\, \mathsf{y}^{\mathrm{M}} \,]\,]$$

$$[\mathsf{x} :: \mathsf{y} \overset{\text{tex}}{\rightarrow} \text{“\#1.}$$
$$\backslash\text{mathrel \{ : \backslash, : \}\#2.”}]$$

$$[* :: * \overset{\text{pyk}}{\rightarrow} \text{“}* \text{ pair } *\text{”}]$$

$$* +2* *$$

$$[\mathsf{x} +2* \mathsf{y} \overset{\text{val}}{\Rightarrow} \mathsf{T} \mathbin{\therefore} [\, \mathsf{x}^{\mathrm{B}} \mathbin{\therefore} [\, \mathsf{y}^{\mathrm{UC}} \,]\,]\,]$$

$$[* +2* * \overset{\text{tex}}{\rightarrow} \text{“\#1.}$$
$$\backslash\text{mathrel \{ \{+\} 2 \backslash ast \}\#2.”}]$$

$$[* +2* * \overset{\text{pyk}}{\rightarrow} \text{“}* \text{ double } *\text{”}]$$

$$*, *$$

$$[\mathsf{x}, \mathsf{y} \overset{\text{tex}}{\rightarrow} \text{“\#1.}$$
$$, \backslash\text{linebreak [0] \#2.”}]$$

$$[\mathsf{x}, \mathsf{y} \overset{\text{pyk}}{\rightarrow} \text{“}* \text{ comma } *\text{”}]$$

$$* \overset{\mathrm{B}}{\approx} *$$

$$[\mathsf{x} \overset{\mathrm{B}}{\approx} \mathsf{y} \overset{\text{val}}{\rightarrow} \mathsf{x} \begin{cases} \mathrm{If}(\mathsf{y}, \mathsf{T}, \mathsf{F}) \\ \mathrm{If}(\mathsf{y}, \mathsf{F}, \mathsf{T}) \end{cases}]$$

$$[* \overset{\mathrm{B}}{\approx} * \overset{\text{tex}}{\rightarrow} \text{“\#1.}$$
$$\backslash\text{stackrel \{B\}\{\backslash approx \}\#2.”}]$$

$$[* \overset{\mathrm{B}}{\approx} * \overset{\text{pyk}}{\rightarrow} \text{“}* \text{ boolean equal } *\text{”}]$$

$$* \overset{\mathrm{D}}{\approx} *$$

$$[\mathsf{x} \overset{\mathrm{D}}{\approx} \mathsf{y} \overset{\text{val}}{\rightarrow} \mathsf{x}^{\mathrm{c}} \begin{cases} \mathrm{If}(\mathsf{y}^{\mathrm{c}}, \mathsf{x} \overset{\mathrm{C}}{\approx} \mathsf{y}, \mathsf{F}) \\ \mathrm{If}(\mathsf{y}^{\mathrm{c}}, \mathsf{F}, \mathsf{x} \overset{\mathrm{P}}{\approx} \mathsf{y}) \end{cases}]$$

$$[* \overset{\mathrm{D}}{\approx} * \overset{\text{tex}}{\rightarrow} \text{“\#1.}$$
$$\backslash\text{stackrel \{D\}\{\backslash approx \}\#2.”}]$$

$[* \overset{\mathrm{D}}{\approx} * \overset{\mathrm{pyk}}{\to} \text{“}* \text{ data equal } *\text{”}]$

$$* \overset{\mathrm{C}}{\approx} *$$

$$[\mathsf{x} \overset{\mathrm{C}}{\approx} \mathsf{y} \overset{\mathrm{val}}{\to} \mathsf{x}^{\mathsf{s}} \begin{cases} \mathrm{If}(\mathsf{y}^{\mathsf{s}}, \mathsf{T}, \mathsf{F}) \\ \mathrm{If}(\mathsf{y}^{\mathsf{s}}, \mathsf{F}, \ [\ \mathsf{x}^{\mathsf{h}} \overset{\mathrm{B}}{\approx} \ [\ \mathsf{y}^{\mathsf{h}}\ ]\ ] \wedge [\ \mathsf{x}^{\mathsf{t}} \overset{\mathrm{C}}{\approx} \ [\ \mathsf{y}^{\mathsf{t}}\ ]\ ]\ ) \end{cases}\ ]$$

$[* \overset{\mathrm{C}}{\approx} * \overset{\mathrm{tex}}{\to} \text{“\#1.}$
$\backslash\mathrm{stackrel}\ \{\mathrm{C}\}\{\backslash\mathrm{approx}\ \}\#2.\text{”}]$

$[* \overset{\mathrm{C}}{\approx} * \overset{\mathrm{pyk}}{\to} \text{“}* \text{ cardinal equal } *\text{”}]$

$$* \overset{\mathrm{P}}{\approx} *$$

$$[\mathsf{x} \overset{\mathrm{P}}{\approx} \mathsf{y} \overset{\mathrm{val}}{\to} \mathsf{x}^{\mathsf{s}} \begin{cases} \mathrm{If}(\mathsf{y}^{\mathsf{s}}, \mathsf{T}, \mathsf{F}) \\ \mathrm{If}(\mathsf{y}^{\mathsf{s}}, \mathsf{F}, \ [\ \mathsf{x}^{\mathsf{h}} \approx \ [\ \mathsf{y}^{\mathsf{h}}\ ]\ ] \wedge [\ \mathsf{x}^{\mathsf{t}} \approx \ [\ \mathsf{y}^{\mathsf{t}}\ ]\ ]\ ) \end{cases}\ ]$$

$[* \overset{\mathrm{P}}{\approx} * \overset{\mathrm{tex}}{\to} \text{“\#1.}$
$\backslash\mathrm{stackrel}\ \{\mathrm{P}\}\{\backslash\mathrm{approx}\ \}\#2.\text{”}]$

$[* \overset{\mathrm{P}}{\approx} * \overset{\mathrm{pyk}}{\to} \text{“}* \text{ peano equal } *\text{”}]$

$$* \approx *$$

$$[\mathsf{x} \approx \mathsf{y} \overset{\mathrm{val}}{\Rightarrow} \mathsf{x}^{\mathsf{d}} \begin{cases} \mathrm{If}(\mathsf{y}^{\mathsf{d}}, \mathsf{x} \overset{\mathrm{D}}{\approx} \mathsf{y}, \mathsf{F}) \\ \mathrm{If}(\mathsf{y}^{\mathsf{d}}, \mathsf{F}, \mathsf{T}) \end{cases}\ ]$$

$[* \approx * \overset{\mathrm{tex}}{\to} \text{“\#1.}$
$\backslash\mathrm{approx}\ \#2.\text{”}]$

$[* \approx * \overset{\mathrm{pyk}}{\to} \text{“}* \text{ tagged equal } *\text{”}]$

$$* = *$$

$[* = * \overset{\mathrm{tex}}{\to} \text{“\#1.}$
$=\#2.\text{”}]$

$[* = * \overset{\mathrm{pyk}}{\to} \text{“}* \text{ math equal } *\text{”}]$

$$* \xrightarrow{+} *$$

$[* \xrightarrow{+} * \overset{\text{tex}}{\rightarrow}$ "#1.
\stackrel {+}{\rightarrow }#2."]

