Logiweb codex of ijcar base

Up Help

ijcar base, $[* \bowtie *]$, “ $*$ ”, , $*$ then $*$, $*[\,*\,]*$, **Preassociative** $*;*$, **Postassociative** $*;*$, $[*]$, $*$, priority $*$ end, $*$, $*$, $(*)^{\mathbf{t}}$, string$(*)+*$, string$(*)$ ++ $*$, bracket $*$ end bracket, big bracket $*$ end bracket, $\$*\$$, **flush left** $[*]$, x, y, z, $[* \xrightarrow{*} *]$, pyk, tex, name, prio, T, if$(*,*,*)$, $[* \overset{*}{\Rightarrow} *]$, val, claim, $*$, $!*$, $"*$, $\#*$, $\$*$, $\%*$, $\&*$, $'*$, $(*$, $)*$, $**$, $+*$, $,*$, $-*$, $.*$, $/*$, $0*$, $1*$, $2*$, $3*$, $4*$, $5*$, $6*$, $7*$, $8*$, $9*$, $:*$, $;*$, $<*$, $=*$, $>*$, $?*$, $@*$, $A*$, $B*$, $C*$, $D*$, $E*$, $F*$, $G*$, $H*$, $I*$, $J*$, $K*$, $L*$, $M*$, $N*$, $O*$, $P*$, $Q*$, $R*$, $S*$, $T*$, $U*$, $V*$, $W*$, $X*$, $Y*$, $Z*$, $[*$, $\backslash*$, $]*$, $\hat{}*$, $\_*$, $`*$, $a*$, $b*$, $c*$, $d*$, $e*$, $f*$, $g*$, $h*$, $i*$, $j*$, $k*$, $l*$, $m*$, $n*$, $o*$, $p*$, $q*$, $r*$, $s*$, $t*$, $u*$, $v*$, $w*$, $x*$, $y*$, $z*$, $\{*$, $|*$, $\}*$, $\tilde{}*$, $\bot$, f$(*)$, $(*)^{\mathrm{I}}$, F, 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, **zip**$(*,*)$, **assoc**$_1(*,*,*)$, $(*)^{\mathbf{P}}$, self, $[* \doteq *]$, $[* \doteq *]$, $[* \doteq *]$, $[* \overset{\text{pyk}}{=} *]$, $[* \overset{\text{tex}}{=} *]$, $[* \overset{\text{name}}{=} *]$, **Priority table**$[*]$, $\tilde{\mathcal{M}}_1$, $\tilde{\mathcal{M}}_2(*)$, $\tilde{\mathcal{M}}_3(*)$, $\tilde{\mathcal{M}}_4(*,*,*,*)$, $\tilde{\mathcal{M}}(*,*,*)$, $\tilde{\mathcal{Q}}(*,*,*)$, $\tilde{\mathcal{Q}}_2(*,*,*)$, $\tilde{\mathcal{Q}}_3(*,*,*,*)$, $\tilde{\mathcal{Q}}^*(*,*,*)$, $(*)$, $(*)$, display$(*)$, statement$(*)$, $[*]^{\cdot}$, $[*]^{-}$, **aspect**$(*,*)$, **aspect**$(*,*,*)$, $\langle * \rangle$, **tuple**$_1(*)$, **tuple**$_2(*)$, let$_2(*,*)$, let$_1(*,*)$, $[* \overset{\text{claim}}{=} *]$, checker, **check**$(*,*)$, **check**$_2(*,*,*)$, **check**$_3(*,*,*)$, **check**$^*(*,*)$, **check**$^*_2(*,*,*)$, $[*]^{\cdot}$, $[*]^{-}$, $[*]^{\circ}$, msg, $[* \overset{\text{msg}}{=} *]$, <stmt>, stmt, $[* \overset{\text{stmt}}{=} *]$, HeadNil′, HeadPair′, Transitivity′, $\perp\!\!\!\perp$, 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$(*,*)$, error$_2(*,*)$, proof$(*,*,*)$, proof$_2(*,*)$, $\mathcal{S}(*,*)$, $\mathcal{S}^{\mathrm{I}}(*,*)$, $\mathcal{S}^{\triangleright}(*,*)$, $\mathcal{S}^{\triangleright}_1(*,*,*)$, $\mathcal{S}^{\mathrm{E}}(*,*)$, $\mathcal{S}^{\mathrm{E}}_1(*,*,*)$, $\mathcal{S}^{+}(*,*)$, $\mathcal{S}^{+}_1(*,*,*)$, $\mathcal{S}^{-}(*,*)$, $\mathcal{S}^{-}_1(*,*,*)$, $\mathcal{S}^{*}(*,*)$, $\mathcal{S}^{*}_1(*,*,*)$, $\mathcal{S}^{*}_2(*,*,*,*)$, $\mathcal{S}^{@}(*,*)$, $\mathcal{S}^{@}_1(*,*,*)$, $\mathcal{S}^{\vdash}(*,*)$, $\mathcal{S}^{\vdash}_1(*,*,*,*)$, $\mathcal{S}^{\Vdash}(*,*)$, $\mathcal{S}^{\Vdash}_1(*,*,*,*)$, $\mathcal{S}^{\text{i.e.}\cdot}(*,*)$, $\mathcal{S}^{\text{i.e.}\cdot}_1(*,*,*,*)$, $\mathcal{S}^{\text{i.e.}\cdot}_2(*,*,*,*,*)$, $\mathcal{S}^{\forall}(*,*)$, $\mathcal{S}^{\forall}_1(*,*,*,*)$, $\mathcal{S}^{\cdot}(*,*)$, $\mathcal{S}^{\cdot}_1(*,*,*)$, $\mathcal{S}^{\cdot}_2(*,*,*,*)$, $\mathcal{T}(*)$, claims$(*,*,*)$, 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$(*,*)$, Head$_{\oplus}(*)$, Tail$_{\oplus}(*)$, rule$_1(*,*)$, rule$(*,*)$, Rule tactic, Plus$(*,*)$,

[**Theory** $*$], theory$_2(*,*)$, theory$_3(*,*)$, theory$_4(*,*,*)$, HeadNil$''$, HeadPair$''$, Transitivity$''$, Contra$''$, HeadNil, HeadPair, Transitivity, Contra, $\mathrm{T_E}$, ragged right, ragged right expansion , parm$(*,*,*)$, parm$^*(*,*,*)$, inst$(*,*)$, inst$^*(*,*)$, occur$(*,*,*)$, occur$^*(*,*,*)$, unify$(*=*,*)$, unify$^*(*=*,*)$, 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, Reflexivity$_1$, Commutativity, Commutativity$_1$, <tactic>, tactic, [$* \overset{\text{tactic}}{=} *$], $\mathcal{P}(*,*,*)$, $\mathcal{P}^*(*,*,*)$, $\mathrm{p_0}$, conclude$_1(*,*)$, conclude$_2(*,*,*)$, conclude$_3(*,*,*,*)$, conclude$_4(*,*)$, $*$-{$*$}, $*$/indexintro$(*,*,*,*)$, $*$/intro$(*,*,*)$, $*$/bothintro$(*,*,*,*,*)$, $*$/nameintro$(*,*,*,*)$, $*'$, $*[*]$, $*[*\rightarrow*]$, $*[*\Rightarrow*]$, $*0$, $*1$, 0b, $*$-color$(*)$, $*$-color$^*(*)$, $*^{\mathrm{H}}$, $*^{\mathrm{T}}$, $*^{\mathrm{U}}$, $*^{\mathrm{h}}$, $*^{\mathrm{t}}$, $*^{\mathrm{s}}$, $*^{\mathrm{c}}$, $*^{\mathrm{d}}$, $*^{\mathrm{a}}$, $*^{\mathrm{C}}$, $*^{\mathrm{M}}$, $*^{\mathrm{B}}$, $*^{\mathrm{r}}$, $*^{\mathrm{i}}$, $*^{\mathrm{d}}$, $*^{\mathrm{R}}$, $*^0$, $*^1$, $*^2$, $*^3$, $*^4$, $*^5$, $*^6$, $*^7$, $*^8$, $*^9$, $*^{\mathrm{E}}$, $*^{\mathcal{V}}$, $*^{\mathcal{C}}$, $*^{\mathcal{C}^*}$, newline $*$, macro newline $*$, $*$ ' $*$, $*$ ‘ $*$, $*\cdot*$, $*\cdot_0*$, $*+*$, $*+_0*$, $*+_1*$, $*-*$, $*-_0*$, $*-_1*$, $*\cup\{*\}$, $*\cup*$, $*\backslash\{*\}$, $*\therefore*$, $*\underline{\therefore}*$, $*::*$, $*\underline{::}*$, $*::*$, $*+2*$, $*\underline{+2*}$, $*::*$, $*+2*$, $*,*$, $*\overset{\mathrm{B}}{\approx}*$, $*\overset{\mathrm{D}}{\approx}*$, $*\overset{\mathrm{C}}{\approx}*$, $*\overset{\mathrm{P}}{\approx}*$, $*\approx*$, $*=*$, $*\overset{+}{\rightarrow}*$, $*\overset{\mathrm{t}}{=}*$, $*\overset{\mathrm{t}^*}{=}*$, $*\overset{\mathrm{r}}{=}*$, $*\in_{\mathrm{t}}*$, $*\subseteq_{\mathrm{T}}*$, $*\overset{\mathrm{T}}{=}*$, $*\overset{\mathrm{s}}{=}*$, $*$ free in $*$, $*$ free in* $*$, $*$ free for $*$ in $*$, $*$ free for* $*$ in $*$, $*\in_{\mathrm{c}}*$, $*<*$, $*<'*$, $*\leq'*$, $\neg*$, $*\wedge*$, $*\ddot{\wedge}*$, $*\tilde{\wedge}*$, $*\wedge_{\mathrm{c}}*$, $*\vee*$, $*\parallel*$, $*\ddot{\vee}*$, $*\nRightarrow*$, $*:*$, $*$ spy $*$, $*!*$, $*\begin{Bmatrix}*\\*\end{Bmatrix}$, $\lambda*.*$, $\Lambda*.*$, $\Lambda*$, **if** $*$ **then** $*$ **else** $*$, **let** $*=*$ **in** $*$, **let** $*\ddot{=}*$ 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 $\gg*=*;*$, $*\&*$, $*\backslash\backslash*$,

ijcar base

[ijcar base $\overset{\text{prio}}{\rightarrow}$
Preassociative
[ijcar base], [bracket $*$ end bracket], [big bracket $*$ end bracket], [\$ $*$ \$], [**flush left** $[*]$], [x], [y], [z], [$[*\bowtie*]$], [$[*\overset{*}{\rightarrow}*]$], [pyk], [tex], [name], [prio], [$*$], [T], [if$(*,*,*)$], [$[*\overset{*}{\Rightarrow}*]$], [val], [claim], [$\perp$], [f$(*)$], [$(*)^{\mathrm{I}}$], [$\mathsf{F}$], [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], [**zip**$(*,*)$], [**assoc**$_1(*,*,*)$], [$(*)^{\mathbf{p}}$], [self], [$[* \doteqdot *]$], [$[* \doteq *]$], [$[* \fallingdotseq *]$], [$[* \overset{\text{pyk}}{=} *]$], [$[* \overset{\text{tex}}{=} *]$], [$[* \overset{\text{name}}{=} *]$], [**Priority table**$[*]$], [$\tilde{\mathcal{M}}_1$], [$\tilde{\mathcal{M}}_2(*)$], [$\tilde{\mathcal{M}}_3(*)$], [$\tilde{\mathcal{M}}_4(*,*,*,*)$], [$\tilde{\mathcal{M}}(*,*,*)$], [$\tilde{\mathcal{Q}}(*,*,*)$], [$\tilde{\mathcal{Q}}_2(*,*,*)$], [$\tilde{\mathcal{Q}}_3(*,*,*,*)$], [$\tilde{\mathcal{Q}}^*(*,*,*)$], [$(*)$], [$(*)$], [display$(*)$], [statement$(*)$], [$[*]^{\cdot}$], [$[*]^{-}$], [**aspect**$(*,*)$], [**aspect**$(*,*,*)$], [$\langle * \rangle$], [**tuple**$_1(*)$], [**tuple**$_2(*)$], [let$_2(*,*)$], [let$_1(*,*)$], [$[* \overset{\text{claim}}{=} *]$], [checker], [**check**$(*,*)$], [**check**$_2(*,*,*)$], [**check**$_3(*,*,*)$], [**check**$^*(*,*)$], [**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], [$(*)^{\mathbf{v}}$], [intro$(*,*,*,*)$], [intro$(*,*,*)$], [error$(*,*)$], [error$_2(*,*)$], [proof$(*,*,*)$], [proof$_2(*,*)$], [$\mathcal{S}(*,*)$], [$\mathcal{S}^{\mathrm{I}}(*,*)$], [$\mathcal{S}^{\triangleright}(*,*)$], [$\mathcal{S}^{\triangleright}_1(*,*,*)$], [$\mathcal{S}^{\mathrm{E}}(*,*)$], [$\mathcal{S}^{\mathrm{E}}_1(*,*,*)$], [$\mathcal{S}^{+}(*,*)$], [$\mathcal{S}^{+}_1(*,*,*)$], [$\mathcal{S}^{-}(*,*)$], [$\mathcal{S}^{-}_1(*,*,*)$], [$\mathcal{S}^{*}(*,*)$], [$\mathcal{S}^{*}_1(*,*,*)$], [$\mathcal{S}^{*}_2(*,*,*,*)$], [$\mathcal{S}^{@}(*,*)$], [$\mathcal{S}^{@}_1(*,*,*)$], [$\mathcal{S}^{\vdash}(*,*)$], [$\mathcal{S}^{\vdash}_1(*,*,*,*)$], [$\mathcal{S}^{\Vdash}(*,*)$], [$\mathcal{S}^{\Vdash}_1(*,*,*,*)$], [$\mathcal{S}^{\mathrm{i.e.}\cdot}(*,*)$], [$\mathcal{S}^{\mathrm{i.e.}\cdot}_1(*,*,*,*)$], [$\mathcal{S}^{\mathrm{i.e.}\cdot}_2(*,*,*,*,*)$], [$\mathcal{S}^{\forall}(*,*)$], [$\mathcal{S}^{\forall}_1(*,*,*,*)$], [$\mathcal{S}^{:}(*,*)$], [$\mathcal{S}^{:}_1(*,*,*)$], [$\mathcal{S}^{:}_2(*,*,*,*)$], [$\mathcal{T}(*)$], [claims$(*,*,*)$], [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$(*,*)$], [Head$_{\oplus}(*)$], [Tail$_{\oplus}(*)$], [rule$_1(*,*)$], [rule$(*,*)$], [Rule tactic], [Plus$(*,*)$], [[**Theory** $*$]], [theory$_2(*,*)$], [theory$_3(*,*)$], [theory$_4(*,*,*)$], [HeadNil$''$], [HeadPair$''$], [Transitivity$''$], [Contra$''$], [HeadNil], [HeadPair], [Transitivity], [Contra], [T_{E}], [ragged right], [ragged right expansion], [parm$(*,*,*)$], [parm$^*(*,*,*)$], [inst$(*,*)$], [inst$^*(*,*)$], [occur$(*,*,*)$], [occur$^*(*,*,*)$], [unify$(* = *,*)$], [unify$^*(* = *,*)$], [unify$_2(* = *,*)$], [L_{a}], [L_{b}], [L_{c}], [L_{d}], [L_{e}], [L_{f}], [L_{g}], [L_{h}], [L_{i}], [L_{j}], [L_{k}], [L_{l}], [L_{m}], [L_{n}], [L_{o}], [L_{p}], [L_{q}], [L_{r}], [L_{s}], [L_{t}], [L_{u}], [L_{v}], [L_{w}], [L_{x}], [L_{y}], [L_{z}], [L_{A}], [L_{B}], [L_{C}], [L_{D}], [L_{E}], [L_{F}], [L_{G}], [L_{H}], [L_{I}], [L_{J}], [L_{K}], [L_{L}], [L_{M}], [L_{N}], [L_{O}], [L_{P}], [L_{Q}], [L_{R}], [L_{S}], [L_{T}], [L_{U}], [L_{V}], [L_{W}], [L_{X}], [L_{Y}], [L_{Z}], [$\mathrm{L}_{?}$], [Reflexivity], [Reflexivity$_1$], [Commutativity], [Commutativity$_1$], [<tactic>], [tactic], [$[* \overset{\text{tactic}}{=} *]$], [$\mathcal{P}(*,*,*)$], [$\mathcal{P}^*(*,*,*)$], [$\mathrm{p}_0$], [conclude$_1(*,*)$], [conclude$_2(*,*,*)$], [conclude$_3(*,*,*,*)$], [conclude$_4(*,*)$];

Preassociative

[$*$_{$*$}], [$*$/indexintro$(*,*,*,*)$], [$*$/intro$(*,*,*)$], [$*$/bothintro$(*,*,*,*,*)$], [$*$/nameintro$(*,*,*,*)$], [$*'$], [$*[\,*\,]$], [$*[*{\rightarrow}*]$], [$*[*{\Rightarrow}*]$], [$*0$], [$*1$], [0b], [$*$-color$(*)$], [$*$-color$^*(*)$], [$*^{\mathrm{H}}$], [$*^{\mathrm{T}}$], [$*^{\mathrm{U}}$], [$*^{\mathrm{h}}$], [$*^{\mathrm{t}}$], [$*^{\mathrm{s}}$], [$*^{\mathrm{c}}$], [$*^{\mathrm{d}}$], [$*^{\mathrm{a}}$], [$*^{\mathrm{C}}$], [$*^{\mathrm{M}}$], [$*^{\mathrm{B}}$], [$*^{\mathrm{r}}$], [$*^{\mathrm{i}}$], [$*^{\mathrm{d}}$], [$*^{\mathrm{R}}$], [$*^{0}$], [$*^{1}$], [$*^{2}$], [$*^{3}$], [$*^{4}$], [$*^{5}$], [$*^{6}$], [$*^{7}$], [$*^{8}$], [$*^{9}$], [$*^{\mathrm{E}}$], [$*^{\mathcal{V}}$], [$*^{\mathcal{C}}$], [$*^{\mathcal{C}^*}$];

Preassociative

[“ $*$ ”], [], [$(*)^{\mathbf{t}}$], [string$(*)$ + $*$], [string$(*)$ ++ $*$], [$*$], [$*$], [!$*$], [”$*$], [#$*$], [\$$*$], [%$*$], [&$*$], [’$*$], [($*$], [)$*$], [**$*$], [+$*$], [,$*$], [-$*$], [.$*$], [/$*$], [0$*$], [1$*$], [2$*$], [3$*$], [4$*$], [5$*$], [6$*$], [7$*$], [8$*$], [9$*$], [:$*$], [;$*$], [<$*$], [=$*$], [>$*$], [?$*$], [@$*$], [A$*$], [B$*$], [C$*$], [D$*$], [E$*$], [F$*$], [G$*$], [H$*$], [I$*$], [J$*$], [K$*$], [L$*$], [M$*$], [N$*$], [O$*$], [P$*$], [Q$*$], [R$*$], [S$*$], [T$*$], [U$*$], [V$*$], [W$*$], [X$*$], [Y$*$], [Z$*$], [[$*$], [\$*$], []$*$], [^$*$],

[_*], [‘*], [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

[* ’ *], [* ‘ *];

Preassociative

[* · *], [* ·$_0$ *];

Preassociative

[* + *], [* +$_0$ *], [* +$_1$ *], [* − *], [* −$_0$ *], [* −$_1$ *];

Preassociative

[* ∪ {*}], [* ∪ *], [*\{*}];

Postassociative

[* ∴ *], [* $\underset{\cdot}{\therefore}$ *], [* $\underset{\cdot}{::}$ *], [* $\underline{+2*}$ *], [* : : *], [* +2* *];

Postassociative

[*, *];

Preassociative

[* $\overset{\mathrm{B}}{\approx}$ *], [* $\overset{\mathrm{D}}{\approx}$ *], [* $\overset{\mathrm{C}}{\approx}$ *], [* $\overset{\mathrm{P}}{\approx}$ *], [* ≈ *], [* = *], [* $\overset{+}{\to}$ *], [* $\overset{\mathrm{t}}{=}$ *], [* $\overset{\mathrm{t}^*}{=}$ *], [* $\overset{\mathrm{r}}{=}$ *], [* ∈$_{\mathrm{t}}$ *], [* ⊆$_{\mathrm{T}}$ *], [* $\overset{\mathrm{T}}{=}$ *], [* $\overset{\mathrm{s}}{=}$ *], [* free in *], [* free in* *], [* free for * in *], [* free for* * in *], [* ∈$_{\mathrm{c}}$ *], [* < *], [* <′ *], [* ≤′ *];

Preassociative

[¬*];

Preassociative

[* ∧ *], [* $\ddot{\wedge}$ *], [* $\tilde{\wedge}$ *], [* ∧$_{\mathrm{c}}$ *];

Preassociative

[* ∨ *], [* ‖ *], [* $\ddot{\vee}$ *];