$[* \xrightarrow{+} * \overset{\text{pyk}}{\rightarrow}$ "$*$ reduce to $*$"]

$$* \overset{\mathsf{t}}{=} *$$

$[\mathsf{x} \overset{\mathsf{t}}{=} \mathsf{y} \overset{\text{val}}{\rightarrow} \mathrm{If}(\mathsf{x} \overset{\mathsf{r}}{=} \mathsf{y}, \mathsf{x}^{\mathsf{t}} \overset{\mathsf{t}^*}{=} [\ \mathsf{y}^{\mathsf{t}}\ ], \mathsf{F})]$

$[* \overset{\mathsf{t}}{=} * \overset{\text{tex}}{\rightarrow}$ "#1.
\stackrel {t}{=}#2."]

$[* \overset{\mathsf{t}}{=} * \overset{\text{pyk}}{\rightarrow}$ "$*$ term equal $*$"]

$$* \overset{\mathsf{t}^*}{=} *$$

$$[\mathsf{x} \overset{\mathsf{t}^*}{=} \mathsf{y} \overset{\text{val}}{\rightarrow} \mathsf{x}^{\mathsf{a}} \begin{cases} \mathrm{If}(\mathsf{y}^{\mathsf{a}}, \mathsf{T}, \mathsf{F}) \\ \mathrm{If}(\mathsf{y}^{\mathsf{a}}, \mathsf{F}, \mathrm{If}(\mathsf{x}^{\mathsf{h}} \overset{\mathsf{t}}{=} [\ \mathsf{y}^{\mathsf{h}}\ ], \mathsf{x}^{\mathsf{t}} \overset{\mathsf{t}^*}{=} [\ \mathsf{y}^{\mathsf{t}}\ ], \mathsf{F})) \end{cases}]$$

$[* \overset{\mathsf{t}^*}{=} * \overset{\text{tex}}{\rightarrow}$ "#1.
\stackrel {t^*}{=}#2."]

$[* \overset{\mathsf{t}^*}{=} * \overset{\text{pyk}}{\rightarrow}$ "$*$ term list equal $*$"]

$$* \overset{\mathsf{r}}{=} *$$

$[\mathsf{x} \overset{\mathsf{r}}{=} \mathsf{y} \overset{\text{val}}{\rightarrow} \mathrm{If}(\mathsf{x}^{\mathsf{r}} \approx [\ \mathsf{y}^{\mathsf{r}}\ ], \mathsf{x}^{\mathsf{i}} \approx [\ \mathsf{y}^{\mathsf{i}}\ ], \mathsf{F})]$

$[\mathsf{x} \overset{\mathsf{r}}{=} \mathsf{y} \overset{\text{tex}}{\rightarrow}$ "#1.
\stackrel{r}{=} #2."]

$[\mathsf{x} \overset{\mathsf{r}}{=} \mathsf{y} \overset{\text{pyk}}{\rightarrow}$ "$*$ term root equal $*$"]

$$* \in_{\mathsf{t}} *$$

$[\mathsf{x} \in_{\mathsf{t}} \mathsf{y} \overset{\text{val}}{\rightarrow} \mathrm{If}(\mathsf{y}^{\mathsf{a}}, \mathsf{x}!\mathsf{F}, \mathrm{If}(\mathsf{x} \overset{\mathsf{t}}{=} [\ \mathsf{y}^{\mathsf{h}}\ ], \mathsf{T}, \mathsf{x} \in_{\mathsf{t}} [\ \mathsf{y}^{\mathsf{t}}\ ]))]$

$[\mathsf{x} \in_{\mathsf{t}} \mathsf{y} \overset{\text{tex}}{\rightarrow}$ "#1.
\in_t #2."]

$[\mathsf{x} \in_{\mathsf{t}} \mathsf{y} \overset{\text{pyk}}{\rightarrow}$ "$*$ term in $*$"]

$* \subseteq_{\mathrm{T}} *$

$[\mathsf{x} \subseteq_{\mathrm{T}} \mathsf{y} \overset{\mathrm{val}}{\rightarrow} \mathrm{If}(\mathsf{x}^{\mathrm{a}}, \mathsf{y}!\mathsf{T}, \mathrm{If}(\mathsf{x}^{\mathrm{h}} \in_{\mathrm{t}} \mathsf{y}, \mathsf{x}^{\mathrm{t}} \subseteq_{\mathrm{T}} \mathsf{y}, \mathsf{F}))]$

$[\mathsf{x} \subseteq_{\mathrm{T}} \mathsf{y} \overset{\mathrm{tex}}{\rightarrow}$ "#1.
\subseteq_T #2."]

$[\mathsf{x} \subseteq_{\mathrm{T}} \mathsf{y} \overset{\mathrm{pyk}}{\rightarrow}$ "$*$ term subset $*$"]

$* \overset{\mathrm{T}}{=} *$

$[\mathsf{x} \overset{\mathrm{T}}{=} \mathsf{y} \overset{\mathrm{val}}{\rightarrow} \mathrm{If}(\mathsf{x} \subseteq_{\mathrm{T}} \mathsf{y}, \mathsf{y} \subseteq_{\mathrm{T}} \mathsf{x}, \mathsf{F})]$

$[\mathsf{x} \overset{\mathrm{T}}{=} \mathsf{y} \overset{\mathrm{tex}}{\rightarrow}$ "#1.
\stackrel{T}{=} #2."]

$[\mathsf{x} \overset{\mathrm{T}}{=} \mathsf{y} \overset{\mathrm{pyk}}{\rightarrow}$ "$*$ term set equal $*$"]

$* \overset{\mathrm{S}}{=} *$

$[\mathsf{x} \overset{\mathrm{s}}{=} \mathsf{y} \overset{\mathrm{val}}{\rightarrow} \mathrm{If}(\neg\, [\, \mathsf{x}^2 \overset{\mathrm{t}}{=} [\, \mathsf{y}^2 \,] \,] \,, \mathsf{F}, \mathrm{If}(\mathsf{x}^0 \overset{\mathrm{T}}{=} [\, \mathsf{y}^0 \,] \,, \mathsf{x}^1 \overset{\mathrm{T}}{=} [\, \mathsf{y}^1 \,] \,, \mathsf{F}))]$

$[\mathsf{x} \overset{\mathrm{s}}{=} \mathsf{y} \overset{\mathrm{tex}}{\rightarrow}$ "#1.
\stackrel{s}{=} #2."]

$[\mathsf{x} \overset{\mathrm{s}}{=} \mathsf{y} \overset{\mathrm{pyk}}{\rightarrow}$ "$*$ sequent equal $*$"]

$*$ free in $*$

$[\mathsf{v}$ free in $\mathsf{t} \overset{\mathrm{val}}{\rightarrow}$
$\mathrm{If}(\mathsf{v} \overset{\mathrm{t}}{=} \mathsf{t}, \mathsf{T},$
$\mathrm{If}(\neg\, [\, \mathsf{t} \overset{\mathrm{r}}{=} \lceil \forall *\colon * \rceil \,] \,, \mathsf{v}$ free in* $[\, \mathsf{t}^{\mathrm{t}} \,] \,,$
$\mathrm{If}(\mathsf{v} \overset{\mathrm{t}}{=} [\, \mathsf{t}^1 \,] \,, \mathsf{F}, \mathsf{v}$ free in $[\, \mathsf{t}^2 \,] \,)))]$

$[\mathsf{x}$ free in $\mathsf{y} \overset{\mathrm{tex}}{\rightarrow}$ "#1.
\mathrel {free\ in} #2."]

$[\mathsf{v}$ free in $\mathsf{t} \overset{\mathrm{pyk}}{\rightarrow}$ "$*$ free in $*$"]

$*$ free in* $*$

$[\mathsf{v}$ free in* $\mathsf{t} \overset{\mathrm{val}}{\rightarrow} \mathrm{If}(\mathsf{t}, \mathsf{v}!\mathsf{F}, \mathrm{If}(\mathsf{v}$ free in $[\, \mathsf{t}^{\mathrm{h}} \,] \,, \mathsf{T}, \mathsf{v}$ free in* $[\, \mathsf{t}^{\mathrm{t}} \,] \,))]$

$[\mathsf{x}\ \text{free in}^*\ \mathsf{y} \overset{\text{tex}}{\rightarrow} \text{“\#1.}$
$\backslash\text{mathrel \{free\textbackslash\ in\}\^{}\{\textbackslash ast\} \#2.”}]$

$[\mathsf{v}\ \text{free in}^*\ \mathsf{t} \overset{\text{pyk}}{\rightarrow} \text{“}*\ \text{free in star}\ *\text{”}]$

$*$ free for $*$ in $*$

$[\mathsf{a}\ \text{free for}\ \mathsf{x}\ \text{in}\ \mathsf{b} \overset{\text{val}}{\rightarrow} \mathsf{a}!\ [\ \mathsf{x}!$
$\text{If}(\mathsf{b}^{\mathcal{V}}, \mathsf{T},$
$\text{If}(\neg\ [\ \mathsf{b} \overset{\text{r}}{=} \lceil\forall *\colon *\rceil\ ]\ , \mathsf{a}\ \text{free for}^*\ \mathsf{x}\ \text{in}\ \ [\ \mathsf{b}^{\mathsf{t}}\ ]\ ,$
$\text{If}(\mathsf{x} \overset{\text{t}}{=}\ [\ \mathsf{b}^1\ ]\ , \mathsf{T},$
$\text{If}(\neg\ [\ \mathsf{x}\ \text{free in}\ \ [\ \mathsf{b}^2\ ]\ \ ]\ , \mathsf{T},$
$\text{If}(\mathsf{b}^1\ \text{free in}\ \mathsf{a}, \mathsf{F},\ [$
$\mathsf{a}\ ]\ \ \text{free for}\ \mathsf{x}\ \text{in}\ \ [\ \mathsf{b}^2\ ]\ ))))))\ ]\ ]$

$[\mathsf{a}\ \text{free for}\ \mathsf{x}\ \text{in}\ \mathsf{b} \overset{\text{tex}}{\rightarrow} \text{“\#1.}$
$\backslash\text{mathrel \{free\textbackslash\ for\} \#2.}$
$\backslash\text{mathrel \{in\} \#3.”}]$

$[\mathsf{a}\ \text{free for}\ \mathsf{x}\ \text{in}\ \mathsf{b} \overset{\text{pyk}}{\rightarrow} \text{“}*\ \text{free for}\ *\ \text{in}\ *\text{”}]$

$*$ free for* $*$ in $*$

$[\mathsf{a}\ \text{free for}^*\ \mathsf{x}\ \text{in}\ \mathsf{b} \overset{\text{val}}{\rightarrow}$
$\text{If}(\mathsf{b}, \mathsf{a}!\ [\ \mathsf{x}!\mathsf{T}\ ]\ ,$
$\text{If}(\mathsf{a}\ \text{free for}\ \mathsf{x}\ \text{in}\ \ [\ \mathsf{b}^{\mathsf{h}}\ ]\ , \mathsf{a}\ \text{free for}^*\ \mathsf{x}\ \text{in}\ \ [\ \mathsf{b}^{\mathsf{t}}\ ]\ , \mathsf{F}))]$

$[\mathsf{a}\ \text{free for}^*\ \mathsf{x}\ \text{in}\ \mathsf{b} \overset{\text{tex}}{\rightarrow} \text{“\#1.}$
$\backslash\text{mathrel \{free\textbackslash\ for\}\^{}\{\textbackslash ast\} \#2.}$
$\backslash\text{mathrel \{in\} \#3.”}]$

$[\mathsf{a}\ \text{free for}^*\ *\ \text{in}\ \mathsf{b} \overset{\text{pyk}}{\rightarrow} \text{“}*\ \text{free for star}\ *\ \text{in}\ *\text{”}]$

$* \in_{\mathrm{c}} *$

$[\mathsf{x} \in_{\mathrm{c}} \mathsf{y} \overset{\text{val}}{\rightarrow}\ [\ \mathsf{y} \overset{\text{r}}{=} \lceil \mathsf{x} \wedge_{\mathrm{c}} \mathsf{y} \rceil\ ]\ \left\{ \begin{array}{l} \text{If}(\mathsf{x} \in_{\mathrm{c}}\ [\ \mathsf{y}^1\ ]\ , \mathsf{T}, \mathsf{x} \in_{\mathrm{c}}\ [\ \mathsf{y}^2\ ]\ ) \\ \mathsf{x} \overset{\text{t}}{=} \mathsf{y} \end{array} \right.\ ]$

$[\mathsf{x} \in_{\mathrm{c}} \mathsf{y} \overset{\text{tex}}{\rightarrow} \text{“\#1.}$
$\backslash\text{in\_c \#2.”}]$

$[\mathsf{x} \in_{\mathrm{c}} \mathsf{y} \overset{\text{pyk}}{\rightarrow} \text{“}*\ \text{claim in}\ *\text{”}]$

$* < *$

$[\mathsf{x} < \mathsf{y} \overset{\text{val}}{\to} \mathrm{If}(\mathsf{x}^{\mathrm{c}} \wedge \ [\ \mathsf{y}^{\mathrm{c}}\ ]\ , \mathsf{x} <' \mathsf{y}, \mathsf{F})]$

$[\mathsf{x} < \mathsf{y} \overset{\text{tex}}{\to}$ “#1.
$<$ #2.”$]$

$[\mathsf{x} < \mathsf{y} \overset{\text{pyk}}{\to}$ “$*$ less $*$”$]$

$* <' *$

$$[\mathsf{x} <' \mathsf{y} \overset{\text{val}}{\to} \mathsf{y}^{\mathrm{s}} \left\{ \begin{array}{l} \mathsf{x!F} \\ \mathsf{x}^{\mathrm{s}} \left\{ \begin{array}{ll} \mathsf{T} & \\ \mathsf{x}^{\mathrm{h}} \left\{ \begin{array}{ll} \mathsf{y}^{\mathrm{h}} \left\{ \begin{array}{ll} \mathsf{x}^{\mathrm{t}} <' & [\ \mathsf{y}^{\mathrm{t}}\ ] \\ \mathsf{x}^{\mathrm{t}} \leq' & [\ \mathsf{y}^{\mathrm{t}}\ ] \end{array} \right. & \\ \mathsf{y}^{\mathrm{h}} \left\{ \begin{array}{ll} \mathsf{x}^{\mathrm{t}} <' & [\ \mathsf{y}^{\mathrm{t}}\ ] \\ \mathsf{x}^{\mathrm{t}} <' & [\ \mathsf{y}^{\mathrm{t}}\ ] \end{array} \right. & \end{array} \right. & \end{array} \right. \end{array} \right.]$$