Postassociative

[* $\ddot{\Rightarrow}$ *];

Postassociative

[* : *], [* spy *], [*!*];

Preassociative

[* $\left\{ \begin{array}{c} * \\ * \end{array} \right.$];

Preassociative

[λ * .*], [Λ * .*], [Λ*], [**if** * **then** * **else** *], [**let** * = * **in** *], [**let** * $\ddot{=}$ * in *];

Preassociative

[*$^{\mathrm{I}}$], [*$^{\triangleright}$], [*$^{\mathrm{V}}$], [*$^{+}$], [*$^{-}$], [**];

Preassociative

[* @ *], [* ▷ *], [* ⧐ *], [* ≫ *];

Postassociative

[* ⊢ *], [* ⊩ *], [* i.e. *];

Preassociative

[∀*: *];

Postassociative

[* ⊕ *];

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
$[*\backslash\backslash *];]$

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

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

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

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

Predef: proclaim

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

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

“ $*$ ”

Predef: hide

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

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

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

[“x” $\overset{\text{pyk}}{\to}$ “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”]

$ ∗ $

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

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

[x $\overset{\text{pyk}}{\to}$ “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}, 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 $\overset{\text{val}}{\to}$ ijcar base[ijcar 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.
)"]

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

$\big(*\big)$

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

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

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

$\Big(*\Big)$

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

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

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

$\displaystyle *$

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

[display(x) $\overset{\text{tex}}{\to}$ “

\addvspace{\abovedisplayskip}

\setlength{\leftskip}{\mathindent}\noindent #1.
\everypar{\setlength{\parindent}{\docparindent}}
\setlength{\parindent}{0mm}

\setlength{\leftskip}{0mm}
\addvspace{\belowdisplayskip}

”]

[display(x) $\overset{\text{pyk}}{\to}$ “display ∗ end display”]

statement$(*)$

$[\mathrm{statement}(\mathsf{x}) \overset{\mathrm{name}}{\to} \text{“}$
statement(#1.
)”]

$[\mathrm{statement}(\mathsf{x}) \overset{\mathrm{tex}}{\to} \text{“}$

\addvspace{\abovedisplayskip}

\setlength{\leftskip}{0mm}\noindent #1.
\everypar{\setlength{\parindent}{\docparindent}}
\setlength{\parindent}{0mm}

\setlength{\leftskip}{0mm}
\addvspace{\belowdisplayskip}

”]

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

$\lceil * \rceil^{\cdot}$

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

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

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

$\lceil * \rceil^{-}$

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

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

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

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

$[\mathbf{aspect}(\mathsf{a},\mathsf{c}) \overset{\text{val}}{\to} \mathsf{a}^{\mathsf{c}} \left\{ \begin{array}{l} \mathsf{c}[0][\mathsf{a}] \\ \mathsf{c}[\mathsf{a}^{\mathsf{r}}][\mathsf{a}^{\mathsf{i}}] \end{array} \right.]$

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

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

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

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

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

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

$\langle * \rangle$

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

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

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

$\mathbf{tuple}_1(*)$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

checker

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

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

check$(*,*)$

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

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

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

check$_2(*,*,*)$

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

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

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

check$_3(*,*,*)$

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

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

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

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

$[\mathbf{check}^{*}(\mathsf{t}, \mathsf{c}) \overset{\text{val}}{\rightarrow} \mathrm{If}(\mathsf{t}, \mathsf{c}!\mathsf{T}, \mathbf{check}_{2}^{*}(\mathsf{t}^{\mathrm{t}}, \mathsf{c}, \mathbf{check}(\mathsf{t}^{\mathrm{h}}, \mathsf{c})))]$

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

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

$\mathbf{check}_{2}^{*}(*, *, *)$

$[\mathbf{check}_{2}^{*}(\mathsf{t}, \mathsf{c}, \mathsf{v}) \overset{\text{val}}{\rightarrow} \mathrm{If}(\neg\mathsf{v}, \mathsf{t}!\ [\ \mathsf{c}!\mathsf{v}\ ]\ , \mathbf{check}^{*}(\mathsf{t}, \mathsf{c}))]$

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

$[\mathbf{check}_{2}^{*}(\mathsf{t}, \mathsf{c}, \mathsf{v}) \overset{\text{pyk}}{\rightarrow}$ “check list two $*$ cache $*$ value $*$ end check”]

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

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

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

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

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

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

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

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

$\lceil * \rceil^{\circ}$

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

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

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

msg

Predef: message

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

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

$\lceil * \overset{\text{msg}}{=} * \rceil$

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

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

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

<stmt>

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

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

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

stmt

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

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

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

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

$[[\mathsf{x} \overset{\mathrm{stmt}}{=\!=} \mathsf{y}] \overset{\mathrm{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\ulcorner[[\mathsf{x} \overset{\mathrm{stmt}}{=\!=} \mathsf{y}] \doteqdot [(\mathsf{x})^{\mathbf{P}} \overset{\mathrm{stmt}}{\to} \mathsf{y}]]\urcorner)]$

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

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

HeadNil′

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

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

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

HeadPair′

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

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

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

Transitivity′

$[\mathrm{Transitivity}' \overset{\mathrm{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\ulcorner[\mathrm{Transitivity}' \doteqdot \forall\mathcal{A}{:}\forall\mathcal{B}{:}\forall\mathcal{C}{:}\ [\ [\ \mathcal{A} = \mathcal{B}\ ] \vdash [\ [\ \mathcal{A} = \mathcal{C}\ ] \vdash [\ \mathcal{B} = \mathcal{C}\ ]\ ]\ ]\urcorner)]$

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

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

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

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

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

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

Contra′

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

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

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

T'_{E}

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

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

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

L_1

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

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

$[\mathrm{L}_1 \overset{\text{pyk}}{\to} \text{“example lemma”}]$

$\underline{*}$

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

$[\underline{\mathsf{x}} \overset{\text{pyk}}{\to} \text{“metavar } * \text{ end metavar”}]$

$\mathcal{A}$

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

$[\mathcal{A} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal A\}”}]$

$[\mathcal{A} \overset{\text{pyk}}{\to} \text{“meta a”}]$

$\mathcal{B}$

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

$[\mathcal{B} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal B\}”}]$

$[\mathcal{B} \overset{\text{pyk}}{\to} \text{“meta b”}]$

$\mathcal{C}$

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

$[\mathcal{C} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal C\}”}]$

$[\mathcal{C} \overset{\text{pyk}}{\to} \text{“meta c”}]$

$\mathcal{D}$

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

$[\mathcal{D} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal D\}”}]$

$[\mathcal{D} \overset{\text{pyk}}{\to} \text{“meta d”}]$

$\mathcal{E}$

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

$[\mathcal{E} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal E\}”}]$

$[\mathcal{E} \overset{\text{pyk}}{\to} \text{“meta e”}]$

$\mathcal{F}$

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

$[\mathcal{F} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal F\}”}]$

$[\mathcal{F} \overset{\text{pyk}}{\to} \text{“meta f”}]$

$\mathcal{G}$

$[\mathcal{G} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\ulcorner[\mathcal{G} \doteqdot \underline{\mathsf{g}}]\urcorner)]$

$[\mathcal{G} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal G\}”}]$

$[\mathcal{G} \overset{\text{pyk}}{\to} \text{“meta g”}]$

$\mathcal{H}$

$[\mathcal{H} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\ulcorner[\mathcal{H} \doteqdot \underline{\mathsf{h}}]\urcorner)]$

$[\mathcal{H} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal H\}”}]$

$[\mathcal{H} \overset{\text{pyk}}{\to} \text{“meta h”}]$

$\mathcal{I}$

$[\mathcal{I} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\ulcorner[\mathcal{I} \doteqdot \underline{\mathsf{i}}]\urcorner)]$

$[\mathcal{I} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal I\}”}]$

$[\mathcal{I} \overset{\text{pyk}}{\to} \text{“meta i”}]$

$\mathcal{J}$

$[\mathcal{J} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\ulcorner[\mathcal{J} \doteqdot \underline{\mathsf{j}}]\urcorner)]$

$[\mathcal{J} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal J\}”}]$

$[\mathcal{J} \overset{\text{pyk}}{\to} \text{“meta j”}]$

$\mathcal{K}$

$[\mathcal{K} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\ulcorner[\mathcal{K} \doteqdot \underline{\mathsf{k}}]\urcorner)]$

$[\mathcal{K} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal K\}”}]$

$[\mathcal{K} \overset{\text{pyk}}{\to} \text{“meta k”}]$

$\mathcal{L}$

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

$[\mathcal{L} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal L\}”}]$

$[\mathcal{L} \overset{\text{pyk}}{\to} \text{“meta l”}]$

$\mathcal{M}$

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

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

$[\mathcal{M} \overset{\text{pyk}}{\to} \text{“meta m”}]$

$\mathcal{N}$

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

$[\mathcal{N} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal N\}”}]$

$[\mathcal{N} \overset{\text{pyk}}{\to} \text{“meta n”}]$

$\mathcal{O}$

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

$[\mathcal{O} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal O\}”}]$

$[\mathcal{O} \overset{\text{pyk}}{\to} \text{“meta o”}]$

$\mathcal{P}$

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

$[\mathcal{P} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal P\}”}]$

$[\mathcal{P} \overset{\text{pyk}}{\to} \text{“meta p”}]$

$\mathcal{Q}$

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

$[\mathcal{Q} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal Q\}”}]$

$[\mathcal{Q} \overset{\text{pyk}}{\to} \text{“meta q”}]$

$\mathcal{R}$

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

$[\mathcal{R} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal R\}”}]$

$[\mathcal{R} \overset{\text{pyk}}{\to} \text{“meta r”}]$

$\mathcal{S}$

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

$[\mathcal{S} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal S\}”}]$

$[\mathcal{S} \overset{\text{pyk}}{\to} \text{“meta s”}]$

$\mathcal{T}$

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

$[\mathcal{T} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal T\}”}]$

$[\mathcal{T} \overset{\text{pyk}}{\to} \text{“meta t”}]$

$\mathcal{U}$

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

$[\mathcal{U} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal U\}”}]$

$[\mathcal{U} \overset{\text{pyk}}{\to} \text{“meta u”}]$

$\mathcal{V}$

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

$[\mathcal{V} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal V\}”}]$

$[\mathcal{V} \overset{\text{pyk}}{\to} \text{“meta v”}]$

$\mathcal{W}$

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

$[\mathcal{W} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal W\}”}]$

$[\mathcal{W} \overset{\text{pyk}}{\to} \text{“meta w”}]$

$\mathcal{X}$

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

$[\mathcal{X} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal X\}”}]$

$[\mathcal{X} \overset{\text{pyk}}{\to} \text{“meta x”}]$

$\mathcal{Y}$

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

$[\mathcal{Y} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal Y\}”}]$

$[\mathcal{Y} \overset{\text{pyk}}{\to} \text{“meta y”}]$

$\mathcal{Z}$

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

$[\mathcal{Z} \overset{\text{tex}}{\to} \text{“\{\textbackslash cal Z\}”}]$

$[\mathcal{Z} \overset{\text{pyk}}{\to} \text{“meta z”}]$

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

$[\langle \mathsf{a} \,|\mathsf{x}{:=}\, \mathsf{b}\rangle \overset{\text{val}}{\to} \mathsf{x}!\ [\ \mathsf{b}!$
$\mathrm{If}(\mathsf{a}^{\mathcal{V}}, \mathrm{If}(\mathsf{a} \overset{\text{t}}{=} \mathsf{x}, \mathsf{b}, \mathsf{a}),$
$\mathrm{If}(\neg\ [\ \mathsf{a} \overset{\text{r}}{=} \lceil\forall *{:}\, *\rceil\ ]\ , \mathsf{a}^{\text{h}} :: \langle {}^{*}\mathsf{a}^{\text{t}} \,|\mathsf{x}{:=}\, \mathsf{b}\rangle,$
$\mathrm{If}(\mathsf{a}^{1} \overset{\text{t}}{=} \mathsf{x}, \mathsf{a},$
$[\ \mathsf{a}^{0} ::\ [\ \mathsf{a}^{1} ::\ [\ \langle \mathsf{a}^{2} \,|\mathsf{x}{:=}\, \mathsf{b}\rangle :: \mathsf{T}\ ]\ ]\ ]\ ))) \ ]\ ]$

$[\langle \mathsf{a} \,|\mathsf{x}{:=}\, \mathsf{b}\rangle \overset{\text{tex}}{\to} \text{“}$
\langle #1.
\, \{\protect\vert\}#2.

{:=}\, #3.
\rangle "]

$[\langle \mathsf{a} \,|\mathsf{x}{:=}\, \mathsf{b}\rangle \overset{\text{pyk}}{\to} \text{“sub } * \text{ set } * \text{ to } * \text{ end sub”}]$

$\left\langle {}^{*}* \;\middle|\; * := * \right\rangle$

$[\langle {}^{*}\mathsf{a} \,|\mathsf{x}{:=}\, \mathsf{b}\rangle \overset{\text{val}}{\to} \mathsf{x}!\ [\ \mathsf{b}!\mathsf{If}(\mathsf{a}, \mathsf{T}, \langle \mathsf{a}^{\mathsf{h}} \,|\mathsf{x}{:=}\, \mathsf{b}\rangle :: \langle {}^{*}\mathsf{a}^{\mathsf{t}} \,|\mathsf{x}{:=}\, \mathsf{b}\rangle)\ ]\ ]$

[⟨*a |x:= b⟩ tex “
\langle ^ { \ast } #1.
\, {\protect\vert}#2.
{:=}\, #3.
\rangle "]

$[\langle {}^{*}\mathsf{a} \,|\mathsf{x}{:=}\, \mathsf{b}\rangle \overset{\text{pyk}}{\to} \text{“sub star } * \text{ set } * \text{ to } * \text{ end sub”}]$

$\emptyset$

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

[∅ tex “
\emptyset "]

$[\emptyset \overset{\text{pyk}}{\to} \text{“the empty set”}]$

Remainder

$[\text{Remainder} \overset{\text{macro}}{\to} \lambda \mathsf{t}.\lambda \mathsf{s}.\lambda \mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t}, \mathsf{s}, \mathsf{c}, \lceil[\text{Remainder} \doteqdot \text{HeadPair}' \oplus\ [\ \text{Transitivity}' \oplus \text{Contra}'\ ]\ ]\rceil)]$

[Remainder tex “
Remainder”]

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

$\left(*\right)^{\mathbf{v}}$

[(x)v name “
(#1.
)^{\bf v}”]

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

$[(\mathsf{x})^{\mathbf{v}} \overset{\text{tex}}{\to} \text{“\#1/tex name.”}]$

$[(\mathsf{x})^{\mathbf{v}} \overset{\text{pyk}}{\to} \text{“make visible} * \text{end visible”}]$

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

$[\text{intro}(\mathsf{x}, \mathsf{i}, \mathsf{p}, \mathsf{t}) \overset{\text{name}}{\to} \text{“}$
intro(#1.
,#2.
,#3.
,#4.
)”]

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

$[\text{intro}(\mathsf{x}, \mathsf{i}, \mathsf{p}, \mathsf{t}) \overset{\text{tex}}{\to} \text{“}$\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{$[#1/tex name/tex.
\stackrel {\mathrm {pyk}}{=} #3/tex name.
]$}”]

$[\text{intro}(\mathsf{x}, \mathsf{i}, \mathsf{p}, \mathsf{t}) \overset{\text{pyk}}{\to} \text{“intro} * \text{index} * \text{pyk} * \text{tex} * \text{end intro”}]$

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

$[\text{intro}(\mathsf{x}, \mathsf{p}, \mathsf{t}) \overset{\text{name}}{\to} \text{“}$
intro(#1.
,#2.
,#3.
)”]

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

$[\text{intro}(\mathsf{x}, \mathsf{p}, \mathsf{t}) \overset{\text{tex}}{\to} \text{“}$\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.
]$}"]

[intro(x, p, t) $\overset{\text{pyk}}{\to}$ "intro ∗ pyk ∗ tex ∗ end intro"]

error(∗, ∗)

[error(m, t) $\overset{\text{macro}}{\to}$ λt.λs.λc.$\tilde{\mathcal{M}}_4$(t, s, c, ⌈[error(m, t) $\ddot{=}$ error$_2$(⌈m⌉, t)]⌉)]

[error(m, t) $\overset{\text{tex}}{\to}$ "
error(#1/tex name.
, #2.
)"]

[error(m, t) $\overset{\text{pyk}}{\to}$ "error ∗ term ∗ end error"]

error$_2$(∗, ∗)

[error$_2$(m, t) $\overset{\text{val}}{\to}$ t-color(m^1 [⌈"
"⌉^{1}t])]

[error$_2$(m, t) $\overset{\text{tex}}{\to}$ "
error_{2}(#1/tex name.
, #2.
)"]

[error$_2$(m, t) $\overset{\text{pyk}}{\to}$ "error two ∗ term ∗ end error"]

proof(∗, ∗, ∗)

[proof(p, t, c) $\overset{\text{val}}{\to}$ proof$_2$($\mathcal{S}$(c, p), t)]

[proof(p, t, c) $\overset{\text{tex}}{\to}$ "
proof(#1.
, #2.
, #3.
)"]

[proof(p, t, c) $\overset{\text{pyk}}{\to}$ "proof ∗ term ∗ cache ∗ end proof"]

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

$[\mathrm{proof}_2(\mathsf{q},\mathsf{t}) \overset{\mathrm{val}}{\to} \mathsf{t}!$
$\mathrm{If}(\mathsf{q}^{\mathrm{E}},\mathsf{q},$
$\mathrm{If}(\neg\ [\ \mathsf{q}^{0}\ ]\ ,\mathrm{error}_2(\lceil\text{“Proof has at least one unresolved premise. Lemma; premise reads:”}\rceil,\mathsf{t};\ [\ \mathsf{q}^{0\mathrm{h}}\ ]\ ),$
$\mathrm{If}(\neg\ [\ \mathsf{q}^{1}\ ]\ ,\mathrm{error}_2(\lceil\text{“Proof has at least one unresolved side condition. Lemma; condition reads:”}\rceil,\mathsf{t};\ [\ \mathsf{q}^{1\mathrm{h}}\ ]\ ),$
$\mathrm{If}(\mathsf{q}^{2} \overset{\mathrm{t}}{=} \mathsf{t},\mathsf{T},$
$\mathrm{error}_2(\lceil\text{“Lemma does not match conclusion. Lemma; conclusion reads:”}\rceil,\mathsf{t};\ [\ \mathsf{q}^{2}\ ]\ ))))))]$

$[\mathrm{proof}_2(\mathsf{q},\mathsf{t}) \overset{\mathrm{tex}}{\to}$ “
proof_{2}(#1.
, #2.
)”]

$[\mathrm{proof}_2(\mathsf{q},\mathsf{t}) \overset{\mathrm{pyk}}{\to}$ “proof two $*$ term $*$ end proof”]

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

$[\mathcal{S}(\mathsf{c},\mathsf{t}) \overset{\mathrm{val}}{\to} \mathsf{c}!$
$\mathrm{If}(\mathsf{t}^{\mathrm{E}},\mathsf{t},$
$\mathrm{If}(\mathsf{t} \overset{\mathrm{r}}{=} \lceil *^{\mathrm{I}}\rceil,\mathcal{S}^{\mathrm{I}}(\mathsf{c},\mathsf{t}),$
$\mathrm{If}(\mathsf{t} \overset{\mathrm{r}}{=} \lceil *^{\triangleright}\rceil,\mathcal{S}^{\triangleright}(\mathsf{c},\mathsf{t}),$
$\mathrm{If}(\mathsf{t} \overset{\mathrm{r}}{=} \lceil *^{\mathrm{V}}\rceil,\mathcal{S}^{\mathrm{E}}(\mathsf{c},\mathsf{t}),$
$\mathrm{If}(\mathsf{t} \overset{\mathrm{r}}{=} \lceil *^{+}\rceil,\mathcal{S}^{+}(\mathsf{c},\mathsf{t}),$
$\mathrm{If}(\mathsf{t} \overset{\mathrm{r}}{=} \lceil *^{-}\rceil,\mathcal{S}^{-}(\mathsf{c},\mathsf{t}),$
$\mathrm{If}(\mathsf{t} \overset{\mathrm{r}}{=} \lceil *^{*}\rceil,\mathcal{S}^{*}(\mathsf{c},\mathsf{t}),$
$\mathrm{If}(\mathsf{t} \overset{\mathrm{r}}{=} \lceil * \mathbin{@} *\rceil,\mathcal{S}^{@}(\mathsf{c},\mathsf{t}),$
$\mathrm{If}(\mathsf{t} \overset{\mathrm{r}}{=} \lceil * \vdash *\rceil,\mathcal{S}^{\vdash}(\mathsf{c},\mathsf{t}),$
$\mathrm{If}(\mathsf{t} \overset{\mathrm{r}}{=} \lceil * \nvdash *\rceil,\mathcal{S}^{\nvdash}(\mathsf{c},\mathsf{t}),$
$\mathrm{If}(\mathsf{t} \overset{\mathrm{r}}{=} \lceil * \text{ i.e. } *\rceil,\mathcal{S}^{\text{i.e.}}(\mathsf{c},\mathsf{t}),$
$\mathrm{If}(\mathsf{t} \overset{\mathrm{r}}{=} \lceil \forall *\colon *\rceil,\mathcal{S}^{\forall}(\mathsf{c},\mathsf{t}),$
$\mathrm{If}(\mathsf{t} \overset{\mathrm{r}}{=} \lceil *;*\rceil,\mathcal{S}^{;}(\mathsf{c},\mathsf{t}),$
$\mathrm{error}_2(\lceil\text{“Unknown sequent operator:”}\rceil,\mathsf{t}))))))))))))))]$

$[\mathcal{S}(\mathsf{x},\mathsf{y}) \overset{\mathrm{tex}}{\to}$ “
{\cal S}(#1.
, #2.
)”]

$[\mathcal{S}(\mathsf{x},\mathsf{y}) \overset{\mathrm{pyk}}{\to}$ “sequent eval $*$ term $*$ end eval”]

$\mathcal{S}^{\mathrm{I}}(*,*)$

$[\mathcal{S}^{\mathrm{I}}(\mathsf{c},\mathsf{t}) \overset{\mathrm{val}}{\to} \mathsf{c}!\ [\ \emptyset :: \ [\ \emptyset :: \ [\ \mathsf{t\text{-}color}(\mathsf{t}^1 \vdash \ [\ \mathsf{t}^1\ ]\ ) :: \mathsf{T}\ ]\ ]\ ]\ ]$

$[\mathcal{S}^{\mathrm{I}}(\mathsf{x},\mathsf{y}) \overset{\mathrm{tex}}{\to}$ “
{\cal S}^{I}(#1.
, #2.
)”]

$[\mathcal{S}^{\mathrm{I}}(\mathsf{x},\mathsf{y}) \overset{\mathrm{pyk}}{\to}$ “seqeval init $*$ term $*$ end eval”]

$\mathcal{S}^{\triangleright}(*,*)$

$[\mathcal{S}^{\triangleright}(\mathsf{c},\mathsf{t}) \overset{\mathrm{val}}{\to} \mathcal{S}_1^{\triangleright}(\mathsf{c},\mathsf{t},\mathcal{S}(\mathsf{c},\mathsf{t}^1))]$

$[\mathcal{S}^{\triangleright}(\mathsf{x},\mathsf{y}) \overset{\mathrm{tex}}{\to}$ “
{\cal S}^{\rhd}(#1.
, #2.
)”]

$[\mathcal{S}^{\triangleright}(\mathsf{x},\mathsf{y}) \overset{\mathrm{pyk}}{\to}$ “seqeval modus $*$ term $*$ end eval”]

$\mathcal{S}_1^{\triangleright}(*,*,*)$

$[\mathcal{S}_1^{\triangleright}(\mathsf{c},\mathsf{t},\mathsf{q}) \overset{\mathrm{val}}{\to} \mathsf{c}!\ [\ \mathsf{t}!$
$\mathrm{If}(\mathsf{q}^{\mathrm{E}},\mathsf{q},$
$\mathrm{If}(\mathsf{q}^2 \overset{\mathrm{r}}{=} \lceil * \vdash * \rceil, \mathsf{q}^0 \cup \{\mathsf{q}^{21}\} :: \ [\ \mathsf{q}^1 :: \ [\ \mathsf{q}^{22} :: \mathsf{T}\ ]\ ]\ ,$
$\mathrm{If}(\mathsf{q}^2 \overset{\mathrm{r}}{=} \lceil * \vDash * \rceil, \mathsf{q}^0 :: \ [\ \mathsf{q}^1 \cup \{\mathsf{q}^{21}\} :: \ [\ \mathsf{q}^{22} :: \mathsf{T}\ ]\ ]\ ,$
$\mathrm{error}_2(\lceil$ “The modus operation requires the conclusion of its argument to be an inference or an endorsement” $\rceil, \mathsf{t}))))\ ]\ ]$

$[\mathcal{S}_1^{\triangleright}(\mathsf{x},\mathsf{y},\mathsf{z}) \overset{\mathrm{tex}}{\to}$ “
{\cal S}_{1}^{\rhd}(#1.
, #2.
, #3.
)”]

$[\mathcal{S}_1^{\triangleright}(\mathsf{x},\mathsf{y},\mathsf{z}) \overset{\mathrm{pyk}}{\to}$ “seqeval modus one $*$ term $*$ sequent $*$ end eval”]

$\mathcal{S}^{\mathrm{E}}(*,*)$

$[\mathcal{S}^{\mathrm{E}}(\mathsf{c},\mathsf{t}) \overset{\mathrm{val}}{\to} \mathcal{S}_1^{\mathrm{E}}(\mathsf{c},\mathsf{t},\mathcal{S}(\mathsf{c},\mathsf{t}^1))]$

$[\mathcal{S}^{\mathrm{E}}(\mathsf{x},\mathsf{y}) \overset{\mathrm{tex}}{\to} \text{“}$
{\cal S}^{E}(#1.
, #2.
)”]

$[\mathcal{S}^{\mathrm{E}}(\mathsf{x},\mathsf{y}) \overset{\mathrm{pyk}}{\to} \text{“seqeval verify} * \text{term} * \text{end eval”}]$

$\mathcal{S}_1^{\mathrm{E}}(*,*,*)$

$[\mathcal{S}_1^{\mathrm{E}}(\mathsf{c},\mathsf{t},\mathsf{q}) \overset{\mathrm{val}}{\to} \mathsf{c}!\ [\ \mathsf{t}!$
$\mathrm{If}(\mathsf{q}^{\mathrm{E}},\mathsf{q},$
$\mathrm{If}(\neg\ [\ \mathsf{q}^2 \overset{\mathrm{r}}{=} \lceil * \Vdash * \rceil\ ]\ , \mathrm{error}_2(\lceil \text{“The verify operation requires the conclusion of its argument to be an endorsement:”} \rceil, \mathsf{t}),$
$\mathrm{If}(\mathcal{U}^{\mathrm{M}}(\mathcal{E}(\mathsf{q}^{21},\mathsf{T},\mathsf{c})\ \text{`}\ \mathsf{c}), \mathsf{q}^0 :: [\ \mathsf{q}^1 :: [\ \mathsf{q}^{22} :: \mathsf{T}\ ]\ ]\ ,$
$\mathrm{error}_2(\lceil \text{“False side condition:”} \rceil, \mathsf{t}))))\ ]\ ]$

$[\mathcal{S}_1^{\mathrm{E}}(\mathsf{x},\mathsf{y},\mathsf{z}) \overset{\mathrm{tex}}{\to} \text{“}$
{\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.
)”]

$[\mathcal{S}^{+}(\mathsf{x},\mathsf{y}) \overset{\mathrm{pyk}}{\to} \text{“sequent eval plus} * \text{term} * \text{end eval”}]$

$\mathcal{S}_1^{+}(*,*,*)$

$[\mathcal{S}_1^{+}(\mathsf{c},\mathsf{t},\mathsf{q}) \overset{\mathrm{val}}{\to} \mathsf{c}!\ [\ \mathsf{t}!$
$\mathrm{If}(\mathsf{q}^{\mathrm{E}},\mathsf{q},$
$\mathrm{If}(\ [\ \mathsf{q}^2 \overset{\mathrm{r}}{=} \lceil * \vdash * \rceil\ ]\ \wedge\ [\ \mathsf{q}^{22} \overset{\mathrm{r}}{=} \lceil * \vdash * \rceil\ ]\ ,$
$[\ \mathsf{q}^0 :: [\ \mathsf{q}^1 :: [\ \mathsf{t\text{-}color}(\ [\ \mathsf{q}^{21} \oplus [\ \mathsf{q}^{221}\ ]\ ]\ \vdash\ [\ \mathsf{q}^{222}\ ]\ ) :: \mathsf{T}\ ]\ ]\ ]\ ,$
$\mathrm{error}_2(\lceil \text{“Term; conclusion not fit for decurrying:”} \rceil, \mathsf{t};\ [\ \mathsf{q}^2\ ]\ ))\ ]\ ]$

$[\mathcal{S}_1^+(\mathsf{x},\mathsf{y},\mathsf{z}) \overset{\text{tex}}{\to} \text{“}$
{\cal S}_{1}^{+}(#1.
, #2.
, #3.
)”]

$[\mathcal{S}_1^+(\mathsf{x},\mathsf{y},\mathsf{z}) \overset{\text{pyk}}{\to} \text{“seqeval plus one } * \text{ term } * \text{ sequent } * \text{ end eval”}]$

$\mathcal{S}^-(*,*)$

$[\mathcal{S}^-(\mathsf{c},\mathsf{t}) \overset{\text{val}}{\to} \mathcal{S}_1^-(\mathsf{c},\mathsf{t},\mathcal{S}(\mathsf{c},\mathsf{t}^1))]$

$[\mathcal{S}^-(\mathsf{x},\mathsf{y}) \overset{\text{tex}}{\to} \text{“}$
{\cal S}^{-}(#1.
, #2.
)”]

$[\mathcal{S}^-(\mathsf{x},\mathsf{y}) \overset{\text{pyk}}{\to} \text{“seqeval minus } * \text{ term } * \text{ end eval”}]$

$\mathcal{S}_1^-(*,*,*)$

$[\mathcal{S}_1^-(\mathsf{c},\mathsf{t},\mathsf{q}) \overset{\text{val}}{\to} \mathsf{c}!\ [\ \mathsf{t}!$
$\text{If}(\mathsf{q}^{\text{E}},\mathsf{q},$
$\text{If}(\ [\ \mathsf{q}^2 \overset{\text{r}}{=} \lceil * \vdash * \rceil\ ]\ \wedge\ [\ \mathsf{q}^{21} \overset{\text{r}}{=} \lceil * \oplus * \rceil\ ]\ ,$
$[\ \mathsf{q}^0 :: [\ \mathsf{q}^1 :: [\ \mathsf{t}\text{-color}(\mathsf{q}^{211} \vdash [\ \mathsf{q}^{212} \vdash [\ \mathsf{q}^{22}\ ]\ ]\ ) :: \mathsf{T}\ ]\ ]\ ]\ ,$
$\text{error}_2(\lceil \text{“Term; conclusion not fit for decurrying:”} \rceil, \mathsf{t};\ [\ \mathsf{q}^2\ ]\ ))\ ]\ ]$

$[\mathcal{S}_1^-(\mathsf{x},\mathsf{y},\mathsf{z}) \overset{\text{tex}}{\to} \text{“}$
{\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.
)”]

$[\mathcal{S}_1^*(\mathsf{x},\mathsf{y},\mathsf{z}) \overset{\text{pyk}}{\to} \text{“seqeval deref one } * \text{ term } * \text{ sequent } * \text{ end eval”}]$

$\mathcal{S}_2^*(*,*,*,*)$

$[\mathcal{S}_2^*(\mathsf{c},\mathsf{t},\mathsf{q},\mathsf{d}) \overset{\text{val}}{\to} \mathsf{c}!\ [\ \mathsf{t}!\ [\ \mathsf{q}!$
$\text{If}(\mathsf{d}, \text{error}_2(\lceil\text{“Dereferencing construct that has no statement def:”}\rceil, \mathsf{t}),$
$[\ \mathsf{q}^0 :: [\ \mathsf{q}^1 :: [\ \mathsf{d}^3 :: \mathsf{T}\ ]\ ]\ ]\ )\ ]\ ]$

$[\mathcal{S}_2^*(\mathsf{c},\mathsf{t},\mathsf{q},\mathsf{d}) \overset{\text{tex}}{\to} \text{“}$
{\cal S}_{2}^{\ast}(#1.
, #2.
, #3.
, #4.
)”]

$[\mathcal{S}_2^*(\mathsf{c},\mathsf{t},\mathsf{q},\mathsf{d}) \overset{\text{pyk}}{\to} \text{“seqeval deref two } * \text{ term } * \text{ sequent } * \text{ def } * \text{ end eval”}]$

$\mathcal{S}^{@}(*,*)$

$[\mathcal{S}^{@}(\mathsf{c},\mathsf{t}) \overset{\text{val}}{\to} \mathcal{S}_1^{@}(\mathsf{c},\mathsf{t},\mathcal{S}(\mathsf{c},\mathsf{t}^1))]$

$[\mathcal{S}^{@}(\mathsf{x},\mathsf{y}) \overset{\text{tex}}{\to} \text{“}$
{\cal S}^{\char64}(#1.
, #2.
)”]

$[\mathcal{S}^{@}(\mathsf{x},\mathsf{y}) \overset{\text{pyk}}{\to} \text{“seqeval at } * \text{ term } * \text{ end eval”}]$

$\mathcal{S}_1^{@}(*,*,*)$

$[\mathcal{S}_1^{@}(\mathsf{c},\mathsf{t},\mathsf{q}) \overset{\text{val}}{\to} \mathsf{c}!\ [\ \mathsf{t}!$
$\mathrm{If}(\mathsf{q}^{\mathrm{E}},\mathsf{q},$
$\mathrm{If}(\neg\ [\ \mathsf{q}^2 \overset{\mathrm{r}}{=} \lceil \forall *\colon * \rceil\ ]\ , \mathrm{error}_2(\lceil \text{“Quantifier elimination requires the conclusion of its argument to be a quantifier:”} \rceil, \mathsf{t}),$
$\mathrm{If}(\neg\ [\ \mathsf{t}^2 \text{ free for } \mathsf{q}^{21} \text{ in } [\ \mathsf{q}^{22}\ ]\ ]\ , \mathrm{error}_2(\lceil \text{“Quantifier elimination leads to variable clash:”} \rceil, \mathsf{t}),$
$[\ \mathsf{q}^0 :: [\ \mathsf{q}^1 :: [\ \langle \mathsf{q}^{22} \,|\mathsf{q}^{21} := \mathsf{t}^2 \rangle :: \mathsf{T}\ ]\ ]\ ]\ ))\ ]\ ]$

$[\mathcal{S}_1^{@}(\mathsf{c},\mathsf{t},\mathsf{q}) \overset{\text{tex}}{\to}$ “
{\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”]

$\mathcal{S}_1^{\vdash}(*,*,*,*)$

$[\mathcal{S}_1^{\vdash}(\mathsf{c},\mathsf{t},\mathsf{p},\mathsf{q}) \overset{\text{val}}{\to} \mathsf{c}!\ [\ \mathsf{t}!\ [\ \mathsf{p}!$
$\mathrm{If}(\mathsf{q}^{\mathrm{E}},\mathsf{q},$
$[\ \mathsf{q}^0 \backslash \{\mathsf{p}\} :: [\ \mathsf{q}^1 :: [\ \mathsf{t}\text{-color}(\mathsf{p} \vdash [\ \mathsf{q}^2\ ]\ ) :: \mathsf{T}\ ]\ ]\ ]\ )\ ]\ ]\ ]$

$[\mathcal{S}_1^{\vdash}(\mathsf{x},\mathsf{y},\mathsf{z},\mathsf{u}) \overset{\text{tex}}{\to}$ “
{\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”]

$\mathcal{S}_1^{\vdash}(*,*,*,*)$

$[\mathcal{S}_1^{\vdash}(\mathsf{c},\mathsf{t},\mathsf{p},\mathsf{q}) \overset{\text{val}}{\to} \mathsf{c}!\ [\ \mathsf{t}!\ [\ \mathsf{p}!$
$\text{If}(\mathsf{q}^{\text{E}},\mathsf{q},$
$[\ \mathsf{q}^0 :: \ [\ \mathsf{q}^1 \backslash \{\mathsf{p}\} :: \ [\ \text{t-color}(\mathsf{p} \Vdash \ [\ \mathsf{q}^2\ ]\ ) :: \mathsf{T}\ ]\ ]\ ]\ )\ ]\ ]\ ]$

$[\mathcal{S}_1^{\vdash}(\mathsf{x},\mathsf{y},\mathsf{z},\mathsf{u}) \overset{\text{tex}}{\to}$ “
{\cal S}_{1}^{\makebox [0mm][l]{\scriptsize $\vdash $}\, {\vdash }}(#1.
, #2.
, #3.
, #4.
)”]

$[\mathcal{S}_1^{\vdash}(\mathsf{x},\mathsf{y},\mathsf{z},\mathsf{u}) \overset{\text{pyk}}{\to}$ “seqeval endorse one $*$ term $*$ side $*$ sequent $*$ end eval”]

$\mathcal{S}^{\text{i.e.}}(*,*)$

$[\mathcal{S}^{\text{i.e.}}(\mathsf{c},\mathsf{t}) \overset{\text{val}}{\to} \mathcal{S}_1^{\text{i.e.}}(\mathsf{c},\mathsf{t},\mathsf{t}^2,\mathcal{S}(\mathsf{c},\mathsf{t}^1))]$

$[\mathcal{S}^{\text{i.e.}}(\mathsf{x},\mathsf{y}) \overset{\text{tex}}{\to}$ “
{\cal S}^{i.e.}(#1.
, #2.
)”]

$[\mathcal{S}^{\text{i.e.}}(\mathsf{x},\mathsf{y}) \overset{\text{pyk}}{\to}$ “seqeval est $*$ term $*$ end eval”]

$\mathcal{S}_1^{\text{i.e.}}(*,*,*,*)$

$[\mathcal{S}_1^{\text{i.e.}}(\mathsf{c},\mathsf{t},\mathsf{a},\mathsf{q}) \overset{\text{val}}{\to} \mathsf{c}!\ [\ \mathsf{t}!\ [\ \mathsf{a}!$
$\text{If}(\mathsf{q}^{\text{E}},\mathsf{q},\mathcal{S}_2^{\text{i.e.}}(\mathsf{c},\mathsf{t},\mathsf{a},\mathsf{q},\textbf{aspect}(<\text{stmt}>,\mathsf{a},\mathsf{c})))\ ]\ ]\ ]$

$[\mathcal{S}_1^{\text{i.e.}}(\mathsf{x},\mathsf{y},\mathsf{z},\mathsf{u}) \overset{\text{tex}}{\to}$ “

{\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.
)"]

$[\mathcal{S}_2^{\text{i.e.}}(\mathsf{c},\mathsf{t},\mathsf{a},\mathsf{q},\mathsf{d}) \overset{\text{pyk}}{\to} \text{“seqeval est two} * \text{term} * \text{name} * \text{sequent} * \text{def} * \text{end eval”}]$

$\mathcal{S}^{\forall}(*,*)$

$[\mathcal{S}^{\forall}(\mathsf{c},\mathsf{t}) \overset{\text{val}}{\to} \mathcal{S}_1^{\forall}(\mathsf{c},\mathsf{t},\mathsf{t}^1,\mathcal{S}(\mathsf{c},\mathsf{t}^2))]$

$[\mathcal{S}^{\forall}(\mathsf{x},\mathsf{y}) \overset{\text{tex}}{\to} \text{“}$
{\cal S}^{\forall}(#1.
, #2.
)"]

$[\mathcal{S}^{\forall}(\mathsf{x},\mathsf{y}) \overset{\text{pyk}}{\to} \text{“seqeval all} * \text{term} * \text{end eval”}]$

$\mathcal{S}_1^{\forall}(*,*,*,*)$

$[\mathcal{S}_1^{\forall}(\mathsf{c},\mathsf{t},\mathsf{v},\mathsf{q}) \overset{\text{val}}{\to} \mathsf{c}!\ [\ \mathsf{t}!\ [\ \mathsf{v}!$
$\text{If}(\mathsf{q}^{\mathrm{E}}, \mathsf{q},$
$\text{If}(\neg\ [\ \mathsf{v}^{\mathcal{V}}\ ]\ , \text{error}_2(\lceil\text{“Metageneralization over non-metavariable:”}\rceil, \mathsf{t}),$

$\mathrm{If}(\mathsf{v}\text{ free in }[\ \mathsf{q}^0\ ]\ , \mathrm{error}_2(\lceil\text{“Metageneralization over metavariable that occurs free in some premise:”}\rceil, \mathsf{t}),$
$\mathrm{If}(\mathsf{v}\text{ free in }[\ \mathsf{q}^1\ ]\ , \mathrm{error}_2(\lceil\text{“Metageneralization over metavariable that occurs free in some side condition:”}\rceil, \mathsf{t}),$
$[\ \mathsf{q}^0 :: [\ \mathsf{q}^1 :: [\ \mathsf{t}\text{-color}(\forall \mathsf{v}\text{: }[\ \mathsf{q}^2\ ]\ ) :: \mathsf{T}\ ]\ ]\ ]\ ))))\ ]\ ]\ ]$

$[\mathcal{S}_1^{\forall}(\mathsf{c}, \mathsf{t}, \mathsf{v}, \mathsf{q}) \overset{\mathrm{tex}}{\to} \text{“}$
{\cal S}_{1}^{\forall}(\mathsf{c}, \mathsf{t}, \mathsf{v}, \mathsf{q})
)”]