$[\mathsf{x} <' \mathsf{y} \overset{\text{tex}}{\to}$ “#1.
$<$’ #2.”$]$

$[\mathsf{x} <' \mathsf{y} \overset{\text{pyk}}{\to}$ “$*$ less zero $*$”$]$

$* \leq' *$

$$[\mathsf{x} \leq' \mathsf{y} \overset{\text{val}}{\to} \mathsf{x}^{\mathrm{s}} \left\{ \begin{array}{l} \mathsf{y!T} \\ \mathsf{y}^{\mathrm{s}} \left\{ \begin{array}{ll} \mathsf{F} & \\ \mathsf{x}^{\mathrm{h}} \left\{ \begin{array}{ll} \mathsf{y}^{\mathrm{h}} \left\{ \begin{array}{ll} \mathsf{x}^{\mathrm{t}} \leq' & [\ \mathsf{y}^{\mathrm{t}}\ ] \\ \mathsf{x}^{\mathrm{t}} \leq' & [\ \mathsf{y}^{\mathrm{t}}\ ] \end{array} \right. & \\ \mathsf{y}^{\mathrm{h}} \left\{ \begin{array}{ll} \mathsf{x}^{\mathrm{t}} <' & [\ \mathsf{y}^{\mathrm{t}}\ ] \\ \mathsf{x}^{\mathrm{t}} \leq' & [\ \mathsf{y}^{\mathrm{t}}\ ] \end{array} \right. & \end{array} \right. & \end{array} \right. \end{array} \right.]$$

$[\mathsf{x} \leq' \mathsf{y} \overset{\text{tex}}{\to}$ “#1.
\le’ #2.”$]$

$[\mathsf{x} \leq' \mathsf{y} \overset{\text{pyk}}{\to}$ “$*$ less one $*$”$]$

$\neg *$

$[\neg \mathsf{x} \overset{\text{val}}{\to} \mathrm{If}(\mathsf{x}, \mathsf{F}, \mathsf{T})]$

$[\neg * \overset{\text{tex}}{\to}$ “
{\neg }#1.”$]$

$[\neg * \overset{\text{pyk}}{\to}$ “not $*$”$]$

$* \bigwedge *$

$$[\mathsf{x} \wedge \mathsf{y} \overset{\text{val}}{\rightarrow} \mathsf{x} \begin{cases} \mathrm{If}(\mathsf{y}, \mathsf{T}, \mathsf{F}) \\ \mathrm{If}(\mathsf{y}, \mathsf{F}, \mathsf{F}) \end{cases}]$$

$[* \wedge * \overset{\text{tex}}{\rightarrow} \text{“\#1.}$
$\backslash\text{wedge \#2.”}]$

$[* \wedge * \overset{\text{pyk}}{\rightarrow} \text{“}* \text{ and } *\text{”}]$

$* \ddot{\bigwedge} *$

$[\mathsf{x} \ddot{\wedge} \mathsf{y} \overset{\text{macro}}{\rightarrow} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t}, \mathsf{s}, \mathsf{c}, \lceil[\mathsf{x} \ddot{\wedge} \mathsf{y} \doteq \mathrm{If}(\mathsf{x}, \mathsf{y}, \mathsf{F})]\rceil)]$

$[\mathsf{x} \ddot{\wedge} \mathsf{y} \overset{\text{tex}}{\rightarrow} \text{“\#1.}$
$\backslash\text{mathrel\{\textbackslash ddot\{\textbackslash wedge\}\} \#2.”}]$

$[\mathsf{x} \ddot{\wedge} \mathsf{y} \overset{\text{pyk}}{\rightarrow} \text{“}* \text{ macro and } *\text{”}]$

$* \tilde{\bigwedge} *$

$[\mathsf{x} \tilde{\wedge} \mathsf{y} \overset{\text{val}}{\rightarrow} \mathrm{if}(\mathsf{x}, \mathsf{y}, \mathsf{x})]$

$[\mathsf{x} \tilde{\wedge} \mathsf{y} \overset{\text{tex}}{\rightarrow} \text{“\#1.}$
$\backslash\text{mathrel\{\textbackslash tilde\{\textbackslash wedge\}\} \#2.”}]$

$[\mathsf{x} \tilde{\wedge} \mathsf{y} \overset{\text{pyk}}{\rightarrow} \text{“}* \text{ simple and } *\text{”}]$

$* \bigwedge_{\mathrm{c}} *$

$[\mathsf{x} \wedge_{\mathrm{c}} \mathsf{y} \overset{\text{val}}{\rightarrow} \lambda\mathsf{t}.\lambda\mathsf{c}.\ [\ [\ [\ \mathsf{x}\ \mathsf{'t}\ ]\ \mathsf{'c}\ ]\ \tilde{\wedge}\ [\ [\ \mathsf{y}\ \mathsf{'t}\ ]\ \mathsf{'c}\ ]\ ]\ ]$

$[\mathsf{x} \wedge_{\mathrm{c}} \mathsf{y} \overset{\text{tex}}{\rightarrow} \text{“\#1.}$
$\backslash\text{wedge\_c \#2.”}]$

$[\mathsf{x} \wedge_{\mathrm{c}} \mathsf{y} \overset{\text{pyk}}{\rightarrow} \text{“}* \text{ claim and } *\text{”}]$

$* \bigvee *$

$$[\mathsf{x} \vee \mathsf{y} \overset{\text{val}}{\rightarrow} \mathsf{x} \begin{cases} \mathrm{If}(\mathsf{y}, \mathsf{T}, \mathsf{T}) \\ \mathrm{If}(\mathsf{y}, \mathsf{T}, \mathsf{F}) \end{cases}]$$

$[* \vee * \overset{\text{tex}}{\rightarrow} \text{“\#1.}$
$\backslash\text{vee \#2.”}]$

$[* \vee * \overset{\text{pyk}}{\to} \text{“}* \text{ or } *\text{”}]$

$* \parallel *$

$[* \parallel * \overset{\text{tex}}{\to} \text{“\#1.}$
$\text{\textbackslash parallel \#2.”}]$

$[* \parallel * \overset{\text{pyk}}{\to} \text{“}* \text{ parallel } *\text{”}]$

$* \ddot{\vee} *$

$[\mathsf{x} \ddot{\vee} \mathsf{y} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\mathsf{x} \ddot{\vee} \mathsf{y} \doteq \mathrm{If}(\mathsf{x},\mathsf{T},\mathsf{y})]\rceil)]$

$[\mathsf{x} \ddot{\vee} \mathsf{y} \overset{\text{tex}}{\to} \text{“\#1.}$
$\text{\textbackslash mathrel\{\textbackslash ddot\{\textbackslash vee\}\} \#2.”}]$

$[\mathsf{x} \ddot{\vee} \mathsf{y} \overset{\text{pyk}}{\to} \text{“}* \text{ macro or } *\text{”}]$

$* \ddot{\Rightarrow} *$

$[\mathsf{x} \ddot{\Rightarrow} \mathsf{y} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\mathsf{x} \ddot{\Rightarrow} \mathsf{y} \doteq \mathrm{If}(\mathsf{x},\mathsf{y},\mathsf{T})]\rceil)]$

$[\mathsf{x} \ddot{\Rightarrow} \mathsf{y} \overset{\text{tex}}{\to} \text{“\#1.}$
$\text{\textbackslash mathrel\{\textbackslash ddot\{\textbackslash Rightarrow\}\} \#2.”}]$

$[\mathsf{x} \ddot{\Rightarrow} \mathsf{y} \overset{\text{pyk}}{\to} \text{“}* \text{ macro imply } *\text{”}]$

$* : *$

$[\mathsf{x} : \mathsf{y} \overset{\text{val}}{\to} \mathrm{if}(\mathsf{x},\mathsf{y},\mathsf{y})]$