$[\mathcal{S}_1^{\forall}(\mathsf{c}, \mathsf{t}, \mathsf{v}, \mathsf{q}) \overset{\mathrm{pyk}}{\to} \text{“seqeval all one } * \text{ term } * \text{ variable } * \text{ sequent } * \text{ end eval”}]$

$\mathcal{S}^{;}(*, *)$

$[\mathcal{S}^{;}(\mathsf{c}, \mathsf{t}) \overset{\mathrm{val}}{\to} \mathcal{S}_1^{;}(\mathsf{c}, \mathsf{t}, \mathcal{S}(\mathsf{c}, \mathsf{t}^1))]$

$[\mathcal{S}^{;}(\mathsf{x}, \mathsf{y}) \overset{\mathrm{tex}}{\to} \text{“}$
{\cal S}^{;}(\mathsf{x}, \mathsf{y})
)”]

$[\mathcal{S}^{;}(\mathsf{x}, \mathsf{y}) \overset{\mathrm{pyk}}{\to} \text{“seqeval cut } * \text{ term } * \text{ end eval”}]$

$\mathcal{S}_1^{;}(*, *, *)$

$[\mathcal{S}_1^{;}(\mathsf{c}, \mathsf{t}, \mathsf{p}) \overset{\mathrm{val}}{\to} \mathsf{c}!\ [\ \mathsf{t}!$
$\mathrm{If}(\mathsf{p}^{\mathrm{E}}, \mathsf{p}, \mathcal{S}_2^{;}(\mathsf{c}, \mathsf{t}, \mathsf{p}, \mathcal{S}(\mathsf{c}, \mathsf{t}^2)))\ ]\ ]$

$[\mathcal{S}_1^{;}(\mathsf{x}, \mathsf{y}, \mathsf{z}) \overset{\mathrm{tex}}{\to} \text{“}$
{\cal S}_{1}^{;}(\mathsf{x}, \mathsf{y}, \mathsf{z})
)”]

$[\mathcal{S}_1^{;}(\mathsf{c}, \mathsf{t}, \mathsf{p}) \overset{\mathrm{pyk}}{\to} \text{“seqeval cut one } * \text{ term } * \text{ forerunner } * \text{ end eval”}]$

$\mathcal{S}_2^{;}(*, *, *, *)$

$[\mathcal{S}_2^{;}(\mathsf{c}, \mathsf{t}, \mathsf{p}, \mathsf{q}) \overset{\mathrm{val}}{\to} \mathsf{c}!\ [\ \mathsf{t}!\ [\ \mathsf{p}!$
$\mathrm{If}(\mathsf{q}^{\mathrm{E}}, \mathsf{q},\ [\ \mathsf{p}^0 \cup [\ \mathsf{q}^0 \backslash \{\mathsf{p}^2\}\ ]\ ]\ ::\ [\ [\ \mathsf{p}^1 \cup [\ \mathsf{q}^1\ ]\ ]\ ::\ [\ \mathsf{q}^2 :: \mathsf{T}\ ]\ ]\ )\ ]\ ]\ ]$

$[\mathcal{S}_2^{\cdot}(\mathsf{c},\mathsf{t},\mathsf{p},\mathsf{q}) \overset{\text{tex}}{\to} \text{“}$
{\cal S}_{2}^{\cdot}(#1.
, #2.
, #3.
, #4.
)”]

$[\mathcal{S}_2^{\cdot}(\mathsf{x},\mathsf{y},\mathsf{z},\mathsf{u}) \overset{\text{pyk}}{\to} \text{“seqeval cut two} * \text{term} * \text{forerunner} * \text{sequent} * \text{end eval”}]$

$\mathcal{T}(*)$

$[\mathcal{T}(\mathsf{x}) \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\mathcal{T}(\mathsf{x}) \doteqdot \lambda\mathsf{c}.\mathcal{U}^{\mathrm{M}}(\mathcal{E}(\lceil\mathsf{x}\rceil,\mathsf{T},\mathsf{c}))]\rceil)]$

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

$[\mathcal{T}(\mathsf{x}) \overset{\text{pyk}}{\to} \text{“computably true} * \text{end true”}]$

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

$[\text{claims}(\mathsf{t},\mathsf{c},\mathsf{r}) \overset{\text{val}}{\to}$
$\text{If}(\text{claims}_2(\mathsf{t},\mathsf{c},\mathsf{r}),\mathsf{T},\text{claims}_2(\mathsf{t},\mathsf{c},\mathsf{c}[\mathsf{r}][\text{"bibliography"}]^1))]$

$[\text{claims}(\mathsf{t},\mathsf{c},\mathsf{r}) \overset{\text{tex}}{\to} \text{“}$
claims(#1.
, #2.
, #3.
)”]

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

$\text{claims}_2(*,*,*)$

$[\text{claims}_2(\mathsf{t},\mathsf{c},\mathsf{r}) \overset{\text{val}}{\to} \text{If}(\neg\ [\ \mathsf{r}^{\mathsf{c}}\ ]\ ,\mathsf{t}!\ [\ \mathsf{c}!\mathsf{F}\ ]\ ,\mathsf{t} \in_{\mathsf{c}}\ \ [\ \mathsf{c}[\mathsf{r}][\text{"codex"}][\mathsf{r}][0][0][\text{"claim"}]^3\ ]\ )]$

$[\text{claims}_2(\mathsf{t},\mathsf{c},\mathsf{r}) \overset{\text{tex}}{\to} \text{“}$
claims_2(#1.
, #2.
, #3.
)”]

$[\text{claims}_2(\mathsf{t},\mathsf{c},\mathsf{r}) \overset{\text{pyk}}{\to} \text{“claims two} * \text{cache} * \text{ref} * \text{end claims”}]$

<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”]

[**Lemma** $*$: $*$]

[[**Lemma** x: y] $\overset{\text{macro}}{\to}$ λt.λs.λc.$\tilde{\mathcal{M}}_4$(t, s, c, ⌈[[**Lemma** x: y] $\doteqdot$ [x $\overset{\text{stmt}}{\to}$ y]]⌉)]

[[**Lemma** x: y] $\overset{\text{tex}}{\to}$ “
[\mathbf{Lemma\ } #1.
\colon #2.
]”]

[[**Lemma** x: y] $\overset{\text{pyk}}{\to}$ “lemma $*$ says $*$ end lemma”]

[**Proof of** $*$: $*$]

[[**Proof of** x: y] $\overset{\text{macro}}{\to}$ λt.λs.λc.$\tilde{\mathcal{M}}_4$(t, s, c, ⌈[[**Proof of** x: y] $\doteqdot$ [x $\overset{\text{proof}}{\to}$ y]]⌉)]

[[**Proof of** x: y] $\overset{\text{tex}}{\to}$ “
[\mathbf{Proof\ of\ }#1/tex name/tex.
\colon #2.
]”]

[[**Proof of** x: y] $\overset{\text{pyk}}{\to}$ “proof of $*$ reads $*$ end proof”]

$[* \textbf{ lemma } *\colon *]$

$[[\mathsf{x}\ \textbf{lemma}\ \mathsf{y}\colon \mathsf{z}] \overset{\text{macro}}{\to} \lambda \mathsf{t}.\lambda \mathsf{s}.\lambda \mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[[\mathsf{x}\ \textbf{lemma}\ \mathsf{y}\colon \mathsf{z}] \doteqdot [\mathsf{y} \overset{\text{stmt}}{=} \mathsf{x} \vdash \mathsf{z}]]\rceil)]$

$[[\mathsf{x}\ \textbf{lemma}\ \mathsf{y}\colon \mathsf{z}] \overset{\text{tex}}{\to}$ “
[#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”]

$[* \textbf{ antilemma } *\colon *]$

$[[\mathsf{x}\ \textbf{antilemma}\ \mathsf{y}\colon \mathsf{z}] \overset{\text{macro}}{\to} \lambda \mathsf{t}.\lambda \mathsf{s}.\lambda \mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[[\mathsf{x}\ \textbf{antilemma}\ \mathsf{y}\colon \mathsf{z}] \doteqdot [\mathsf{x}\ \textbf{lemma}\ \mathsf{y}\colon \mathsf{z} \vdash \perp\!\!\!\perp]]\rceil)]$

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

$[[\mathsf{x}\ \textbf{antilemma}\ \mathsf{y}\colon \mathsf{z}] \overset{\text{pyk}}{\to}$ “in theory $*$ antilemma $*$ says $*$ end antilemma”]

$[* \textbf{ rule } *\colon *]$

$[[\mathsf{x}\ \textbf{rule}\ \mathsf{y}\colon \mathsf{z}] \overset{\text{macro}}{\to} \lambda \mathsf{t}.\lambda \mathsf{s}.\lambda \mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[[\mathsf{x}\ \textbf{rule}\ \mathsf{y}\colon \mathsf{z}] \doteqdot [\mathsf{x}\ \textbf{lemma}\ \mathsf{y}\colon \mathsf{z}][\textbf{Proof of}\ \mathsf{y}\colon \text{Rule tactic}]]\rceil)]$

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

$[[\mathsf{x}\ \textbf{rule}\ \mathsf{y}\colon \mathsf{z}] \overset{\text{pyk}}{\to}$ “in theory $*$ rule $*$ says $*$ end rule”]

$[* \textbf{ antirule } *\colon *]$

$[[\mathsf{x}\ \textbf{antirule}\ \mathsf{y}\colon \mathsf{z}] \overset{\text{macro}}{\to} \lambda \mathsf{t}.\lambda \mathsf{s}.\lambda \mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[[\mathsf{x}\ \textbf{antirule}\ \mathsf{y}\colon \mathsf{z}] \doteqdot [\mathsf{x}\ \textbf{rule}\ \mathsf{y}\colon \mathsf{z} \vdash \perp\!\!\!\perp]]\rceil)]$

[[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.
let$_1$(λp.
let$_1$(λd.
If($\neg$d, d,
let$_1$(λi.
If($\neg$ [i$^{\text{c}}$] , T,
error$_2$($\lceil$“Circular proof. Circle
includes:”$\rceil$, p[i]$^{0\text{h}}$)), $\mathcal{V}_5$(c, r, p, p))), $\mathcal{V}_3$(c, r, p, T)), $\mathcal{V}_2$(c, x)), c[r]["codex"][r]), c[0])]

[$\mathcal{V}_1$(c) $\overset{\text{tex}}{\to}$ “
{\cal V}_1(#1.
)”]

[$\mathcal{V}_1$(c) $\overset{\text{pyk}}{\to}$ “verify one ∗ end verify”]

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

[$\mathcal{V}_2$(c, p) $\overset{\text{val}}{\to}$ c!
If(p, T,
If($\neg$ [p$^{\text{hc}}$] , $\mathcal{V}_2$(c, p$^{\text{h}}$) :: $\mathcal{V}_2$(c, p$^{\text{t}}$), p$^{\text{h}}$ ::
let$_1$(λd.
If(d, T,
let$_1$(λr.
If(r$^{\text{E}}$, error$_2$($\lceil$“Error in proof of”$\rceil$, d^2 [$\lceil$“
”$\rceil^1$r]), r), $\mathcal{S}$(c, $\mathcal{U}^{\text{M}}$([$\mathcal{E}$(d^3, T, c) ‘ c] ‘ p)))), **aspect**(<proof>, p$^{\text{t}}$)))))]

$[\mathcal{V}_2(\mathsf{c},\mathsf{p}) \overset{\text{tex}}{\to}$ “
{\cal V}_2(#1.
, #2.
)”$]$

$[\mathcal{V}_2(\mathsf{c},\mathsf{p}) \overset{\text{pyk}}{\to}$ “verify two ∗ proofs ∗ end verify”$]$

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

$[\mathcal{V}_3(\mathsf{c},\mathsf{r},\mathsf{p},\mathsf{d}) \overset{\text{val}}{\to} \mathsf{c}!\ [\ \mathsf{r}!\ [\ \mathsf{p}!$
$\text{If}(\neg\mathsf{d},\mathsf{d},$
$\text{If}(\mathsf{p},\mathsf{T},$
$\text{If}(\neg\ [\ \mathsf{p}^{\text{hc}}\ ]\ ,\mathcal{V}_3(\mathsf{c},\mathsf{r},\mathsf{p}^{\text{t}},\mathcal{V}_3(\mathsf{c},\mathsf{r},\mathsf{p}^{\text{h}},\mathsf{T})),$
$\text{let}_1(\lambda\mathsf{i}.$
$\text{let}_1(\lambda\mathsf{q}.$
$\text{If}(\mathsf{q},\mathsf{T},$
$\text{If}(\mathsf{q}^{\text{E}},\mathsf{q},$
$\text{If}(\neg\ [\ \mathsf{q}^{1}\ ]\ ,\text{error}_2(\lceil\text{“Unchecked sidecondition:”}\rceil,\mathsf{q}^{1\text{h}}),$
$\text{let}_1(\lambda\mathsf{d}.$
$\text{If}(\mathsf{d},\text{error}_2(\lceil\text{“Proof of non-existent lemma:”}\rceil,\mathsf{q}^{2}),$
$\text{If}(\neg\ [\ \mathsf{q}^{2} \overset{\text{t}}{=}\ [\ \mathsf{d}^{3}\ ]\ ]\ ,\text{error}_2(\lceil\text{“Lemma/proof mismatch:”}\rceil,\mathsf{d}^{2};\ [\ \mathsf{q}^{2}\ ]\ ),$
$\mathcal{V}_4(\mathsf{c},\mathsf{q}^{0}))),\textbf{aspect}(\text{<stmt>},\mathsf{c}[\mathsf{r}][\text{"codex"}][\mathsf{r}][\mathsf{i}])))))),\mathsf{p}^{\text{t}}),\mathsf{p}^{\text{h}}))))\ ]\ ]\ ]$

$[\mathcal{V}_3(\mathsf{c},\mathsf{r},\mathsf{p},\mathsf{d}) \overset{\text{tex}}{\to}$ “
{\cal V}_3(#1.
, #2.
, #3.
, #4.
)”$]$

$[\mathcal{V}_3(\mathsf{c},\mathsf{r},\mathsf{p},\mathsf{d}) \overset{\text{pyk}}{\to}$ “verify three ∗ ref ∗ sequents ∗ diagnose ∗ end verify”$]$

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

$[\mathcal{V}_4(\mathsf{c},\mathsf{p}) \overset{\text{val}}{\to} \mathsf{c}!$
$\text{If}(\mathsf{p},\mathsf{T},$
$\text{let}_1(\lambda\mathsf{d}.$
$\text{If}(\neg\mathsf{d},\mathsf{d},$
$\text{let}_1(\lambda\mathsf{p}.$
$\text{let}_1(\lambda\mathsf{r}.$
$\text{let}_1(\lambda\mathsf{i}.$
$\text{If}(\neg\ [\ \mathsf{c}[\mathsf{r}][\text{"diagnose"}]\ ]\ ,$
$\text{error}_2(\lceil\text{“Reference to erroneous page”}\rceil,\mathsf{p}),$

$\mathrm{If}(\neg\mathrm{claims}(\lceil\text{verifier}\rceil, \mathsf{c}, \mathsf{r}),$
$\mathrm{error}_2(\lceil\text{“Reference to unchecked lemma”}\rceil, \mathsf{p}),$
$\mathrm{If}(\mathbf{aspect}(\text{<proof>}, \mathsf{p}, \mathsf{c}),$
$\mathrm{error}_2(\lceil\text{“Reference to unproved lemma”}\rceil, \mathsf{p}), \mathsf{T}))), \mathsf{p}^{\mathrm{i}}), \mathsf{p}^{\mathrm{r}}), \mathsf{p}^{\mathrm{h}})), \mathcal{V}_4(\mathsf{c}, \mathsf{p}^{\mathrm{t}})))]$

$[\mathcal{V}_4(\mathsf{c}, \mathsf{p}) \overset{\mathrm{tex}}{\to}$ “
{\cal V}_4(#1.
, #2.
)”]

$[\mathcal{V}_4(\mathsf{c}, \mathsf{p}) \overset{\mathrm{pyk}}{\to}$ “verify four ∗ premises ∗ end verify”]

$\mathcal{V}_5(*, *, *, *)$

$[\mathcal{V}_5(\mathsf{c}, \mathsf{r}, \mathsf{a}, \mathsf{q}) \overset{\mathrm{val}}{\to} \mathsf{c}!\ [\ \mathsf{r}!\ [\ \mathsf{a}!$
$\mathrm{If}(\mathsf{q}^{\mathrm{c}}, \mathsf{q},$
$\mathrm{If}(\mathsf{a}, \mathsf{q},$
$\mathrm{If}(\neg\ [\ \mathsf{a}^{\mathrm{hc}}\ ]\ , \mathcal{V}_5(\mathsf{c}, \mathsf{r}, \mathsf{a}^{\mathrm{t}}, \mathcal{V}_5(\mathsf{c}, \mathsf{r}, \mathsf{a}^{\mathrm{h}}, \mathsf{q})),$
$\mathcal{V}_7(\mathsf{c}, \mathsf{r}, \mathsf{a}^{\mathrm{h}}, \mathsf{q}))))\ ]\ \ ]\ ]$

$[\mathcal{V}_5(\mathsf{c}, \mathsf{r}, \mathsf{a}, \mathsf{q}) \overset{\mathrm{tex}}{\to}$ “
{\cal V}_5(#1.
, #2.
, #3.
, #4.
)”]

$[\mathcal{V}_5(\mathsf{c}, \mathsf{r}, \mathsf{a}, \mathsf{q}) \overset{\mathrm{pyk}}{\to}$ “verify five ∗ ref ∗ array ∗ sequents ∗ end verify”]

$\mathcal{V}_6(*, *, *, *)$

$[\mathcal{V}_6(\mathsf{c}, \mathsf{r}, \mathsf{p}, \mathsf{q}) \overset{\mathrm{val}}{\to} \mathsf{c}!\ [\ \mathsf{r}!\ [\ \mathsf{p}!$
$\mathrm{If}(\mathsf{q}^{\mathrm{c}}, \mathsf{q},$
$\mathrm{If}(\mathsf{p}, \mathsf{q},$
$\mathrm{let}_1(\lambda\mathsf{q}.$
$\mathrm{If}(\mathsf{q}^{\mathrm{c}}, \mathsf{q},$
$\mathrm{If}(\neg\ [\ \mathsf{r} \approx\ [\ \mathsf{p}^{\mathrm{hr}}\ ]\ \ ]\ , \mathsf{q},$
$\mathcal{V}_7(\mathsf{c}, \mathsf{r}, \mathsf{p}^{\mathrm{hi}}, \mathsf{q}))), \mathcal{V}_6(\mathsf{c}, \mathsf{r}, \mathsf{p}^{\mathrm{t}}, \mathsf{q}))))\ ]\ \ ]\ ]$

$[\mathcal{V}_6(\mathsf{c}, \mathsf{r}, \mathsf{p}, \mathsf{q}) \overset{\mathrm{tex}}{\to}$ “
{\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.
)”]

$[\mathcal{V}_7(\mathsf{c},\mathsf{r},\mathsf{i},\mathsf{q}) \overset{\text{pyk}}{\to} \text{“verify seven} * \text{ref} * \text{id} * \text{sequents} * \text{end verify”}]$

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

$[\text{Cut}(\mathsf{a},\mathsf{b}) \overset{\text{val}}{\to} \text{If}(\mathsf{b},\mathsf{a},\mathsf{a};\mathsf{b})]$

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

$[\text{Cut}(\mathsf{a},\mathsf{b}) \overset{\text{pyk}}{\to} \text{“cut} * \text{and} * \text{end cut”}]$

$\text{Head}_{\oplus}(*)$

$[\text{Head}_{\oplus}(\mathsf{s}) \overset{\text{val}}{\to}\ [\ \mathsf{s}^1 \vdash\ [\ \mathsf{s}^2 \vdash\ [\ \mathsf{s}^{1\text{I}\triangleright}\ ]\ ]\ ]^{+\triangleright}]$

$[\text{Head}_{\oplus}(\mathsf{s}) \overset{\text{tex}}{\to} \text{“}$
Head_{\oplus} (#1.
)”]

$[\text{Head}_{\oplus}(\mathsf{s}) \overset{\text{pyk}}{\to} \text{“head} * \text{end head”}]$

$\mathrm{Tail}_{\oplus}(*)$

$[\mathrm{Tail}_{\oplus}(\mathsf{s}) \overset{\mathrm{val}}{\rightarrow} \ [\ \mathsf{s}^{1} \vdash \ [\ \mathsf{s}^{2\mathrm{I}}\ ]\ ]\ ^{+\triangleright}]$

$[\mathrm{Tail}_{\oplus}(\mathsf{s}) \overset{\mathrm{tex}}{\rightarrow}$ “
Tail_{\oplus} (#1.
)”]

$[\mathrm{Tail}_{\oplus}(\mathsf{s}) \overset{\mathrm{pyk}}{\rightarrow}$ “tail $*$ end tail”]

$\mathrm{rule}_{1}(*,*)$

$[\mathrm{rule}_{1}(\mathsf{s},\mathsf{t}) \overset{\mathrm{val}}{\rightarrow}$
$\mathrm{If}(\mathsf{s} \overset{\mathrm{t}}{=} \mathsf{t}, \mathsf{T},$
$\mathrm{If}(\neg\ [\ \mathsf{t} \overset{\mathrm{r}}{=} \lceil \mathsf{x} \oplus \mathsf{y} \rceil\ ]\ , 0,$
$\mathrm{let}_{1}(\lambda \mathsf{p}.$
$\mathrm{If}(\neg\ [\ \mathsf{p}^{\mathrm{c}}\ ]\ , \mathrm{Cut}(\mathrm{Head}_{\oplus}(\mathsf{t}), \mathsf{p}),$
$\mathrm{let}_{1}(\lambda \mathsf{p}.$
$\mathrm{If}(\neg\ [\ \mathsf{p}^{\mathrm{c}}\ ]\ , \mathrm{Cut}(\mathrm{Tail}_{\oplus}(\mathsf{t}), \mathsf{p}), 0), \mathrm{rule}_{1}(\mathsf{s}, \mathsf{t}^{2}))), \mathrm{rule}_{1}(\mathsf{s}, \mathsf{t}^{1}))))]$

$[\mathrm{rule}_{1}(\mathsf{s},\mathsf{t}) \overset{\mathrm{tex}}{\rightarrow}$ “
rule_1(#1.
, #2.
)”]

$[\mathrm{rule}_{1}(\mathsf{s},\mathsf{t}) \overset{\mathrm{pyk}}{\rightarrow}$ “rule one $*$ theory $*$ end rule”]

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

$[\mathrm{rule}(\mathsf{c},\mathsf{p}) \overset{\mathrm{val}}{\rightarrow} \mathsf{c}!$
$\mathrm{let}_{1}(\lambda \mathsf{s}.$
$\mathrm{If}(\mathsf{s}, \lceil$“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”$\rceil,$
$\mathrm{let}_{1}(\lambda \mathsf{r}.$
$\mathrm{If}(\mathsf{r}^{\mathrm{c}}, \mathrm{error}_{2}(\lceil$“The theory does not assert the given rule”$\rceil, \mathsf{s}; \mathsf{t}),$
$[\ \mathsf{s}^{1} \vdash \mathrm{Cut}(\mathsf{s}^{1\mathrm{I}\triangleright *}, \mathsf{r})\ ]$
$), \mathrm{rule}_{1}(\mathsf{s}^{2}, \mathsf{t}))), \mathbf{aspect}(<\mathrm{stmt}>, \mathsf{s}^{1}, \mathsf{c})^{3}))), \mathbf{aspect}(<\mathrm{stmt}>, \mathsf{p}^{\mathrm{t}})^{3})]$

$[\mathrm{rule}(\mathsf{c},\mathsf{p}) \overset{\mathrm{tex}}{\rightarrow}$ “
rule(#1.
, #2.

)”]

[rule(c, p) $\overset{\text{pyk}}{\to}$ “rule ∗ subcodex ∗ end rule”]

Rule tactic

[Rule tactic $\overset{\text{val}}{\to}$ λc.λp.rule(c, p)]

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

[Rule tactic $\overset{\text{pyk}}{\to}$ “rule tactic”]

Plus(∗, ∗)

[Plus(a, b) $\overset{\text{val}}{\to}$ If(b, a, a ⊕ b)]

[Plus(a, b) $\overset{\text{tex}}{\to}$ “
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.
)"]

[$\mathrm{theory}_2(\mathsf{t}, \mathsf{c}) \overset{\mathrm{pyk}}{\to}$ "theory two ∗ cache ∗ end theory"]

$\mathrm{theory}_3(*, *)$

[$\mathrm{theory}_3(\mathsf{c}, \mathsf{n}) \overset{\mathrm{val}}{\to} \mathsf{n}!$
$\mathrm{let}_1(\lambda \mathsf{r}.$
$\mathrm{theory}_4(\mathsf{c}[\mathsf{r}][\texttt{"codex"}][\mathsf{r}], \mathsf{n}, \mathsf{T}), \mathsf{c}[0])$]

[$\mathrm{theory}_3(\mathsf{c}, \mathsf{n}) \overset{\mathrm{tex}}{\to}$ "
theory_3(#1.
, #2.
)"]

[$\mathrm{theory}_3(\mathsf{c}, \mathsf{n}) \overset{\mathrm{pyk}}{\to}$ "theory three ∗ name ∗ end theory"]

$\mathrm{theory}_4(*, *, *)$

[$\mathrm{theory}_4(\mathsf{c}, \mathsf{n}, \mathsf{s}) \overset{\mathrm{val}}{\to} \mathsf{n}!$
$\mathrm{If}(\mathsf{c}, \mathsf{s},$
$\mathrm{If}(\neg\ [\ \mathsf{c}^{\mathrm{hc}}\ ]\ , \mathrm{theory}_4(\mathsf{c}^{\mathrm{t}}, \mathsf{n}, \mathrm{theory}_4(\mathsf{c}^{\mathrm{h}}, \mathsf{n}, \mathsf{s})),$
$\mathrm{If}(\neg\ [\ \mathbf{aspect}(\texttt{<proof>}, \mathsf{c}^{\mathrm{t}})^3 \overset{\mathrm{t}}{=} \lceil \text{Rule tactic} \rceil\ ]\ , \mathsf{s},$
$\mathrm{let}_1(\lambda \mathsf{d}.$
$\mathrm{If}(\neg\ [\ \mathsf{d}^1 \overset{\mathrm{t}}{=} \mathsf{n}\ ]\ , \mathsf{s},$
$\mathrm{Plus}(\mathsf{d}^2, \mathsf{s})), \mathbf{aspect}(\texttt{<stmt>}, \mathsf{c}^{\mathrm{t}})^3))))$]

[$\mathrm{theory}_4(\mathsf{c}, \mathsf{n}, \mathsf{s}) \overset{\mathrm{tex}}{\to}$ "
theory_4(#1.
, #2.
, #3.
)"]

[$\mathrm{theory}_4(\mathsf{c}, \mathsf{n}, \mathsf{s}) \overset{\mathrm{pyk}}{\to}$ "theory four ∗ name ∗ sum ∗ end theory"]

HeadNil″

[HeadNil″ $\overset{\mathrm{proof}}{\to}$ Rule tactic]

[HeadNil″ $\overset{\mathrm{stmt}}{\to}$ $\mathrm{T}'_{\mathrm{E}} \vdash\ [\ \mathsf{T}^{\mathrm{h}} = \mathsf{T}\ ]$]

[HeadNil″ $\overset{\mathrm{tex}}{\to}$ "

HeadNil’”]

[HeadNil″ $\overset{\text{pyk}}{\to}$ “example axiom lemma primed”]

HeadPair″

[HeadPair″ $\overset{\text{proof}}{\to}$ Rule tactic]

[HeadPair″ $\overset{\text{stmt}}{\to}$ $\mathrm{T}'_{\mathrm{E}} \vdash \forall \underline{\mathsf{a}} \colon \forall \underline{\mathsf{b}} \colon [\ [\ \underline{\mathsf{a}} :: \underline{\mathsf{b}}\ ]^{\,\mathrm{h}} = \underline{\mathsf{a}}\ ]$]

[HeadPair″ $\overset{\text{tex}}{\to}$ “
HeadPair’”]

[HeadPair″ $\overset{\text{pyk}}{\to}$ “example scheme lemma primed”]

Transitivity″

[Transitivity″ $\overset{\text{proof}}{\to}$ Rule tactic]

[Transitivity″ $\overset{\text{stmt}}{\to}$ $\mathrm{T}'_{\mathrm{E}} \vdash \forall \underline{\mathsf{a}} \colon \forall \underline{\mathsf{b}} \colon \forall \underline{\mathsf{c}} \colon [\ [\ \underline{\mathsf{a}} = \underline{\mathsf{b}}\ ] \vdash [\ [\ \underline{\mathsf{a}} = \underline{\mathsf{c}}\ ] \vdash [\ \underline{\mathsf{b}} = \underline{\mathsf{c}}\ ]\ ]\ ]$]

[Transitivity″ $\overset{\text{tex}}{\to}$ “
Transitivity’”]

[Transitivity″ $\overset{\text{pyk}}{\to}$ “example rule lemma primed”]

Contra″

[Contra″ $\overset{\text{proof}}{\to}$ Rule tactic]

[Contra″ $\overset{\text{stmt}}{\to}$ $\mathrm{T}'_{\mathrm{E}} \vdash [\ [\ [\ \mathsf{T} :: \mathsf{T}\ ] = \mathsf{T}\ ] \vdash \perp\!\!\!\perp\ ]$]

[Contra″ $\overset{\text{tex}}{\to}$ “
Contra’”]

[Contra″ $\overset{\text{pyk}}{\to}$ “contraexample lemma primed”]

HeadNil

[HeadNil $\overset{\text{proof}}{\to}$ Rule tactic]

[HeadNil $\overset{\text{stmt}}{\to}$ $\mathrm{T}_{\mathrm{E}} \vdash [\ \mathsf{T}^{\mathrm{h}} = \mathsf{T}\ ]$]

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

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

HeadPair

[HeadPair $\overset{\text{proof}}{\to}$ Rule tactic]

[HeadPair $\overset{\text{stmt}}{\to}$ $\mathrm{T_E} \vdash \forall \underline{a}\colon \forall \underline{b}\colon [\ [\ \underline{a} :: \underline{b}\ ]^{\,h} = \underline{a}\ ]$]

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

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

Transitivity

[Transitivity $\overset{\text{proof}}{\to}$ Rule tactic]

[Transitivity $\overset{\text{stmt}}{\to}$ $\mathrm{T_E} \vdash \forall \underline{a}\colon \forall \underline{b}\colon \forall \underline{c}\colon [\ [\ \underline{a} = \underline{b}\ ] \vdash [\ [\ \underline{a} = \underline{c}\ ] \vdash [\ \underline{b} = \underline{c}\ ]\ ]\ ]$]

[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”]

$\mathrm{T_E}$

[$\mathrm{T_E}$ $\overset{\text{stmt}}{\to}$ $[\ \forall \underline{a}\colon \forall \underline{b}\colon \forall \underline{c}\colon [\ [\ \underline{a} = \underline{b}\ ] \vdash [\ [\ \underline{a} = \underline{c}\ ] \vdash [\ \underline{b} = \underline{c}\ ]\ ]\ ]\ ] \oplus [\ [\ \mathsf{T}^{h} = \mathsf{T}\ ] \oplus [\ [\ \forall \underline{a}\colon \forall \underline{b}\colon [\ [\ \underline{a} :: \underline{b}\ ]^{\,h} = \underline{a}\ ]\ ] \oplus [\ [\ [\ \mathsf{T} :: \mathsf{T}\ ] = \mathsf{T}\ ] \vdash \perp\!\!\!\perp\ ]\ ]\ ]$]

[$\mathrm{T_E}$ $\overset{\text{tex}}{\to}$ “
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 $\overset{\text{macro}}{\to}$ $\lambda \mathsf{t}.\lambda \mathsf{s}.\lambda \mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t}, \mathsf{s}, \mathsf{c}, \lceil$[ragged right expansion $\doteqdot$ 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.
)"]

$[\mathrm{parm}^*(\mathsf{t},\mathsf{s},\mathsf{n}) \overset{\mathrm{pyk}}{\to} \text{“parameter term star } * \text{ stack } * \text{ seed } * \text{ end parameter”}]$

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

$[\mathrm{inst}(\mathsf{t},\mathsf{s}) \overset{\mathrm{val}}{\to} \mathrm{If}(\mathsf{t}^{\mathrm{c}}, \mathrm{inst}(\mathsf{s}[\mathsf{t}],\mathsf{s}), \mathsf{t}^{\mathrm{R}} :: \mathrm{inst}^*(\mathsf{t}^{\mathrm{t}},\mathsf{s}))]$

[inst(t, s) $\overset{\mathrm{tex}}{\to}$ “
inst(#1.
, #2.
)”]

$[\mathrm{inst}(\mathsf{t},\mathsf{s}) \overset{\mathrm{pyk}}{\to} \text{“instantiate } * \text{ with } * \text{ end instantiate”}]$

$\mathrm{inst}^*(*,*)$

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

[inst*(t, s) $\overset{\mathrm{tex}}{\to}$ “
instˆ*(#1.
, #2.
)”]

$[\mathrm{inst}^*(\mathsf{t},\mathsf{s}) \overset{\mathrm{pyk}}{\to} \text{“instantiate star } * \text{ with } * \text{ end instantiate”}]$

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

$[\mathrm{occur}(\mathsf{t},\mathsf{u},\mathsf{s}) \overset{\mathrm{val}}{\to} \mathsf{s}!\mathrm{If}(\mathsf{u}^{\mathrm{c}}, \mathrm{If}(\mathsf{t} \approx \mathsf{u}, \mathsf{T}, \mathrm{occur}(\mathsf{t},\mathsf{s}[\mathsf{u}],\mathsf{s})), \mathrm{occur}^*(\mathsf{t},\mathsf{u}^{\mathrm{t}},\mathsf{s}))]$

[occur(t, u, s) $\overset{\mathrm{tex}}{\to}$ “
occur(#1.
, #2.
, #3.
)”]

$[\mathrm{occur}(\mathsf{t},\mathsf{u},\mathsf{s}) \overset{\mathrm{pyk}}{\to} \text{“occur } * \text{ in } * \text{ substitution } * \text{ end occur”}]$

$\mathrm{occur}^*(*,*,*)$

$[\mathrm{occur}^*(\mathsf{t},\mathsf{u},\mathsf{s}) \overset{\mathrm{val}}{\to} \mathsf{t}!\ [\ \mathsf{s}!\mathrm{If}(\mathsf{u}^{\mathrm{a}}, \mathsf{F}, \mathrm{If}(\mathrm{occur}(\mathsf{t},\mathsf{u}^{\mathrm{h}},\mathsf{s}), \mathsf{T}, \mathrm{occur}^*(\mathsf{t},\mathsf{u}^{\mathrm{t}},\mathsf{s})))\ ]\ ]$

$[\mathrm{occur}^*(\mathsf{t},\mathsf{u},\mathsf{s}) \overset{\mathrm{tex}}{\to} \text{“}$
$\mathrm{occur}\hat{}*(\#1.$
$,\#2.$
$,\#3.$
$)\text{”}]$

$[\mathrm{occur}^*(\mathsf{t},\mathsf{u},\mathsf{s}) \overset{\mathrm{pyk}}{\to} \text{“occur star } * \text{ in } * \text{ substitution } * \text{ end occur”}]$

$\mathrm{unify}(* = *, *)$

$[\mathrm{unify}(\mathsf{t}=\mathsf{u},\mathsf{s}) \overset{\mathrm{val}}{\to} \mathsf{t}!\ [\ \mathsf{u}!$
$\mathrm{If}(\mathsf{s}^{\mathrm{c}},\mathsf{s},$
$\mathrm{If}(\mathsf{t}^{\mathrm{c}},\mathrm{unify}_2(\mathsf{t}=\mathsf{u},\mathsf{s}),$
$\mathrm{If}(\mathsf{u}^{\mathrm{c}},\mathrm{unify}_2(\mathsf{u}=\mathsf{t},\mathsf{s}),$
$\mathrm{If}(\mathsf{t} \overset{\mathrm{r}}{=} \mathsf{u},\mathrm{unify}^*(\mathsf{t}^{\mathrm{t}}=\mathsf{u}^{\mathrm{t}},\mathsf{s}),0))))\ ]\ ]$

$[\mathrm{unify}(\mathsf{t}=\mathsf{u},\mathsf{s}) \overset{\mathrm{tex}}{\to} \text{“}$
$\mathrm{unify}(\#1.$
$=\#2.$
$,\#3.$
$)\text{”}]$

$[\mathrm{unify}(\mathsf{t}=\mathsf{u},\mathsf{s}) \overset{\mathrm{pyk}}{\to} \text{“unify } * \text{ with } * \text{ substitution } * \text{ end unify”}]$

$\mathrm{unify}^*(* = *, *)$

$[\mathrm{unify}^*(\mathsf{t}=\mathsf{u},\mathsf{s}) \overset{\mathrm{val}}{\to} \mathsf{u}!\mathrm{If}(\mathsf{t}^{\mathrm{a}},\mathsf{s},\mathrm{unify}^*(\mathsf{t}^{\mathrm{t}}=\mathsf{u}^{\mathrm{t}},\mathrm{unify}(\mathsf{t}^{\mathrm{h}}=\mathsf{u}^{\mathrm{h}},\mathsf{s})))]$

$[\mathrm{unify}^*(\mathsf{t}=\mathsf{u},\mathsf{s}) \overset{\mathrm{tex}}{\to} \text{“}$
$\mathrm{unify}\hat{}*(\#1.$
$=\#2.$
$,\#3.$
$)\text{”}]$

$[\mathrm{unify}^*(\mathsf{t}=\mathsf{u},\mathsf{s}) \overset{\mathrm{pyk}}{\to} \text{“unify star } * \text{ with } * \text{ substitution } * \text{ end unify”}]$

$\mathrm{unify}_2(* = *, *)$

$[\mathrm{unify}_2(\mathsf{t}=\mathsf{u},\mathsf{s}) \overset{\mathrm{val}}{\to}$
$\mathrm{If}(\mathsf{t} \approx \mathsf{u},\mathsf{s},$
$\mathrm{let}_1(\lambda \mathsf{t}'.$
$\mathrm{If}(\neg\ [\ \mathsf{t}'\ ]\ ,\mathrm{unify}(\mathsf{t}'=\mathsf{u},\mathsf{s}),$
$\mathrm{If}(\mathrm{occur}(\mathsf{t},\mathsf{u},\mathsf{s}),0,\mathsf{s}[\mathsf{t}{\to}\mathsf{u}])),\mathsf{s}[\mathsf{t}]))]$

$[\mathrm{unify}_2(\mathsf{t} = \mathsf{u}, \mathsf{s}) \overset{\mathrm{tex}}{\to} \text{“}$
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 ”]

$[\mathrm{L_a} \overset{\mathrm{pyk}}{\to} \text{“ell a”}]$

$\mathrm{L_b}$

$[\mathrm{L_b} \overset{\mathrm{name}}{\to} \text{“L_b”}]$

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

$[\mathrm{L_b} \overset{\mathrm{pyk}}{\to} \text{“ell b”}]$

$\mathrm{L_c}$

$[\mathrm{L_c} \overset{\mathrm{name}}{\to} \text{“L_c”}]$

$[\mathrm{L_c} \overset{\mathrm{tex}}{\to} \text{“}$
\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

[$L_e \overset{name}{\to}$ “L_e”]

[$L_e \overset{tex}{\to}$ “
\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 ”]

[$L_e \overset{pyk}{\to}$ “ell 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 lgwellf\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellf {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellf \fi ”]

[$L_f \overset{pyk}{\to}$ “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 ”]

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

L_i

$[L_i \overset{\text{name}}{\to} \text{“L\_i”}]$

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

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

L_j

$[L_j \overset{\text{name}}{\to} \text{“L\_j”}]$

$[L_j \overset{\text{tex}}{\to} \text{“}$

\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

[$L_o \overset{name}{\to}$ “L_o”]

[$L_o \overset{tex}{\to}$ “
\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 ”]

[$L_o \overset{pyk}{\to}$ “ell 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 lgwellp\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellp {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellp \fi ”]

[$L_p \overset{pyk}{\to}$ “ell p”]

L_q

$[L_q \overset{\text{name}}{\rightarrow} \text{“L\_q”}]$

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

$[L_q \overset{\text{pyk}}{\rightarrow} \text{“ell q”}]$

L_r

$[L_r \overset{\text{name}}{\rightarrow} \text{“L\_r”}]$

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

$[L_r \overset{\text{pyk}}{\rightarrow} \text{“ell r”}]$

L_s

$[L_s \overset{\text{name}}{\rightarrow} \text{“L\_s”}]$

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

$[L_s \overset{\text{pyk}}{\rightarrow} \text{“ell s”}]$

L_t

$[L_t \overset{\text{name}}{\rightarrow} \text{“L\_t”}]$

$[L_t \overset{\text{tex}}{\rightarrow} \text{“}$

\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 "]

[$L_t \overset{\text{pyk}}{\longrightarrow}$ "ell t"]

L_u

[$L_u \overset{\text{name}}{\longrightarrow}$ "L_u"]

[$L_u \overset{\text{tex}}{\longrightarrow}$ "
\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 "]

[$L_u \overset{\text{pyk}}{\longrightarrow}$ "ell u"]

L_v

[$L_v \overset{\text{name}}{\longrightarrow}$ "L_v"]

[$L_v \overset{\text{tex}}{\longrightarrow}$ "
\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 "]

[$L_v \overset{\text{pyk}}{\longrightarrow}$ "ell v"]

L_w

[$L_w \overset{\text{name}}{\longrightarrow}$ "L_w"]