$[* : * \overset{\text{tex}}{\to} \text{“\#1.}$
$\text{:\#2.”}]$

$[* : * \overset{\text{pyk}}{\to} \text{“}* \text{ guard } *\text{”}]$

$*!*$

$[\mathsf{x}!\mathsf{y} \overset{\text{val}}{\Rightarrow} \mathrm{If}(\mathsf{x},\mathsf{y},\mathsf{y})]$

$[*!* \overset{\text{tex}}{\to} \text{“\#1.}$
$\text{!\#2.”}]$

$[*!* \overset{\text{pyk}}{\rightarrow} \text{“}* \text{ tagged guard } *\text{”}]$

$$* \left\{ \begin{array}{l} * \\ * \end{array} \right.$$

$$[\mathsf{x} \left\{ \begin{array}{ll} \mathsf{y} & \overset{\text{val}}{\Rightarrow} \mathrm{If}(\mathsf{x},\mathsf{y},\mathsf{z}) \\ \mathsf{z} & \end{array} \right.]$$

$$[* \left\{ \begin{array}{ll} * & \overset{\text{tex}}{\rightarrow} \text{“\#1.} \\ * & \end{array} \right.$$
\left\{\protect \begin {array}{l}#2.
\\#3.
\protect \end {array}\right.”]

$$[* \left\{ \begin{array}{ll} * & \overset{\text{pyk}}{\rightarrow} \text{“}* \text{ select } * \text{ else } * \text{ end select”} \\ * & \end{array} \right.]$$

$\lambda * .*$

Predef: lambda
$[\lambda * .* \overset{\text{tex}}{\rightarrow}$ “
\lambda #1.
.#2.”]

$[\lambda * .* \overset{\text{pyk}}{\rightarrow} \text{“lambda } * \text{ dot } *\text{”}]$

$\Lambda *$

$[\Lambda \mathsf{x} \overset{\text{val}}{\Rightarrow} \mathcal{M}(\lambda \mathsf{u}.\mathcal{U}(\mathsf{x}\,\text{'}\,\mathcal{M}(\mathsf{u})))]$

$[\Lambda * \overset{\text{tex}}{\rightarrow}$ “
\Lambda #1.”]

$[\Lambda * \overset{\text{pyk}}{\rightarrow} \text{“tagging } *\text{”}]$

if $*$ **then** $*$ **else** $*$

$[\textbf{if } \mathsf{x} \textbf{ then } \mathsf{y} \textbf{ else } \mathsf{z} \overset{\text{macro}}{\rightarrow} \lambda \mathsf{t}.\lambda \mathsf{s}.\lambda \mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\textbf{if } \mathsf{x} \textbf{ then } \mathsf{y} \textbf{ else } \mathsf{z} \doteqdot \mathrm{If}(\mathsf{x},\mathsf{y},\mathsf{z})]\rceil)]$

$[\textbf{if } \mathsf{x} \textbf{ then } \mathsf{y} \textbf{ else } \mathsf{z} \overset{\text{tex}}{\rightarrow}$ “
{\bf if} \ #1.
\ {\bf then} \ #2.
\ {\bf else} \ #3.”]

$[\textbf{if } \mathsf{x} \textbf{ then } \mathsf{y} \textbf{ else } \mathsf{z} \overset{\text{pyk}}{\rightarrow} \text{“open if } * \text{ then } * \text{ else } *\text{”}]$

$\textbf{let } * = * \textbf{ in } *$

$[\textbf{let } \mathsf{x} = \mathsf{y} \textbf{ in } \mathsf{z} \overset{\text{macro}}{\rightarrow} \lambda \mathsf{t}.\lambda \mathsf{s}.\lambda \mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\textbf{let } \mathsf{x} = \mathsf{y} \textbf{ in } \mathsf{z} \ddot{=} \text{let}_1(\lambda \mathsf{x}.\mathsf{z},\mathsf{y})]\rceil)]$

$[\textbf{let } \mathsf{x} = \mathsf{y} \textbf{ in } \mathsf{z} \overset{\text{tex}}{\rightarrow} \text{“}$
\mathbf{let\ } #1.
= #2.
\mathbf{\ in\ } #3.”]

$[\textbf{let } \mathsf{x} = \mathsf{y} \textbf{ in } \mathsf{z} \overset{\text{pyk}}{\rightarrow} \text{“let } * \text{ be } * \text{ in } *\text{”}]$

$\textbf{let } * \ddot{=} * \text{ in } *$

$[\textbf{let } \mathsf{x} \ddot{=} \mathsf{y} \text{ in } \mathsf{z} \overset{\text{macro}}{\rightarrow} \lambda \mathsf{t}.\lambda \mathsf{s}.\lambda \mathsf{c}.$
$\tilde{\mathcal{M}}(\mathsf{t}^3,\mathsf{s},\mathsf{c}[\mathsf{t}^{1\mathrm{r}} :: [\text{"codex"} :: [\mathsf{t}^{1\mathrm{r}} :: [\mathsf{t}^{1\mathrm{i}} :: [0 :: [\text{"macro"} :: \mathsf{T}]]]]]$
$\Rightarrow \tilde{\mathcal{M}}_3(\mathsf{t})])]$

$[\textbf{let } \mathsf{x} \ddot{=} \mathsf{y} \text{ in } \mathsf{z} \overset{\text{tex}}{\rightarrow} \text{“}$
\mathbf{let\ } #1.
\mathrel{\ddot{=}} #2.
\mathbf{\ in\ } #3.”]

$[\textbf{let } \mathsf{x} \ddot{=} \mathsf{y} \text{ in } \mathsf{z} \overset{\text{pyk}}{\rightarrow} \text{“let } * \text{ abbreviate } * \text{ in } *\text{”}]$

$*^{\mathrm{I}}$

$[\mathsf{x}^{\mathrm{I}} \overset{\text{val}}{\rightarrow} \lceil \mathsf{x}^{\mathrm{I}} \rceil^{\mathrm{R}} :: [\mathsf{x} :: \mathsf{T}]]$

$[\mathsf{x}^{\mathrm{I}} \overset{\text{tex}}{\rightarrow} \text{“\#1.}$
{} ^ { I }”]

$[\mathsf{x}^{\mathrm{I}} \overset{\text{pyk}}{\rightarrow} \text{“}* \text{ init”}]$

$*^{\triangleright}$

$[\mathsf{x}^{\triangleright} \overset{\text{val}}{\rightarrow} \lceil \mathsf{x}^{\triangleright} \rceil^{\mathrm{R}} :: [\mathsf{x} :: \mathsf{T}]]$

$[\mathsf{x}^{\triangleright} \overset{\text{tex}}{\rightarrow} \text{“\#1.}$
{} ^ { \rhd }”]

$[\mathsf{x}^{\triangleright} \overset{\text{pyk}}{\rightarrow} \text{“}* \text{ modus”}]$

$*^{\mathsf{V}}$

$[\mathsf{x}^{\mathsf{V}} \overset{\mathsf{val}}{\rightarrow} \lceil \mathsf{x}^{\mathsf{V}} \rceil^{\mathsf{R}} :: [\, \mathsf{x} :: \mathsf{T} \,]\,]$

$[\mathsf{x}^{\mathsf{V}} \overset{\mathsf{tex}}{\rightarrow} \text{“\#1.}$
$\{\}\ \hat{}\ \{\ \mathrm{V}\ \}\ \text{”}]$

$[\mathsf{x}^{\mathsf{V}} \overset{\mathsf{pyk}}{\rightarrow} \text{“}* \text{ verify”}]$