[$L_w \overset{\text{tex}}{\longrightarrow}$ "
\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 "]

[$L_w \overset{pyk}{\to}$ “ell 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 lgwellx\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellx {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellx \fi ”]

[$L_x \overset{pyk}{\to}$ “ell 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 lgwelly\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwelly {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwelly \fi ”]

[$L_y \overset{pyk}{\to}$ “ell y”]

L_z

[$L_z \overset{name}{\to}$ “L_z”]

[$L_z \overset{tex}{\to}$ “
\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 ”]

[$L_z \overset{pyk}{\to}$ “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 ”]

$[L_B \overset{\text{pyk}}{\rightarrow} \text{“ell big b”}]$

L_C

$[L_C \overset{\text{name}}{\rightarrow} \text{“L\_C”}]$

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

$[L_C \overset{\text{pyk}}{\rightarrow} \text{“ell big c”}]$

L_D

$[L_D \overset{\text{name}}{\rightarrow} \text{“L\_D”}]$

$[L_D \overset{\text{tex}}{\rightarrow} \text{“}$

\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

[$L_I \overset{name}{\to}$ “L_I”]

[$L_I \overset{tex}{\to}$ “
\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 ”]

[$L_I \overset{pyk}{\to}$ “ell big 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 lgwellbigj\endcsname
\global \advance \lgwproofline by 1
\xdef \lgwellbigj {L\ifnum \lgwproofline <10 0\fi \number \lgwproofline }
\fi \lgwellbigj \fi ”]

[$L_J \overset{pyk}{\to}$ “ell big j”]

L_K

$[L_K \overset{\text{name}}{\rightarrow} \text{“L\_K”}]$

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

$[L_K \overset{\text{pyk}}{\rightarrow} \text{“ell big k”}]$

L_L

$[L_L \overset{\text{name}}{\rightarrow} \text{“L\_L”}]$

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

$[L_L \overset{\text{pyk}}{\rightarrow} \text{“ell big l”}]$

L_M

$[L_M \overset{\text{name}}{\rightarrow} \text{“L\_M”}]$

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

$[L_M \overset{\text{pyk}}{\rightarrow} \text{“ell big m”}]$

L_N

$[L_N \overset{\text{name}}{\rightarrow} \text{“L\_N”}]$

$[L_N \overset{\text{tex}}{\rightarrow} \text{“}$

\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

[$L_S \overset{name}{\to}$ “L_S”]

[$L_S \overset{tex}{\to}$ “
\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 ”]

[$L_S \overset{pyk}{\to}$ “ell big s”]

L_T

[$L_T \overset{name}{\to}$ “L_T”]

[$L_T \overset{tex}{\to}$ “
\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 ”]

[$L_T \overset{pyk}{\to}$ “ell big t”]

L_U

[$L_U \overset{name}{\rightarrow}$ “L_U”]

[$L_U \overset{tex}{\rightarrow}$ “
\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 ”]

[$L_U \overset{pyk}{\rightarrow}$ “ell big u”]

L_V

[$L_V \overset{name}{\rightarrow}$ “L_V”]

[$L_V \overset{tex}{\rightarrow}$ “
\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 ”]

[$L_V \overset{pyk}{\rightarrow}$ “ell big v”]

L_W

[$L_W \overset{name}{\rightarrow}$ “L_W”]

[$L_W \overset{tex}{\rightarrow}$ “
\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 ”]

[$L_W \overset{pyk}{\rightarrow}$ “ell big w”]

L_X

[$L_X \overset{name}{\rightarrow}$ “L_X”]

[$L_X \overset{tex}{\rightarrow}$ “

\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 "]

[$L_Y \overset{pyk}{\to}$ "ell big y"]

L_Z

[$L_Z \overset{name}{\to}$ "L_Z"]

[$L_Z \overset{tex}{\to}$ "
\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 "]

[$L_Z \overset{pyk}{\to}$ "ell big z"]

$L_?$

[$L_? \overset{name}{\to}$ "L_?"]

[$L_? \overset{tex}{\to}$ "
\if \relax \csname lgwprooflinep\endcsname L_? \else
\global \advance \lgwproofline by 1
L\ifnum \lgwproofline <10 0\fi \number \lgwproofline
\fi "]

[$L_? \overset{pyk}{\to}$ "ell dummy"]

Reflexivity

$[\text{Reflexivity} \overset{\text{proof}}{\longrightarrow} \lceil \mathrm{T_E} \vdash \forall \underline{\mathsf{a}}\colon [\ [\ [\ \mathrm{HeadPair}^{\mathrm{I}\triangleright *\triangleright}\ @\ \underline{\mathsf{a}}\ ]\ @\ \underline{\mathsf{a}}\ ]\ ;\ [\ [\ [\ [\ \mathrm{Transitivity}^{\mathrm{I}\triangleright *\triangleright}\ @\ [\ [\ \underline{\mathsf{a}} :: \underline{\mathsf{a}}\ ]^{\,\mathrm{h}}\ ]\ ]\ @\ \underline{\mathsf{a}}\ ]\ @\ \underline{\mathsf{a}}\ ]^{\,\triangleright\triangleright}\ ]\ ]\ ]\rceil]$

$[\text{Reflexivity} \overset{\text{stmt}}{\longrightarrow} \mathrm{T_E} \vdash \forall \underline{\mathsf{a}}\colon [\ \underline{\mathsf{a}} = \underline{\mathsf{a}}\ ]\ ]$

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

[Reflexivity $\overset{\text{pyk}}{\longrightarrow}$ “sequent reflexivity”]

Reflexivity_1

$[\text{Reflexivity}_1 \overset{\text{proof}}{\longrightarrow} \lambda \mathsf{c}.\lambda \mathsf{x}.\mathcal{P}(\lceil \mathrm{T_E} \vdash \forall \underline{\mathsf{a}}\colon [\ [\ \mathrm{HeadPair} \gg [\ [\ \underline{\mathsf{a}} :: \underline{\mathsf{a}}\ ]^{\,\mathrm{h}} = \underline{\mathsf{a}}\ ]\ ]\ ;\ [\ [\ [\ \mathrm{Transitivity} \triangleright [\ [\ \underline{\mathsf{a}} :: \underline{\mathsf{a}}\ ]^{\,\mathrm{h}} = \underline{\mathsf{a}}\ ]\ ]\ \triangleright [\ [\ \underline{\mathsf{a}} :: \underline{\mathsf{a}}\ ]^{\,\mathrm{h}} = \underline{\mathsf{a}}\ ]\ ]\ \gg [\ \underline{\mathsf{a}} = \underline{\mathsf{a}}\ ]\ ]\ ]\rceil, \mathrm{p_0}, \mathsf{c})]$

$[\text{Reflexivity}_1 \overset{\text{stmt}}{\longrightarrow} \mathrm{T_E} \vdash \forall \underline{\mathsf{a}}\colon [\ \underline{\mathsf{a}} = \underline{\mathsf{a}}\ ]\ ]$

[Reflexivity_1 $\overset{\text{tex}}{\longrightarrow}$ “
Reflexivity_1”]

[Reflexivity_1 $\overset{\text{pyk}}{\longrightarrow}$ “tactic reflexivity”]

Commutativity

$[\text{Commutativity} \overset{\text{proof}}{\longrightarrow} \lceil \mathrm{T_E} \vdash \forall \underline{\mathsf{a}}\colon \forall \underline{\mathsf{b}}\colon [\ [\ \underline{\mathsf{a}} = \underline{\mathsf{b}}\ ]\ \vdash\ [\ [\ \mathrm{Reflexivity}^{\mathrm{I}\triangleright *\triangleright}\ @\ \underline{\mathsf{a}}\ ]\ ;\ [\ [\ [\ [\ \mathrm{Transitivity}^{\mathrm{I}\triangleright *\triangleright}\ @\ \underline{\mathsf{a}}\ ]\ @\ \underline{\mathsf{b}}\ ]\ @\ \underline{\mathsf{a}}\ ]^{\,\triangleright\triangleright}\ ]\ ]\ ]\rceil]$

$[\text{Commutativity} \overset{\text{stmt}}{\longrightarrow} \mathrm{T_E} \vdash \forall \underline{\mathsf{a}}\colon \forall \underline{\mathsf{b}}\colon [\ [\ \underline{\mathsf{a}} = \underline{\mathsf{b}}\ ]\ \vdash\ [\ \underline{\mathsf{b}} = \underline{\mathsf{a}}\ ]\ ]\ ]$

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

[Commutativity $\overset{\text{pyk}}{\longrightarrow}$ “sequent commutativity”]

Commutativity_1

$[\text{Commutativity}_1 \overset{\text{proof}}{\longrightarrow} \lambda \mathsf{c}.\lambda \mathsf{x}.\mathcal{P}(\lceil \mathrm{T_E} \vdash \forall \underline{\mathsf{a}}\colon \forall \underline{\mathsf{b}}\colon [\ [\ \underline{\mathsf{a}} = \underline{\mathsf{b}}\ ]\ \vdash\ [\ [\ \mathrm{Reflexivity}_1 \gg [\ \underline{\mathsf{a}} = \underline{\mathsf{a}}\ ]\ ]\ ;\ [\ [\ [\ \mathrm{Transitivity} \triangleright [\ \underline{\mathsf{a}} = \underline{\mathsf{b}}\ ]\ ]\ \triangleright [\ \underline{\mathsf{a}} = \underline{\mathsf{a}}\ ]\ ]\ \gg [\ \underline{\mathsf{b}} = \underline{\mathsf{a}}\ ]\ ]\ ]\ ]\rceil, \mathrm{p_0}, \mathsf{c})]$

$[\text{Commutativity}_1 \overset{\text{stmt}}{\longrightarrow} \mathrm{T_E} \vdash \forall \underline{\mathsf{a}}\colon \forall \underline{\mathsf{b}}\colon [\ [\ \underline{\mathsf{a}} = \underline{\mathsf{b}}\ ]\ \vdash\ [\ \underline{\mathsf{b}} = \underline{\mathsf{a}}\ ]\ ]\ ]$

$[\text{Commutativity}_1 \overset{\text{tex}}{\to} \text{“}$
$\text{Commutativity\_1”}]$

$[\text{Commutativity}_1 \overset{\text{pyk}}{\to} \text{“tactic commutativity”}]$

<tactic>

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

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

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

tactic

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

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

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

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

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

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

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

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

$[\mathcal{P}(\mathsf{t}, \mathsf{s}, \mathsf{c}) \overset{\text{val}}{\to} \mathsf{s}!$
$\text{let}_1(\lambda \mathsf{d}.$
$\text{If}(\mathsf{d}, \mathsf{t}^{\mathrm{h}} :: \mathcal{P}^*(\mathsf{t}^{\mathrm{t}}, \mathsf{s}, \mathsf{c}),$
$\mathcal{U}^{\mathrm{M}}(\ [\ [\ \mathcal{E}(\mathsf{d}^3, \mathsf{T}, \mathsf{c}) \text{‘ } \mathsf{t}\ ]\ \text{‘ } \mathsf{s}\ ]\ \text{‘ } \mathsf{c})), \mathbf{aspect}(\text{<tactic>}, \mathsf{t}, \mathsf{c}))]$

$[\mathcal{P}(\mathsf{t}, \mathsf{s}, \mathsf{c}) \overset{\text{tex}}{\to} \text{“}$
$\text{\{\textbackslash cal P\}(\#1.}$

, #2.
, #3.
)”]

$[\mathcal{P}(\mathsf{t},\mathsf{s},\mathsf{c}) \overset{\text{pyk}}{\rightarrow} \text{“proof expand} * \text{state} * \text{cache} * \text{end expand”}]$

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

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

$[\mathcal{P}^*(\mathsf{t},\mathsf{s},\mathsf{c}) \overset{\text{tex}}{\rightarrow} \text{“}$
{\cal P}^*(#1.
, #2.
, #3.
)”]

$[\mathcal{P}^*(\mathsf{t},\mathsf{s},\mathsf{c}) \overset{\text{pyk}}{\rightarrow} \text{“proof expand list} * \text{state} * \text{cache} * \text{end expand”}]$

p_0

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

$[\mathrm{p}_0 \overset{\text{tex}}{\rightarrow} \text{“}$
p_0”]

$[\mathrm{p}_0 \overset{\text{pyk}}{\rightarrow} \text{“proof state”}]$

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

$[\mathrm{conclude}_1(\mathsf{t},\mathsf{c}) \overset{\text{val}}{\rightarrow}$
$\mathrm{let}_1(\lambda\mathsf{r}.$
$\mathrm{If}(\mathsf{r}^{\mathsf{c}},\mathrm{error}_2(\lceil\text{“Unification failed”}\rceil,\mathsf{t}),\mathsf{r}),\mathrm{conclude}_2(\mathsf{t}^1,\mathsf{t}^2,\mathsf{c}))]$

$[\mathrm{conclude}_1(\mathsf{t},\mathsf{c}) \overset{\text{tex}}{\rightarrow} \text{“}$
conclude_1 (#1.
, #2.
)”]

$[\mathrm{conclude}_1(\mathsf{t},\mathsf{c}) \overset{\text{pyk}}{\rightarrow} \text{“conclude one} * \text{cache} * \text{end conclude”}]$

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

$[\mathrm{conclude}_2(\mathsf{a},\mathsf{t},\mathsf{c}) \overset{\mathrm{val}}{\rightarrow} \mathsf{t}!$
$\mathrm{If}(\mathsf{a} \overset{\mathrm{r}}{=} \lceil \mathsf{x} \triangleright \mathsf{y} \rceil, \mathrm{conclude}_2(\mathsf{a}^1, \mathsf{a}\text{-}\mathrm{color}(\mathsf{t} \triangleright\ [\ \mathsf{a}^2\ ]), \mathsf{c}),$
$\mathrm{If}(\mathsf{a} \overset{\mathrm{r}}{=} \lceil \mathsf{x} \Rrightarrow \mathsf{y} \rceil, \mathrm{conclude}_2(\mathsf{a}^1, \mathsf{a}\text{-}\mathrm{color}(\mathsf{t} \Rrightarrow\ [\ \mathsf{a}^2\ ]), \mathsf{c}),$
$\mathrm{If}(\mathsf{a} \overset{\mathrm{r}}{=} \lceil \mathsf{x} @ \mathsf{y} \rceil, \mathrm{conclude}_2(\mathsf{a}^1, \mathsf{a}\text{-}\mathrm{color}(\mathsf{t} @\ [\ \mathsf{a}^2\ ]), \mathsf{c}),$
$\mathrm{If}(\mathbf{aspect}(<\mathrm{proof}>, \mathsf{a}, \mathsf{c}), \mathrm{error}_2(\lceil \text{“Lemma expected”} \rceil, \mathsf{a}),$
$\mathrm{let}_1(\lambda \mathsf{d}.$
$\mathrm{conclude}_3(\mathsf{a}\text{-}\mathrm{color}(\mathrm{conclude}_4(\mathsf{a}^{\mathrm{I} \triangleright * \triangleright}, \mathsf{d}^{32})), \mathsf{t}, \mathrm{parm}(\mathsf{d}^{32}, \mathsf{T}, 1), \mathsf{T}), \mathbf{aspect}(<\mathrm{stmt}>, \mathsf{a},$

$[\mathrm{conclude}_2(\mathsf{a},\mathsf{t},\mathsf{c}) \overset{\mathrm{tex}}{\rightarrow} \text{“}$
$\mathrm{conclude\_2}\ (\ \#1.$
$,\ \#2.$
$,\ \#3.$
$)\text{”}]$

$[\mathrm{conclude}_2(\mathsf{a},\mathsf{t},\mathsf{c}) \overset{\mathrm{pyk}}{\rightarrow} \text{“conclude two } * \text{ proves } * \text{ cache } * \text{ end conclude”}]$

$\mathrm{conclude}_3(*,*,*,*)$

$[\mathrm{conclude}_3(\mathsf{a},\mathsf{t},\mathsf{l},\mathsf{s}) \overset{\mathrm{val}}{\rightarrow} \mathsf{a}!\ [\ \mathsf{t}!\ [\ \mathsf{l}!\ [\ \mathsf{s}!$
$\mathrm{If}(\mathsf{l} \overset{\mathrm{r}}{=} \lceil \mathsf{x} \vdash \mathsf{y} \rceil,\ [\ [$
$\mathsf{t}\ ]\ \overset{\mathrm{r}}{=} \lceil \mathsf{x} \triangleright \mathsf{y} \rceil\ ]\ \begin{cases} \mathrm{conclude}_3(\mathsf{a}^{\triangleright}, \mathsf{t}^1, \mathsf{l}^2, \mathrm{unify}(\mathsf{l}^1 = \mathsf{t}^2, \mathsf{s})) \\ \mathrm{conclude}_3(\mathsf{a}^{\triangleright}, \mathsf{t}, \mathsf{l}^2, \mathsf{s}) \end{cases},$
$\mathrm{If}(\mathsf{l} \overset{\mathrm{r}}{=} \lceil \mathsf{x} \Vdash \mathsf{y} \rceil,\ [\ [$
$\mathsf{t}\ ]\ \overset{\mathrm{r}}{=} \lceil \mathsf{x} \Rrightarrow \mathsf{y} \rceil\ ]\ \begin{cases} \mathrm{conclude}_3(\mathsf{a}^{\triangleright}, \mathsf{t}^1, \mathsf{l}^2, \mathrm{unify}(\mathsf{l}^1 = \mathsf{t}^2, \mathsf{s})) \\ \mathrm{conclude}_3(\mathsf{a}^{\mathrm{V}}, \mathsf{t}, \mathsf{l}^2, \mathsf{s}) \end{cases},$
$\mathrm{If}(\mathsf{l} \overset{\mathrm{r}}{=} \lceil \forall \mathsf{x} \colon \mathsf{y} \rceil,\ [\ [$
$\mathsf{t}\ ]\ \overset{\mathrm{r}}{=} \lceil \mathsf{x} @ \mathsf{y} \rceil\ ]\ \begin{cases} \mathrm{conclude}_3(\mathsf{a} @\ [\ \mathsf{t}^2\ ], \mathsf{t}^1, \mathsf{l}^2, \mathrm{unify}(\mathsf{l}^1 = \mathsf{t}^2, \mathsf{s})) \\ \mathrm{conclude}_3(\mathsf{a} @\ [\ \mathsf{l}^1\ ], \mathsf{t}, \mathsf{l}^2, \mathsf{s}) \end{cases},$
$\mathrm{let}_1(\lambda \mathsf{s}.$
$\mathrm{If}(\mathsf{s}^{\mathrm{c}}, \mathsf{s},$
$\mathrm{inst}(\mathsf{a}, \mathsf{s})), \mathrm{unify}(\mathsf{l} = \mathsf{t}, \mathsf{s})))))]\ ]\ ]\ ]$

$[\mathrm{conclude}_3(\mathsf{a},\mathsf{t},\mathsf{l},\mathsf{s}) \overset{\mathrm{tex}}{\rightarrow} \text{“}$
$\mathrm{conclude\_3}\ (\ \#1.$
$,\ \#2.$
$,\ \#3.$
$,\ \#4.$
$)\text{”}]$

$[\mathrm{conclude}_3(\mathsf{a},\mathsf{t},\mathsf{l},\mathsf{s}) \overset{\mathrm{pyk}}{\rightarrow} \text{“conclude three } * \text{ proves } * \text{ lemma } * \text{ substitution } * \text{ end conclude”}]$

$\mathrm{conclude}_4(*,*)$

$[\mathrm{conclude}_4(\mathsf{a},\mathsf{l}) \overset{\mathrm{val}}{\to} \mathsf{a}!\ [\ \mathsf{l}!$
$\mathrm{If}(\neg\ [\ \mathsf{l} \overset{\mathrm{r}}{=} \lceil \forall \mathsf{x}\colon \mathsf{y} \rceil\ ]\ ,\mathsf{a},$
$\mathrm{let}_1(\lambda \mathsf{v}.\forall \mathsf{v}\colon \mathrm{conclude}_4(\mathsf{a}\ @\ \mathsf{v},\mathsf{l}^2), \lceil \underline{*} \rceil^{\mathrm{R}} ::\ [\ \mathsf{l}^1 :: \mathsf{T}\ ]\ ))\ ]\ ]$

$[\mathrm{conclude}_4(\mathsf{a},\mathsf{l}) \overset{\mathrm{tex}}{\to}$ “
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.
\}”]

$[*\_\{*\} \overset{\mathrm{tex}}{\to}$ “#1.
_{#2.
}”]

$[*\_\{*\} \overset{\mathrm{pyk}}{\to}$ “$*$ sub $*$ end sub”]

$*/\mathrm{indexintro}(*,*,*,*)$

$[\mathsf{x}/\mathrm{indexintro}(\mathsf{y},\mathsf{i},\mathsf{p},\mathsf{t}) \overset{\mathrm{name}}{\to}$ “#1.
/indexintro(#2.
,#3.
,#4.
,#5.
)”]

$[\mathsf{x}/\mathrm{indexintro}(\mathsf{y},\mathsf{i},\mathsf{p},\mathsf{t}) \overset{\mathrm{macro}}{\to} \lambda \mathsf{t}.\lambda \mathsf{s}.\lambda \mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil [\mathsf{x}/\mathrm{indexintro}(\mathsf{y},\mathsf{i},\mathsf{p},\mathsf{t}) \ddot{=} \mathsf{x}\ [$
$\$[\mathsf{y} \overset{\mathrm{pyk}}{=} \mathsf{p}]\$\ \ \$[\mathsf{y} \overset{\mathrm{tex}}{=} \mathsf{t}]\$\ \ ]\ ]\rceil)]$

$[\mathsf{x}/\mathrm{indexintro}(\mathsf{y},\mathsf{i},\mathsf{p},\mathsf{t}) \overset{\mathrm{tex}}{\to}$ “#1.%
\footnote{$[#2/tex name/tex.
\stackrel {\mathrm {pyk}}{=} #4/tex name.
]$}\index{#3.: #4. @#3.: $[#2/tex name/tex.]$ #4.}%
\index{pyk: #4. $[#2/tex name/tex.]$}%
\tex{
$[#2/tex name/tex.