$*^{+}$

$[\mathsf{x}^{+} \overset{\mathsf{val}}{\rightarrow} \lceil \mathsf{x}^{+} \rceil^{\mathsf{R}} :: [\, \mathsf{x} :: \mathsf{T} \,]\,]$

$[\mathsf{x}^{+} \overset{\mathsf{tex}}{\rightarrow} \text{“\#1.}$
$\{\}\ \hat{}\ \{\ +\ \}\ \text{”}]$

$[\mathsf{x}^{+} \overset{\mathsf{pyk}}{\rightarrow} \text{“}* \text{ curry plus”}]$

$*^{-}$

$[\mathsf{x}^{-} \overset{\mathsf{val}}{\rightarrow} \lceil \mathsf{x}^{-} \rceil^{\mathsf{R}} :: [\, \mathsf{x} :: \mathsf{T} \,]\,]$

$[\mathsf{x}^{-} \overset{\mathsf{tex}}{\rightarrow} \text{“\#1.}$
$\{\}\ \hat{}\ \{\ \text{-}\ \}\ \text{”}]$

$[\mathsf{x}^{-} \overset{\mathsf{pyk}}{\rightarrow} \text{“}* \text{ curry minus”}]$

$*^{*}$

$[\mathsf{x}^{*} \overset{\mathsf{val}}{\rightarrow} \lceil \mathsf{x}^{*} \rceil^{\mathsf{R}} :: [\, \mathsf{x} :: \mathsf{T} \,]\,]$

$[\mathsf{x}^{*} \overset{\mathsf{tex}}{\rightarrow} \text{“\#1.}$
$\{\}\ \hat{}\ \{\ \backslash\mathrm{ast}\ \}\ \text{”}]$

$[\mathsf{x}^{*} \overset{\mathsf{pyk}}{\rightarrow} \text{“}* \text{ dereference”}]$

$* \mathbin{@} *$

$[\mathsf{x} \mathbin{@} \mathsf{y} \overset{\mathsf{val}}{\rightarrow} \lceil \mathsf{x} \mathbin{@} \mathsf{y} \rceil^{\mathsf{R}} :: [\, \mathsf{x} :: [\, \mathsf{y} :: \mathsf{T} \,]\,]\,]$

$[\mathsf{x} \mathbin{@} \mathsf{y} \overset{\mathsf{tex}}{\rightarrow} \text{“\#1.}$
$\backslash\mathrm{mathop}\ \{\backslash\mathrm{char64}\}\ \#2.\text{”}]$

$[\mathsf{x} \mathbin{@} \mathsf{y} \overset{\mathsf{pyk}}{\rightarrow} \text{“}* \text{ at } *\text{”}]$

$* \rhd *$

$[\mathsf{x} \rhd \mathsf{y} \overset{\text{val}}{\to} \lceil \mathsf{x} \rhd \mathsf{y} \rceil^{\mathrm{R}} :: [\, \mathsf{x} :: [\, \mathsf{y} :: \mathsf{T} \,] \,] \,]$

$[\mathsf{x} \rhd \mathsf{y} \overset{\text{tex}}{\to} \text{“\#1.}$
$\backslash\text{rhd \#2.”}]$

$[\mathsf{x} \rhd \mathsf{y} \overset{\text{pyk}}{\to} \text{“}* \text{ modus ponens } *\text{”}]$

$* \mathbb{\rhd} *$

$[\mathsf{x} \mathbb{\rhd} \mathsf{y} \overset{\text{val}}{\to} \lceil \mathsf{x} \mathbb{\rhd} \mathsf{y} \rceil^{\mathrm{R}} :: [\, \mathsf{x} :: [\, \mathsf{y} :: \mathsf{T} \,] \,] \,]$

$[\mathsf{x} \mathbb{\rhd} \mathsf{y} \overset{\text{tex}}{\to} \text{“\#1.}$
$\backslash\text{mathrel \{\backslash makebox [0mm][l]\{\$\backslash rhd \$\}\backslash,\{\backslash rhd \}\} \#2.”}]$

$[\mathsf{x} \mathbb{\rhd} \mathsf{y} \overset{\text{pyk}}{\to} \text{“}* \text{ modus probans } *\text{”}]$

$* \gg *$

$[\mathsf{x} \gg \mathsf{y} \overset{\text{tactic}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\mathrm{conclude}_1(\mathsf{t},\mathsf{c})]$

$[\mathsf{x} \gg \mathsf{y} \overset{\text{tex}}{\to} \text{“\#1.}$
$\backslash\text{gg \#2.”}]$

$[\mathsf{x} \gg \mathsf{y} \overset{\text{pyk}}{\to} \text{“}* \text{ conclude } *\text{”}]$

$* \vdash *$

$[\mathsf{x} \vdash \mathsf{y} \overset{\text{val}}{\to} \lceil \mathsf{x} \vdash \mathsf{y} \rceil^{\mathrm{R}} :: [\, \mathsf{x} :: [\, \mathsf{y} :: \mathsf{T} \,] \,] \,]$

$[\mathsf{x} \vdash \mathsf{y} \overset{\text{tex}}{\to} \text{“\#1.}$
$\backslash\text{vdash \#2.”}]$

$[\mathsf{x} \vdash \mathsf{y} \overset{\text{pyk}}{\to} \text{“}* \text{ infer } *\text{”}]$

$* \Vdash *$

$[\mathsf{x} \Vdash \mathsf{y} \overset{\text{val}}{\to} \lceil \mathsf{x} \Vdash \mathsf{y} \rceil^{\mathrm{R}} :: [\, \mathsf{x} :: [\, \mathsf{y} :: \mathsf{T} \,] \,] \,]$

$[\mathsf{x} \Vdash \mathsf{y} \overset{\text{tex}}{\to} \text{“\#1.}$
$\backslash\text{mathrel \{\backslash makebox [0mm][l]\{\$\backslash vdash \$\}\backslash,\{\backslash vdash \}\} \#2.”}]$

$[\mathsf{x} \Vdash \mathsf{y} \overset{\text{pyk}}{\to} \text{“}* \text{ endorse } *\text{”}]$

$* \text{ i.e. } *$

$[\mathsf{x} \text{ i.e. } \mathsf{y} \overset{\text{val}}{\to} \lceil \mathsf{x} \text{ i.e. } \mathsf{y} \rceil^{\mathrm{R}} :: [\, \mathsf{x} :: [\, \mathsf{y} :: \mathsf{T} \,] \,]]$

$[\mathsf{x} \text{ i.e. } \mathsf{y} \overset{\text{tex}}{\to} \text{“\#1.}$
$\backslash\text{mathrel } \{\text{i.e.}\} \text{ \#2.”}]$

$[\mathsf{x} \text{ i.e. } \mathsf{y} \overset{\text{pyk}}{\to} \text{“}* \text{ id est } *\text{”}]$

$\forall * : *$

$[\forall \mathsf{x} : \mathsf{y} \overset{\text{val}}{\to} \lceil \forall \mathsf{x} : \mathsf{y} \rceil^{\mathrm{R}} :: [\, \mathsf{x} :: [\, \mathsf{y} :: \mathsf{T} \,] \,]]$

$[\forall \mathsf{x} : \mathsf{y} \overset{\text{tex}}{\to} \text{“}$
$\backslash\text{forall \#1.}$
$\backslash\text{colon \#2.”}]$