\stackrel {\mathrm {tex}}{=} #5/tex name.
]$}"]

[x/indexintro(y, i, p, t) $\overset{\text{pyk}}{\to}$ "∗ intro ∗ index ∗ pyk ∗ tex ∗ end intro"]

∗/intro(∗, ∗, ∗)

[x/intro(y, p, t) $\overset{\text{name}}{\to}$ "#1.
/intro(#2.
, #3.
, #4.
)"]

[x/intro(y, p, t) $\overset{\text{macro}}{\to}$ λt.λs.λc.$\tilde{\mathcal{M}}_4$(t, s, c, ⌈[x/intro(y, p, t) $\ddot{=}$ x [$[y $\overset{\text{pyk}}{=}$ p]$
$[y $\overset{\text{tex}}{=}$ t]$]]⌉)]

[x/intro(y, p, t) $\overset{\text{tex}}{\to}$ "#1.%
\footnote{$[#2/tex name/tex.
\stackrel {\mathrm {pyk}}{=} #3/tex name.
]$}\index{\alpha #3. @\back \makebox[20mm][l]{$[#2/tex
name/tex.]$}#3.}%
\index{pyk: #3. $[#2/tex name/tex.]$}%
\tex{
$[#2/tex name/tex.
\stackrel {\mathrm {tex}}{=} #4/tex name.
]$}"]

[x/intro(y, p, t) $\overset{\text{pyk}}{\to}$ "∗ intro ∗ pyk ∗ tex ∗ end intro"]

∗/bothintro(∗, ∗, ∗, ∗, ∗)

[x/bothintro(y, i, p, t, n) $\overset{\text{name}}{\to}$ "#1.
/bothintro(#2.
, #3.
, #4.
, #5.
, #6.
)"]

[x/bothintro(y, i, p, t, n) $\overset{\text{macro}}{\to}$ λt.λs.λc.$\tilde{\mathcal{M}}_4$(t, s, c, ⌈[x/bothintro(y, i, p, t, n) $\ddot{=}$ x [
$[y $\overset{\text{pyk}}{=}$ p]$ [$[y $\overset{\text{tex}}{=}$ t]$ $[y $\overset{\text{name}}{=}$ n]$]]]⌉)]

[x/bothintro(y, i, p, t, n) $\overset{\text{tex}}{\to}$ "#1.%
\footnote{$[#2/tex name/tex.
\stackrel {\mathrm {pyk}}{=} #4/tex name.

]$}\index{#3.: #4. @#3.: $[#2/tex name/tex.]$ #4.}%
\index{pyk: #4. $[#2/tex name/tex.]$}%
\tex{
$[#2/tex name/tex.
\stackrel {\mathrm {tex}}{=} #5/tex name.
]$}
\tex{
$[#2/tex name/tex.
\stackrel {\mathrm {name}}{=} #6/tex name.
]$}"]

[x/bothintro(y, i, p, t, n) $\overset{\text{pyk}}{\to}$ "∗ intro ∗ index ∗ pyk ∗ tex ∗ name ∗ end intro"]

∗/nameintro(∗, ∗, ∗, ∗)

[x/nameintro(y, p, t, n) $\overset{\text{name}}{\to}$ "#1.
/nameintro(#2.
, #3.
, #4.
, #5.
)"]

[x/nameintro(y, p, t, n) $\overset{\text{macro}}{\to}$ λt.λs.λc.$\tilde{\mathcal{M}}_4$(t, s, c, ⌈[x/nameintro(y, p, t, n) $\doteqdot$ x [$[y $\overset{\text{pyk}}{=}$ p]$ [$[y $\overset{\text{tex}}{=}$ t]$ $[y $\overset{\text{name}}{=}$ n]$]]]⌉)]

[x/nameintro(y, p, t, n) $\overset{\text{tex}}{\to}$ "#1.%
\footnote{$[#2/tex name/tex.
\stackrel {\mathrm {pyk}}{=} #3/tex name.
]$}\index{\alpha #3. @\back \makebox[20mm][l]{$[#2/tex
name/tex.]$}#3.}%
\index{pyk: #3. $[#2/tex name/tex.]$}%
\tex{
$[#2/tex name/tex.
\stackrel {\mathrm {tex}}{=} #4/tex name.
]$}
\tex{
$[#2/tex name/tex.
\stackrel {\mathrm {name}}{=} #5/tex name.
]$}"]

[x/nameintro(y, p, t, n) $\overset{\text{pyk}}{\to}$ "∗ intro ∗ pyk ∗ tex ∗ name ∗ end intro"]

$*'$

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

$[\mathsf{x}' \overset{\text{pyk}}{\to} \text{“}* \text{ prime”}]$

$*\big[\ *\ \big]$

$[\mathsf{a}[\mathsf{k}] \overset{\text{val}}{\to} \mathbf{assoc}_1(\mathsf{a}, \mathsf{k}, \mathsf{k})]$

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

$[*\big[\ *\ \big] \overset{\text{pyk}}{\to} \text{“}* \text{ assoc } * \text{ end assoc”}]$

$*\big[*\longrightarrow*\big]$

$[\mathsf{a}[\mathsf{i}\to\mathsf{v}] \overset{\text{val}}{\to} \mathsf{i}^{\mathsf{c}} \left\{ \begin{array}{l} \mathsf{v} \left\{ \begin{array}{l} \text{array-remove}(\mathsf{i}, \mathsf{a}, 0) \\ \text{array-put}(\mathsf{i}, \mathsf{v}, \mathsf{a}, 0) \end{array} \right. \\ \mathsf{v}!\mathsf{a} \end{array} \right.\ ]$

$[\mathsf{a}[\mathsf{i}\to\mathsf{v}] \overset{\text{tex}}{\to} \text{“\#1.}$
$\text{[\#2.}$
$\text{\{\textbackslash rightarrow\} \#3.}$
$\text{]”}]$

$[\mathsf{a}[\mathsf{i}\to\mathsf{v}] \overset{\text{pyk}}{\to} \text{“}* \text{ set } * \text{ to } * \text{ end set”}]$

$*\big[*\Rightarrow*\big]$

$[\mathsf{a}[\mathsf{i}\Rightarrow\mathsf{v}] \overset{\text{val}}{\to} \mathsf{i}^{\mathsf{a}} \left\{ \begin{array}{l} \mathsf{a}!\mathsf{v} \\ \mathsf{a}[\mathsf{i}^{\mathsf{h}}\to\mathsf{a}[\mathsf{i}^{\mathsf{h}}][\mathsf{i}^{\mathsf{t}}\Rightarrow\mathsf{v}]] \end{array} \right.\ ]$

$[\mathsf{a}[\mathsf{i}\Rightarrow\mathsf{v}] \overset{\text{tex}}{\to} \text{“\#1.}$
$\text{[\#2.}$
$\text{\{\textbackslash Rightarrow\} \#3.}$
$\text{]”}]$

$[\mathsf{a}[\mathsf{i}\Rightarrow\mathsf{v}] \overset{\text{pyk}}{\to} \text{“}* \text{ set multi } * \text{ to } * \text{ end set”}]$

$*0$

$[\mathsf{x0} \overset{\mathrm{val}}{\to} \mathsf{T} \mathbin{+\!\!*} \mathsf{x}]$

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

$[*0 \overset{\mathrm{pyk}}{\to} \text{“}* \text{ bit nil”}]$

$*1$

$[\mathsf{x1} \overset{\mathrm{val}}{\to} \mathsf{F} \mathbin{+\!\!*} \mathsf{x}]$

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

$[*1 \overset{\mathrm{pyk}}{\to} \text{“}* \text{ bit one”}]$

0b

$[0\mathrm{b} \overset{\mathrm{val}}{\to} 0]$

$[0\mathrm{b} \overset{\mathrm{tex}}{\to} \text{“}$
$0\ \backslash\mathrm{mathrm}\ \{\mathrm{b}\}\text{”}]$

$[0\mathrm{b} \overset{\mathrm{pyk}}{\to} \text{“binary”}]$

$*$-color$(*)$

$$[\mathsf{a\text{-}color}(\mathsf{t}) \overset{\mathrm{val}}{\to} \mathsf{t}^{\mathrm{d}} \begin{cases} [\,\mathsf{t}^{\mathrm{r}} :: [\,\mathsf{t}^{\mathrm{i}} :: [\,\mathsf{a}^{\mathrm{d}}\,]\,]\,] :: [\,\mathsf{a\text{-}color}^{*}(\mathsf{t}^{\mathrm{t}})\,] \\ \mathsf{a!t} \end{cases}]$$

$[\mathsf{x\text{-}color}(\mathsf{y}) \overset{\mathrm{tex}}{\to} \text{“\#1.}$
$\backslash\mathrm{mbox}\ \{\text{-color}\}(\ \#2.$
$\text{)”}]$

$[\mathsf{x\text{-}color}(\mathsf{y}) \overset{\mathrm{pyk}}{\to} \text{“}* \text{ color } * \text{ end color”}]$

$*$-color$^{*}(*)$

$$[\mathsf{a\text{-}color}^{*}(\mathsf{t}) \overset{\mathrm{val}}{\to} \mathsf{t} \begin{cases} \mathsf{a!T} \\ \mathsf{a\text{-}color}(\mathsf{t}^{\mathrm{h}}) :: [\,\mathsf{a\text{-}color}^{*}(\mathsf{t}^{\mathrm{t}})\,] \end{cases}]$$

$[\mathsf{x}\text{-color}^{*}(\mathsf{y}) \overset{\text{tex}}{\to} \text{“\#1.}$
$\backslash\text{mbox }\{\text{-color}\}\hat{}\{\backslash\text{ast}\}(\ \#2.$
$)\text{”}]$

$[\mathsf{x}\text{-color}^{*}(\mathsf{y}) \overset{\text{pyk}}{\to} \text{“}* \text{ color star } * \text{ end color”}]$

$*^{\mathrm{H}}$

$[\mathsf{x}^{\mathrm{H}} \overset{\text{val}}{\to} \mathsf{x}\text{ ' }\mathsf{T}]$

$[*^{\mathrm{H}} \overset{\text{tex}}{\to} \text{“\#1.}$
$\{\}\hat{}\mathrm{H}\text{”}]$

$[*^{\mathrm{H}} \overset{\text{pyk}}{\to} \text{“}* \text{ raw head”}]$

$*^{\mathrm{T}}$

$[\mathsf{x}^{\mathrm{T}} \overset{\text{val}}{\to} \mathsf{x}\text{ ' }\mathsf{F}]$

$[*^{\mathrm{T}} \overset{\text{tex}}{\to} \text{“\#1.}$
$\{\}\hat{}\mathrm{T}\text{”}]$

$[*^{\mathrm{T}} \overset{\text{pyk}}{\to} \text{“}* \text{ raw tail”}]$

$*^{\mathrm{U}}$

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

$[*^{\mathrm{U}} \overset{\text{tex}}{\to} \text{“\#1.}$
$\{\}\hat{}\mathrm{U}\text{”}]$

$[*^{\mathrm{U}} \overset{\text{pyk}}{\to} \text{“}* \text{ cardinal untag”}]$

$*^{\mathrm{h}}$

$[\mathsf{x}^{\mathrm{h}} \overset{\text{val}}{\Rightarrow} \mathsf{x}^{\mathrm{MTH}}]$

$[*^{\mathrm{h}} \overset{\text{tex}}{\to} \text{“\#1.}$
$\{\}\hat{}\mathrm{h}\text{”}]$

$[*^{\mathrm{h}} \overset{\text{pyk}}{\to} \text{“}* \text{ head”}]$

$*^{\mathrm{t}}$

$[\mathsf{x}^{\mathrm{t}} \overset{\mathrm{val}}{\Rightarrow} \mathrm{if}(\mathsf{x}^{\mathrm{d}}, \mathrm{if}(\mathsf{x}^{\mathrm{c}}, \mathsf{T} \mathrel{\underline{\therefore}} [\ \mathsf{x}^{\mathrm{MTT}}\ ], \mathsf{x}^{\mathrm{MTT}}), \mathsf{T})]$

$[*^{\mathrm{t}} \overset{\mathrm{tex}}{\rightarrow}$ "#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"]

$*^{\mathrm{C}}$

$[\mathsf{x}^{\mathrm{C}} \overset{\mathrm{val}}{\to} \mathrm{if}(\mathsf{x}, \mathsf{T}, \mathsf{x}^{\mathrm{HB}} \underline{+2*} [\, \mathsf{x}^{\mathrm{TC}} \,])]$

$[*^{\mathrm{C}} \overset{\mathrm{tex}}{\to} \text{“\#1.}$
$\{\}\hat{}\mathrm{C}\text{”}]$

$[*^{\mathrm{C}} \overset{\mathrm{pyk}}{\to} \text{“}* \text{ cardinal retract”}]$

$*^{\mathrm{M}}$

$[\mathsf{x}^{\mathrm{M}} \overset{\mathrm{val}}{\Rightarrow} \mathrm{if}(\mathsf{x}, \mathsf{T}, \mathrm{if}(\mathsf{x}^{\mathrm{H}}, \mathsf{T} \underline{\therefore} [\, \mathsf{x}^{\mathrm{TC}} \,], \mathrm{if}(\mathsf{x}^{\mathrm{HTH}}, \mathsf{x}^{\mathrm{THM}} \underline{::} [\, \mathsf{x}^{\mathrm{TTM}} \,], \mathcal{M}(\mathsf{x}^{\mathrm{T}})))))]$

$[*^{\mathrm{M}} \overset{\mathrm{tex}}{\to} \text{“\#1.}$
$\{\}\hat{}\mathrm{M}\text{”}]$

$[*^{\mathrm{M}} \overset{\mathrm{pyk}}{\to} \text{“}* \text{ tagged retract”}]$

$*^{\mathrm{B}}$

$[\mathsf{x}^{\mathrm{B}} \overset{\mathrm{val}}{\to} \mathrm{if}(\mathsf{x}, \mathsf{T}, \mathsf{F})]$

$[*^{\mathrm{B}} \overset{\mathrm{tex}}{\to} \text{“\#1.}$
$\{\}\hat{}\mathrm{B}\text{”}]$

$[*^{\mathrm{B}} \overset{\mathrm{pyk}}{\to} \text{“}* \text{ boolean retract”}]$

$*^{\mathrm{r}}$

$[\mathsf{x}^{\mathrm{r}} \overset{\mathrm{val}}{\to} \mathsf{x}^{\mathrm{hh}}]$

$[\mathsf{x}^{\mathrm{r}} \overset{\mathrm{tex}}{\to} \text{“\#1.}$
$\{\}\hat{}\{\mathrm{r}\}\text{”}]$

$[\mathsf{x}^{\mathrm{r}} \overset{\mathrm{pyk}}{\to} \text{“}* \text{ ref”}]$

$*^{\mathrm{i}}$

$[\mathsf{x}^{\mathrm{i}} \overset{\mathrm{val}}{\to} \mathsf{x}^{\mathrm{hth}}]$

$[\mathsf{x}^{\mathrm{i}} \overset{\mathrm{tex}}{\to} \text{“\#1.}$
$\{\}\hat{}\{\mathrm{i}\}\text{”}]$

$[\mathsf{x}^{\mathrm{i}} \overset{\mathrm{pyk}}{\to} \text{“}* \text{ id”}]$

$*^{\mathrm{d}}$

$[\mathsf{x}^{\mathrm{d}} \overset{\mathrm{val}}{\to} \mathsf{x}^{\mathrm{htt}}]$

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

$[\mathsf{x}^{\mathrm{d}} \overset{\mathrm{pyk}}{\to} \text{“}* \text{ debug”}]$

$*^{\mathrm{R}}$

$[\mathsf{x}^{\mathrm{R}} \overset{\mathrm{val}}{\to} \mathsf{x}^{\mathrm{r}} :: [\, \mathsf{x}^{\mathrm{i}} :: \mathsf{T} \,]\,]$

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

$[\mathsf{x}^{\mathrm{R}} \overset{\mathrm{pyk}}{\to} \text{“}* \text{ root”}]$

$*^{0}$

$[\mathsf{x}^{0} \overset{\mathrm{val}}{\to} \mathsf{x}^{\mathrm{h}}]$

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

$[\mathsf{x}^{0} \overset{\mathrm{pyk}}{\to} \text{“}* \text{ zeroth”}]$

$*^{1}$

$[\mathsf{x}^{1} \overset{\mathrm{val}}{\to} \mathsf{x}^{\mathrm{t}0}]$

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

$[\mathsf{x}^{1} \overset{\mathrm{pyk}}{\to} \text{“}* \text{ first”}]$

$*^{2}$

$[\mathsf{x}^{2} \overset{\mathrm{val}}{\to} \mathsf{x}^{\mathrm{t}1}]$

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

$[\mathsf{x}^{2} \overset{\mathrm{pyk}}{\to} \text{“}* \text{ second”}]$

$*^{3}$

$[x^{3} \overset{\text{val}}{\to} x^{t2}]$

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

$[x^{3} \overset{\text{pyk}}{\to} \text{“}* \text{ third”}]$

$*^{4}$

$[x^{4} \overset{\text{val}}{\to} x^{t3}]$

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

$[x^{4} \overset{\text{pyk}}{\to} \text{“}* \text{ fourth”}]$

$*^{5}$

$[x^{5} \overset{\text{val}}{\to} x^{t4}]$

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

$[x^{5} \overset{\text{pyk}}{\to} \text{“}* \text{ fifth”}]$

$*^{6}$

$[x^{6} \overset{\text{val}}{\to} x^{t5}]$

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

$[x^{6} \overset{\text{pyk}}{\to} \text{“}* \text{ sixth”}]$

$*^{7}$

$[x^{7} \overset{\text{val}}{\to} x^{t6}]$

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

$[x^{7} \overset{\text{pyk}}{\to} \text{“}* \text{ seventh”}]$

$*^{8}$

$[\mathsf{x}^{8} \overset{\text{val}}{\to} \mathsf{x}^{\mathsf{t}\,7}]$

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

$[\mathsf{x}^{8} \overset{\text{pyk}}{\to} \text{“}* \text{ eighth”}]$

$*^{9}$

$[\mathsf{x}^{9} \overset{\text{val}}{\to} \mathsf{x}^{\mathsf{t}\,8}]$

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

$[\mathsf{x}^{9} \overset{\text{pyk}}{\to} \text{“}* \text{ ninth”}]$

$*^{\mathrm{E}}$

$[\mathsf{x}^{\mathrm{E}} \overset{\text{val}}{\to} \mathsf{x} \overset{\text{r}}{=} \lceil \mathsf{xy} \rceil]$

$[\mathsf{x}^{\mathrm{E}} \overset{\text{tex}}{\to} \text{“\#1.}$
$\{\}\ \hat{}\ \{\ \mathrm{E}\ \}\text{”}]$

$[\mathsf{x}^{\mathrm{E}} \overset{\text{pyk}}{\to} \text{“}* \text{ is error”}]$

$*^{\mathcal{V}}$

$[\mathsf{t}^{\mathcal{V}} \overset{\text{val}}{\to} \mathsf{t} \overset{\text{r}}{=} \lceil \underline{\mathsf{a}} \rceil]$

$[\mathsf{t}^{\mathcal{V}} \overset{\text{tex}}{\to} \text{“\#1.}$
$\{\}\ \hat{}\ \{\backslash\text{cal V}\}\text{”}]$

$[\mathsf{t}^{\mathcal{V}} \overset{\text{pyk}}{\to} \text{“}* \text{ is metavar”}]$

$*^{\mathcal{C}}$

$[\mathsf{t}^{\mathcal{C}} \overset{\text{val}}{\to} \mathrm{If}(\mathsf{t}^{\mathcal{V}}, \mathsf{F}, \mathsf{t}^{\mathsf{t}\mathcal{C}^{*}})]$

$[\mathsf{t}^{\mathcal{C}} \overset{\text{tex}}{\to} \text{“\#1.}$
$\{\}\ \hat{}\ \{\backslash\text{cal C}\}\text{”}]$