$[\forall \mathsf{x} : \mathsf{y} \overset{\text{pyk}}{\to} \text{“all } * \text{ indeed } *\text{”}]$

$* \oplus *$

$[\mathsf{x} \oplus \mathsf{y} \overset{\text{val}}{\to} \lceil \mathsf{x} \oplus \mathsf{y} \rceil^{\mathrm{R}} :: [\, \mathsf{x} :: [\, \mathsf{y} :: \mathsf{T} \,] \,]]$

$[\mathsf{x} \oplus \mathsf{y} \overset{\text{tex}}{\to} \text{“\#1.}$
$\backslash\text{mathrel } \{\backslash\text{oplus}\} \text{ \#2.”}]$

$[\mathsf{x} \oplus \mathsf{y} \overset{\text{pyk}}{\to} \text{“}* \text{ rule plus } *\text{”}]$

$*; *$

$[\mathsf{x}; \mathsf{y} \overset{\text{val}}{\to} \lceil \mathsf{x}; \mathsf{y} \rceil^{\mathrm{R}} :: [\, \mathsf{x} :: [\, \mathsf{y} :: \mathsf{T} \,] \,]]$

$[\mathsf{x}; \mathsf{y} \overset{\text{tex}}{\to} \text{“\#1.}$
$; \text{ \#2.”}]$

$[\mathsf{x}; \mathsf{y} \overset{\text{pyk}}{\to} \text{“}* \text{ cut } *\text{”}]$

$* \text{ proves } *$

$[\mathsf{p} \text{ proves } \mathsf{t} \overset{\text{macro}}{\to} \lambda \mathsf{t}.\lambda \mathsf{s}.\lambda \mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t}, \mathsf{s}, \mathsf{c}, \lceil [\mathsf{p} \text{ proves } \mathsf{t} \doteqdot \text{proof}(\lceil \mathsf{p} \rceil, \lceil \mathsf{t} \rceil, \text{self})] \rceil)]$

$[\mathsf{p} \text{ proves } \mathsf{t} \overset{\text{tex}}{\to} \text{“\#1.}$
$\backslash \text{ proves} \backslash \text{ \#2.”}]$

[x proves $\mathsf{y} \overset{\text{pyk}}{\to}$ "$*$ proves $*$"]

$*$ proof of $* : *$

[t **proof of** $\mathsf{s} : \mathsf{p} \overset{\text{name}}{\to}$ "#1.
\mathbf{\ proof\ of\ } #2.
: #3."]

[t **proof of** $\mathsf{s} : \mathsf{p} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t}, \mathsf{s}, \mathsf{c}, \lceil$[$\mathsf{t}$ **proof of** $\mathsf{s} : \mathsf{p} \ddot{=}$
[**Proof of** s: $\lambda\mathsf{c}.\lambda\mathsf{x}.\mathcal{P}(\lceil \mathsf{t} \vdash \mathsf{p} \rceil, \mathrm{p}_0, \mathsf{c})$]]$\rceil$)]

[t **proof of** $\mathsf{s} : \mathsf{p} \overset{\text{tex}}{\to}$ "
\if\relax\csname lgwprooflinep\endcsname
\def\lgwprooflinep{x}
\newcount\lgwproofline
\fi
\begingroup
\def\insideproof{x}
\lgwproofline=0 #1.
\mathbf {\ proof\ of\ } #2.
\colon #3.
\gdef\lgwella{\relax}
\gdef\lgwellb{\relax}
\gdef\lgwellc{\relax}
\gdef\lgwelld{\relax}
\gdef\lgwelle{\relax}
\gdef\lgwellf{\relax}
\gdef\lgwellg{\relax}
\gdef\lgwellh{\relax}
\gdef\lgwelli{\relax}
\gdef\lgwellj{\relax}
\gdef\lgwellk{\relax}
\gdef\lgwelll{\relax}
\gdef\lgwellm{\relax}
\gdef\lgwelln{\relax}
\gdef\lgwello{\relax}
\gdef\lgwellp{\relax}
\gdef\lgwellq{\relax}
\gdef\lgwellr{\relax}
\gdef\lgwells{\relax}
\gdef\lgwellt{\relax}
\gdef\lgwellu{\relax}
\gdef\lgwellv{\relax}
\gdef\lgwellw{\relax}
\gdef\lgwellx{\relax}

```
\gdef\lgwelly{\relax}
\gdef\lgwellz{\relax}
\gdef\lgwellbiga{\relax}
\gdef\lgwellbigb{\relax}
\gdef\lgwellbigc{\relax}
\gdef\lgwellbigd{\relax}
\gdef\lgwellbige{\relax}
\gdef\lgwellbigf{\relax}
\gdef\lgwellbigg{\relax}
\gdef\lgwellbigh{\relax}
\gdef\lgwellbigi{\relax}
\gdef\lgwellbigj{\relax}
\gdef\lgwellbigk{\relax}
\gdef\lgwellbigl{\relax}
\gdef\lgwellbigm{\relax}
\gdef\lgwellbign{\relax}
\gdef\lgwellbigo{\relax}
\gdef\lgwellbigp{\relax}
\gdef\lgwellbigq{\relax}
\gdef\lgwellbigr{\relax}
\gdef\lgwellbigs{\relax}
\gdef\lgwellbigt{\relax}
\gdef\lgwellbigu{\relax}
\gdef\lgwellbigv{\relax}
\gdef\lgwellbigw{\relax}
\gdef\lgwellbigx{\relax}
\gdef\lgwellbigy{\relax}
\gdef\lgwellbigz{\relax}
\endgroup "]
```

$[\mathsf{t}\ \textbf{proof of}\ \mathsf{l} : \mathsf{p} \overset{\text{pyk}}{\rightarrow} \text{“}* \text{ proof of } * \text{ reads } *\text{”}]$

$\text{Line} * : * \gg *; *$

$[\text{Line}\,\mathsf{l} : \mathsf{a} \gg \mathsf{i}; \mathsf{p} \overset{\text{name}}{\rightarrow} \text{“}$

```
Line \, #1.
: #2.
\gg #3.
; #4."]
```

$[\text{Line}\,\mathsf{l} : \mathsf{a} \gg \mathsf{i}; \mathsf{p} \overset{\text{macro}}{\rightarrow} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t}, \mathsf{s}, \mathsf{c}, \lceil[\text{Line}\,\mathsf{l} : \mathsf{a} \gg \mathsf{i}; \mathsf{p} \doteqdot (\ [\ \mathsf{a} \gg \mathsf{i}\ ]\ ; \textbf{let}\ \mathsf{l} \doteqdot \mathsf{i}\ \ \text{in}\ \ \mathsf{p})]\rceil)]$

$[\text{Line}\,\mathsf{l} : \mathsf{a} \gg \mathsf{i}; \mathsf{p} \overset{\text{tex}}{\rightarrow} \text{“}$

```
\newline \makebox [0.1\textwidth]{}%
```

\parbox [b]{0.4\textwidth }{\raggedright
\setlength {\parindent }{-0.1\textwidth }%
\makebox [0.1\textwidth][l]{$#1.
$:}$#2.
{}\gg {}$}\quad
\parbox [t]{0.4\textwidth }{$#3.
$\hfill \makebox [0mm][l]{\quad ;}}#4."]

[Line l : $\mathsf{a} \gg \mathsf{i}; \mathsf{p} \overset{\text{pyk}}{\to}$ "line $*$ because $*$ indeed $*$ end line $*$"]

Last line $* \gg * \square$

[Last line $\mathsf{a} \gg \mathsf{i} \square \overset{\text{name}}{\to}$ "
Last\ line \, #1.
\gg #2.
\, \Box"]

[Last line $\mathsf{a} \gg \mathsf{i} \square \overset{\text{macro}}{\to} \lambda \mathsf{t}.\lambda \mathsf{s}.\lambda \mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t}, \mathsf{s}, \mathsf{c}, \lceil [\text{Last line } \mathsf{a} \gg \mathsf{i} \square \doteqdot (\mathsf{a} \gg \mathsf{i})] \rceil)$]

[Last line $\mathsf{a} \gg \mathsf{i} \square \overset{\text{tex}}{\to}$ "
\newline \makebox [0.1\textwidth]{}%
\parbox [b]{0.4\textwidth }{\raggedright
\setlength {\parindent }{-0.1\textwidth }%
\makebox [0.1\textwidth][l]{$
\if \relax \csname lgwprooflinep\endcsname L_? \else
\global \advance \lgwproofline by 1
L\ifnum \lgwproofline <10 0\fi \number \lgwproofline
\fi
$:}$#1.
{}\gg {}$}\quad
\parbox [t]{0.4\textwidth }{$#2.
$\hfill \makebox [0mm][l]{\quad \makebox[0mm]{$\Box$}}}"]

[Last line $\mathsf{a} \gg \mathsf{i} \square \overset{\text{pyk}}{\to}$ "because $*$ indeed $*$ qed"]

Line $*$: Premise $\gg *; *$

[Line l : Premise $\gg \mathsf{i}; \mathsf{p} \overset{\text{name}}{\to}$ "
Line \, #1.
: Premise \gg #2.
;#3."]

[Line l : Premise $\gg \mathsf{i}; \mathsf{p} \overset{\text{macro}}{\to} \lambda \mathsf{t}.\lambda \mathsf{s}.\lambda \mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t}, \mathsf{s}, \mathsf{c}, \lceil [\text{Line } \mathsf{l} : \text{Premise} \gg \mathsf{i}; \mathsf{p} \doteqdot (\mathsf{i} \vdash \textbf{let } \mathsf{l} \doteqdot \mathsf{i} \text{ in } \mathsf{p})] \rceil)$]

[Line l : Premise $\gg \mathsf{i}; \mathsf{p} \overset{\text{tex}}{\to}$ "

\newline \makebox [0.1\textwidth][l]{$#1.
$:}\makebox [0.4\textwidth][l]{$Premise{}\gg{}$}\quad
\parbox [t]{0.4\textwidth }{$#2.
$\hfill \makebox [0mm][l]{\quad ;}}#3."]

[Line l : Premise $\gg$ i; p $\overset{\text{pyk}}{\to}$ "line $*$ premise $*$ end line $*$"]

Line $*$: **Side-condition** $\gg$ $*$; $*$

[Line l : Side-condition $\gg$ i; p $\overset{\text{name}}{\to}$ "
Line \, #1.
: \mbox{Side-condition} \gg #2.
; #3."]

[Line l : Side-condition $\gg$ i; p $\overset{\text{macro}}{\to}$ $\lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\text{Line }\mathsf{l}:$
Side-condition $\gg$ i; $\mathsf{p} \doteq (\mathsf{i} \Vdash \textbf{let } \mathsf{l} \doteq \mathsf{i} \text{ in } \mathsf{p})]\rceil)$]

[Line l : Side-condition $\gg$ i; p $\overset{\text{tex}}{\to}$ "
\newline \makebox [0.1\textwidth][l]{$#1.
$:}\makebox [0.4\textwidth][l]{%
$\mbox{Side-condition}{}\gg{}$}\quad
\parbox [t]{0.4\textwidth }{$#2.
$\hfill \makebox [0mm][l]{\quad ;}}#3."]

[Line l : Side-condition $\gg$ i; p $\overset{\text{pyk}}{\to}$ "line $*$ side condition $*$ end line $*$"]

Arbitrary $\gg$ $*$; $*$

[Arbitrary $\gg$ i; p $\overset{\text{name}}{\to}$ "
Arbitrary \gg #1.
;#2."]

[Arbitrary $\gg$ i; p $\overset{\text{macro}}{\to}$ $\lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\text{Arbitrary} \gg \mathsf{i}; \mathsf{p} \doteq (\forall \mathsf{i}\colon \mathsf{p})]\rceil)$]

[Arbitrary $\gg$ i; p $\overset{\text{tex}}{\to}$ "
\newline \makebox [0.1\textwidth][l]{$
\if \relax \csname lgwprooflinep\endcsname L_? \else
\global \advance \lgwproofline by 1
L\ifnum \lgwproofline <10 0\fi \number \lgwproofline
\fi
$:}\makebox [0.4\textwidth][l]{$Arbitrary{}\gg{}$}\quad
\parbox [t]{0.4\textwidth }{$#1.
$\hfill \makebox [0mm][l]{\quad ;}}#2."]

[Arbitrary $\gg$ i; p $\overset{\text{pyk}}{\to}$ "arbitrary $*$ end line $*$"]

Local $\gg * = *; *$

$[\mathsf{Local} \gg \mathsf{a} = \mathsf{i}; \mathsf{p} \overset{\text{name}}{\rightarrow} \text{“}$
Local \gg #1.
= #2.
; #3.”]

$[\mathsf{Local} \gg \mathsf{a} = \mathsf{i}; \mathsf{p} \overset{\text{macro}}{\rightarrow} \lambda \mathsf{t}.\lambda \mathsf{s}.\lambda \mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t}, \mathsf{s}, \mathsf{c}, \lceil [\mathsf{Local} \gg \mathsf{a} = \mathsf{i}; \mathsf{p} \doteq (\textbf{let } \mathsf{a} \doteq \mathsf{i} \text{ in } \mathsf{p})] \rceil)]$

$[\mathsf{Local} \gg \mathsf{a} = \mathsf{i}; \mathsf{p} \overset{\text{tex}}{\rightarrow} \text{“}$
\newline\makebox[0.1\textwidth][l]{$
\if \relax \csname lgwprooflinep\endcsname L_? \else
\global \advance \lgwproofline by 1
L\ifnum \lgwproofline <10 0\fi \number \lgwproofline
\fi
$:}%
\makebox[0.4\textwidth][l]{$Local{}\gg{}$}%
\quad%
\parbox[t]{0.4\textwidth}{$#1.
= #2.
$\hfill\makebox[0mm][l]{\quad ;}}#3.”]

$[\mathsf{Local} \gg \mathsf{u} = \mathsf{v}; \mathsf{p} \overset{\text{pyk}}{\rightarrow} \text{“locally define } * \text{ as } * \text{ end line } *\text{”}]$

&

[*&* $\overset{\text{name}}{\rightarrow}$ “#1.
\& #2.”]

[*&* $\overset{\text{tex}}{\rightarrow}$ “#1.
&#2.”]

[*&* $\overset{\text{pyk}}{\rightarrow}$ “* tab *”]

**

[** $\overset{\text{name}}{\rightarrow}$ “#1.
\backslash \backslash #2.”]

[** $\overset{\text{tex}}{\rightarrow}$ “#1.
\\ #2.”]

[** $\overset{\text{pyk}}{\rightarrow}$ “* row

*”]

The pyk compiler, version 0.grue.20050603 by Klaus Grue
GRD-2005-06-22.UTC:06:58:05.413682 = MJD-53543.TAI:06:58:37.413682 = LGT-4626140317413682e-6