$[\mathsf{t}^{\mathcal{C}} \overset{\text{pyk}}{\to} \text{“}* \text{ is metaclosed”}]$

$*^{\mathcal{C}^*}$

$[\mathsf{t}^{\mathcal{C}^*} \overset{\text{val}}{\to} \mathrm{If}(\mathsf{t}, \mathsf{T}, \mathrm{If}(\mathsf{t}^{\mathrm{h}\mathcal{C}}, \mathsf{t}^{\mathrm{t}\mathcal{C}^*}, \mathsf{F}))]$

$[\mathsf{t}^{\mathcal{C}^*} \overset{\text{tex}}{\to} \text{“\#1.}$
$\{\} \hat{} \{\{\backslash\text{cal C}\} \hat{} \{ \backslash\text{ast }\}\}\text{”}]$

$[\mathsf{t}^{\mathcal{C}^*} \overset{\text{pyk}}{\to} \text{“}* \text{ is metaclosed star”}]$

newline $*$

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

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

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

$[\text{newline } \mathsf{x} \overset{\text{pyk}}{\to} \text{“newline } *\text{”}]$

macro newline $*$

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

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

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

$[\text{macro newline } \mathsf{x} \overset{\text{pyk}}{\to} \text{“macro newline } *\text{”}]$

$*$ ’ $*$

Predef: apply

$[* \text{ ’ } * \overset{\text{tex}}{\to} \text{“}\#1.$
$\backslash\text{mathbin } \{\backslash\text{mbox } \{\text{’}\}\}\#2.\text{”}]$

$[* \text{ ’ } * \overset{\text{pyk}}{\to} \text{“}* \text{ apply } *\text{”}]$

$* \mathbin{`} *$

$[\mathsf{f} \mathbin{`} \mathsf{x} \overset{\text{val}}{\to} \mathbf{apply}(\mathsf{f}, \mathsf{x})]$

$[* \mathbin{`} * \overset{\text{tex}}{\to} \text{“\#1.}$
$\text{\textbackslash mathbin \{\textbackslash mbox \{`\}\}\#2.”}]$

$[* \mathbin{`} * \overset{\text{pyk}}{\to} \text{“}* \text{ tagged apply }*\text{”}]$

$* \cdot *$

$[\mathsf{x} \cdot \mathsf{y} \overset{\text{val}}{\to} \mathrm{If}(\mathsf{x}^{\mathrm{c}} \wedge [\, \mathsf{y}^{\mathrm{c}} \,], \mathsf{x} \cdot_0 \mathsf{y}, \mathsf{T})]$

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

$[\mathsf{x} \cdot \mathsf{y} \overset{\text{pyk}}{\to} \text{“}* \text{ times }*\text{”}]$

$* \cdot_0 *$

$$[\mathsf{x} \cdot_0 \mathsf{y} \overset{\text{val}}{\to} \mathsf{y}^{\mathrm{s}} \begin{cases} \mathsf{x}!0 \\ \mathsf{y}^{\mathrm{h}} \begin{cases} \mathsf{T} +2* [\, \mathsf{x} \cdot_0 [\, \mathsf{y}^{\mathrm{t}} \,] \,] &] \\ (\mathsf{T} +2* [\, \mathsf{x} \cdot_0 [\, \mathsf{y}^{\mathrm{t}} \,] \,])^{\mathrm{M}} +_0 \mathsf{x} \end{cases} \end{cases}$$

$[\mathsf{x} \cdot_0 \mathsf{y} \overset{\text{tex}}{\to} \text{“\#1.}$
$\text{\textbackslash cdot\_0 \#2.”}]$

$[\mathsf{x} \cdot_0 \mathsf{y} \overset{\text{pyk}}{\to} \text{“}* \text{ times zero }*\text{”}]$

$* + *$

$[\mathsf{x} + \mathsf{y} \overset{\text{val}}{\to} \mathrm{If}(\mathsf{x}^{\mathrm{c}} \wedge [\, \mathsf{y}^{\mathrm{c}} \,], \mathsf{x} +_0 \mathsf{y}, \mathsf{T})]$

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

$[\mathsf{x} + \mathsf{y} \overset{\text{pyk}}{\to} \text{“}* \text{ plus }*\text{”}]$

$* +_0 *$

$$[\mathsf{x} +_0 \mathsf{y} \overset{\text{val}}{\to} \mathsf{x}^{\mathsf{s}} \begin{cases} \mathsf{y} \\ \mathsf{y}^{\mathsf{s}} \begin{cases} \mathsf{x} \\ \mathsf{x}^{\mathsf{h}} \begin{cases} \mathsf{y}^{\mathsf{h}} \begin{cases} \mathsf{T} +2* [\, \mathsf{x}^{\mathsf{t}} +_0 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \\ \mathsf{F} +2* [\, \mathsf{x}^{\mathsf{t}} +_0 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \end{cases} \\ \mathsf{y}^{\mathsf{h}} \begin{cases} \mathsf{F} +2* [\, \mathsf{x}^{\mathsf{t}} +_0 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \\ \mathsf{T} +2* [\, \mathsf{x}^{\mathsf{t}} +_1 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \end{cases} \end{cases} \end{cases} \end{cases}]$$

$[\mathsf{x} +_0 \mathsf{y} \overset{\text{tex}}{\to} \text{“\#1.}$
$\backslash\text{mathop\{+\_0\} \#2.”}]$

$[\mathsf{x} +_0 \mathsf{y} \overset{\text{pyk}}{\to} \text{“}* \text{ plus zero } *\text{”}]$

$* +_1 *$

$$[\mathsf{x} +_1 \mathsf{y} \overset{\text{val}}{\to} \mathsf{x}^{\mathsf{s}} \begin{cases} \mathsf{y} +_0 1 \\ \mathsf{y}^{\mathsf{s}} \begin{cases} \mathsf{x} +_0 1 \\ \mathsf{x}^{\mathsf{h}} \begin{cases} \mathsf{y}^{\mathsf{h}} \begin{cases} \mathsf{F} +2* [\, \mathsf{x}^{\mathsf{t}} +_0 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \\ \mathsf{T} +2* [\, \mathsf{x}^{\mathsf{t}} +_1 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \end{cases} \\ \mathsf{y}^{\mathsf{h}} \begin{cases} \mathsf{T} +2* [\, \mathsf{x}^{\mathsf{t}} +_1 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \\ \mathsf{F} +2* [\, \mathsf{x}^{\mathsf{t}} +_1 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \end{cases} \end{cases} \end{cases} \end{cases}]$$

$[\mathsf{x} +_1 \mathsf{y} \overset{\text{tex}}{\to} \text{“\#1.}$
$\backslash\text{mathop\{+\_1\} \#2.”}]$

$[\mathsf{x} +_1 \mathsf{y} \overset{\text{pyk}}{\to} \text{“}* \text{ plus one } *\text{”}]$

$* - *$

$[\mathsf{x} - \mathsf{y} \overset{\text{val}}{\to} \text{If}(\mathsf{x}^{\mathsf{c}} \wedge [\, \mathsf{y}^{\mathsf{c}} \,], \text{If}(\mathsf{x} < \mathsf{y}, 0, \mathsf{x} -_0 \mathsf{y}), \mathsf{T})]$

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

$[\mathsf{x} - \mathsf{y} \overset{\text{pyk}}{\to} \text{“}* \text{ minus } *\text{”}]$

$* -_0 *$

$$[\mathsf{x} -_0 \mathsf{y} \overset{\text{val}}{\to} \mathsf{y}^{\mathsf{s}} \begin{cases} \mathsf{x} \\ \mathsf{x}^{\mathsf{h}} \begin{cases} \mathsf{y}^{\mathsf{h}} \begin{cases} \mathsf{T} +2* [\, \mathsf{x}^{\mathsf{t}} -_0 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \\ \mathsf{F} +2* [\, \mathsf{x}^{\mathsf{t}} -_1 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \end{cases} \\ \mathsf{y}^{\mathsf{h}} \begin{cases} \mathsf{F} +2* [\, \mathsf{x}^{\mathsf{t}} -_0 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \\ \mathsf{T} +2* [\, \mathsf{x}^{\mathsf{t}} -_0 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \end{cases} \end{cases} \end{cases}]$$

$[\mathsf{x} -_0 \mathsf{y} \overset{\text{tex}}{\rightarrow} \text{“\#1.}$
$\backslash\text{mathop\{-\_0\} \#2.”}]$

$[\mathsf{x} -_0 \mathsf{y} \overset{\text{pyk}}{\rightarrow} \text{“}* \text{ minus zero } *\text{”}]$

$* -_1 *$

$$[\mathsf{x} -_1 \mathsf{y} \overset{\text{val}}{\rightarrow} \mathsf{y}^{\mathsf{s}} \begin{cases} \mathsf{x} -_0 1 \\ \mathsf{x}^{\mathsf{h}} \begin{cases} \mathsf{y}^{\mathsf{h}} \begin{cases} \mathsf{F} +2* [\, \mathsf{x}^{\mathsf{t}} -_1 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \\ \mathsf{T} +2* [\, \mathsf{x}^{\mathsf{t}} -_1 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \end{cases} \\ \mathsf{y}^{\mathsf{h}} \begin{cases} \mathsf{T} +2* [\, \mathsf{x}^{\mathsf{t}} -_0 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \\ \mathsf{F} +2* [\, \mathsf{x}^{\mathsf{t}} -_1 [\, \mathsf{y}^{\mathsf{t}} \,] \,] \end{cases} \end{cases} \end{cases}]$$

$[\mathsf{x} -_1 \mathsf{y} \overset{\text{tex}}{\rightarrow} \text{“\#1.}$
$\backslash\text{mathop\{-\_1\} \#2.”}]$

$[\mathsf{x} -_1 \mathsf{y} \overset{\text{pyk}}{\rightarrow} \text{“}* \text{ minus one } *\text{”}]$

$* \cup \{*\}$

$[\mathsf{x} \cup \{\mathsf{y}\} \overset{\text{val}}{\rightarrow} \text{If}(\mathsf{y} \in_{\mathsf{t}} \mathsf{x}, \mathsf{x}, \mathsf{y} :: \mathsf{x})]$

$[\mathsf{x} \cup \{\mathsf{y}\} \overset{\text{tex}}{\rightarrow} \text{“\#1.}$
$\backslash\text{cup } \backslash\{ \#2.}$
$\backslash\}\text{”}]$

$[\mathsf{x} \cup \{\mathsf{y}\} \overset{\text{pyk}}{\rightarrow} \text{“}* \text{ term plus } * \text{ end plus”}]$

$* \bigcup *$

$[\mathsf{x} \cup \mathsf{y} \overset{\text{val}}{\rightarrow} \text{If}(\mathsf{x}^{\mathsf{a}}, \mathsf{y}, [\, \mathsf{x}^{\mathsf{t}} \cup \mathsf{y} \,] \cup \{\mathsf{x}^{\mathsf{h}}\})]$

$[\mathsf{x} \cup \mathsf{y} \overset{\text{tex}}{\rightarrow} \text{“\#1.}$
$\backslash\text{cup \#2.”}]$

$[\mathsf{x} \cup \mathsf{y} \overset{\text{pyk}}{\rightarrow} \text{“}* \text{ term union } *\text{”}]$

$*\backslash\{*\}$

$[\mathsf{x}\backslash\{\mathsf{y}\} \overset{\text{val}}{\rightarrow} \text{If}(\mathsf{x}^{\mathsf{a}}, \mathsf{y}!\emptyset, \text{If}(\mathsf{y} \overset{\text{t}}{=} [\, \mathsf{x}^{\mathsf{h}} \,], \mathsf{x}^{\mathsf{t}}, \mathsf{x}^{\mathsf{h}} :: [\, \mathsf{x}^{\mathsf{t}}\backslash\{\mathsf{y}\} \,]))]$

$[\mathsf{x}\backslash\{\mathsf{y}\} \overset{\text{tex}}{\rightarrow} \text{“\#1.}$
$\backslash\text{backslash } \backslash\{ \#2.}$

\}”]

[x\{y} $\overset{\text{pyk}}{\to}$ “∗ term minus ∗ end minus”]

$* \mathbin{\dot{\therefore}} *$

[y ∴ z $\overset{\text{val}}{\Rightarrow}$ λx.if(x, y, z)]

[∗ $\dot{\therefore}$ ∗ $\overset{\text{tex}}{\to}$ “#1.
\mathrel { \dot { . \, . } }#2.”]

[∗ $\dot{\therefore}$ ∗ $\overset{\text{pyk}}{\to}$ “∗ raw pair ∗”]

$* \mathbin{\underline{\dot{\therefore}}} *$

[x $\underline{\therefore}$ y $\overset{\text{val}}{\to}$ x : [y : [x $\dot{\therefore}$ y]]]

[∗ $\underline{\therefore}$ ∗ $\overset{\text{tex}}{\to}$ “#1.
\mathrel { \underline { \dot { . \, . } } }#2.”]

[∗ $\underline{\therefore}$ ∗ $\overset{\text{pyk}}{\to}$ “∗ eager pair ∗”]

$* \mathbin{\underline{::}} *$

[x $\underline{::}$ y $\overset{\text{val}}{\to}$ ($\underline{0}$ $\underline{\therefore}$ [$\underline{0}$ $\underline{\therefore}$ ⊤])$^{\text{I}}$ $\underline{\therefore}$ [x $\underline{\therefore}$ y]]

[∗ $\underline{::}$ ∗ $\overset{\text{tex}}{\to}$ “#1.
\mathrel { \underline { : \, : } }#2.”]

[∗ $\underline{::}$ ∗ $\overset{\text{pyk}}{\to}$ “∗ tagged pair ∗”]

$* \mathbin{\underline{+2*}} *$

[x $\underline{+2*}$ y $\overset{\text{val}}{\to}$ if(x, if(y, ⊤, x $\underline{\therefore}$ y), x $\underline{\therefore}$ 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 $*$"]

$$* \in_{\mathrm{t}} *$$

$[\mathsf{x} \in_{\mathrm{t}} \mathsf{y} \overset{\text{val}}{\rightarrow} \mathrm{If}(\mathsf{y}^{\mathsf{a}}, \mathsf{x}!\mathsf{F}, \mathrm{If}(\mathsf{x} \overset{\mathsf{t}}{=} [\ \mathsf{y}^{\mathsf{h}}\ ], \mathsf{T}, \mathsf{x} \in_{\mathrm{t}} [\ \mathsf{y}^{\mathsf{t}}\ ]))]$

$[\mathsf{x} \in_{\mathrm{t}} \mathsf{y} \overset{\text{tex}}{\rightarrow}$ "#1.
\in_t #2."]

$[\mathsf{x} \in_{\mathrm{t}} \mathsf{y} \overset{\text{pyk}}{\rightarrow}$ "$*$ 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* $[\, \mathsf{t}^{\mathrm{t}} \,] \,))]$

[x free in* y $\overset{\text{tex}}{\to}$ "#1.
\mathrel {free\ in}^{\ast} #2."]

[v free in* t $\overset{\text{pyk}}{\to}$ "∗ free in star ∗"]

∗ free for ∗ in ∗

[a free for x in b $\overset{\text{val}}{\to}$ a! [x!
If($b^{\mathcal{V}}$, T,
If(¬ [b $\overset{\text{r}}{=}$ ⌈∀∗: ∗⌉] , a free for* x in [b^{t}] ,
If(x $\overset{\text{t}}{=}$ [b^{1}] , T,
If(¬ [x free in [b^{2}]] , T,
If(b^{1} free in a, F, [
a] free for x in [b^{2}]))))))]]

[a free for x in b $\overset{\text{tex}}{\to}$ "#1.
\mathrel {free\ for} #2.
\mathrel {in} #3."]

[a free for x in b $\overset{\text{pyk}}{\to}$ "∗ free for ∗ in ∗"]

∗ free for* ∗ in ∗

[a free for* x in b $\overset{\text{val}}{\to}$
If(b, a! [x!T] ,
If(a free for x in [b^{h}] , a free for* x in [b^{t}] , F))]

[a free for* x in b $\overset{\text{tex}}{\to}$ "#1.
\mathrel {free\ for}^{\ast} #2.
\mathrel {in} #3."]

[a free for* ∗ in b $\overset{\text{pyk}}{\to}$ "∗ free for star ∗ in ∗"]

∗ $\in_c$ ∗

[x $\in_c$ y $\overset{\text{val}}{\to}$ [y $\overset{\text{r}}{=}$ ⌈x $\wedge_c$ y⌉]] $\left\{ \begin{array}{l} \text{If}(x \in_c [\, y^{1} \,], T, x \in_c [\, y^{2} \,]) \\ x \overset{\text{t}}{=} y \end{array} \right.$]

[x $\in_c$ y $\overset{\text{tex}}{\to}$ "#1.
\in_c #2."]

[x $\in_c$ y $\overset{\text{pyk}}{\to}$ "∗ claim in ∗"]

$* < *$

$[\mathsf{x} < \mathsf{y} \overset{\text{val}}{\to} \mathrm{If}(\mathsf{x}^{\mathrm{c}} \wedge \ [\ \mathsf{y}^{\mathrm{c}}\ ]\ , \mathsf{x} <' \mathsf{y}, \mathsf{F})]$

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

$[\mathsf{x} < \mathsf{y} \overset{\text{pyk}}{\to}$ “$*$ less $*$”$]$

$* <' *$

$$[\mathsf{x} <' \mathsf{y} \overset{\text{val}}{\to} \mathsf{y}^{\mathrm{s}} \left\{ \begin{array}{l} \mathsf{x!F} \\ \mathsf{x}^{\mathrm{s}} \left\{ \begin{array}{ll} \mathsf{T} & \\ \mathsf{x}^{\mathrm{h}} \left\{ \begin{array}{ll} \mathsf{y}^{\mathrm{h}} \left\{ \begin{array}{ll} \mathsf{x}^{\mathrm{t}} <' & [\ \mathsf{y}^{\mathrm{t}}\ ] \\ \mathsf{x}^{\mathrm{t}} \leq' & [\ \mathsf{y}^{\mathrm{t}}\ ] \end{array} \right. \\ \mathsf{y}^{\mathrm{h}} \left\{ \begin{array}{ll} \mathsf{x}^{\mathrm{t}} <' & [\ \mathsf{y}^{\mathrm{t}}\ ] \\ \mathsf{x}^{\mathrm{t}} <' & [\ \mathsf{y}^{\mathrm{t}}\ ] \end{array} \right. \end{array} \right. \end{array} \right. \end{array} \right. \quad]$$

$[\mathsf{x} <' \mathsf{y} \overset{\text{tex}}{\to}$ “#1.
$<$’ #2.”$]$

$[\mathsf{x} <' \mathsf{y} \overset{\text{pyk}}{\to}$ “$*$ less zero $*$”$]$

$* \leq' *$

$$[\mathsf{x} \leq' \mathsf{y} \overset{\text{val}}{\to} \mathsf{x}^{\mathrm{s}} \left\{ \begin{array}{l} \mathsf{y!T} \\ \mathsf{y}^{\mathrm{s}} \left\{ \begin{array}{ll} \mathsf{F} & \\ \mathsf{x}^{\mathrm{h}} \left\{ \begin{array}{ll} \mathsf{y}^{\mathrm{h}} \left\{ \begin{array}{ll} \mathsf{x}^{\mathrm{t}} \leq' & [\ \mathsf{y}^{\mathrm{t}}\ ] \\ \mathsf{x}^{\mathrm{t}} \leq' & [\ \mathsf{y}^{\mathrm{t}}\ ] \end{array} \right. \\ \mathsf{y}^{\mathrm{h}} \left\{ \begin{array}{ll} \mathsf{x}^{\mathrm{t}} <' & [\ \mathsf{y}^{\mathrm{t}}\ ] \\ \mathsf{x}^{\mathrm{t}} \leq' & [\ \mathsf{y}^{\mathrm{t}}\ ] \end{array} \right. \end{array} \right. \end{array} \right. \end{array} \right. \quad]$$

$[\mathsf{x} \leq' \mathsf{y} \overset{\text{tex}}{\to}$ “#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 $*$”$]$

$* \bigwedge *$

$$[\mathsf{x} \wedge \mathsf{y} \overset{\text{val}}{\rightarrow} \mathsf{x} \begin{cases} \mathrm{If}(\mathsf{y}, \mathsf{T}, \mathsf{F}) \\ \mathrm{If}(\mathsf{y}, \mathsf{F}, \mathsf{F}) \end{cases}]$$

$[* \wedge * \overset{\text{tex}}{\rightarrow} \text{“\#1.}$
$\backslash\text{wedge \#2.”}]$

$[* \wedge * \overset{\text{pyk}}{\rightarrow} \text{“}* \text{ and } *\text{”}]$

$* \ddot{\bigwedge} *$

$$[\mathsf{x} \ddot{\wedge} \mathsf{y} \overset{\text{macro}}{\rightarrow} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t}, \mathsf{s}, \mathsf{c}, \lceil[\mathsf{x} \ddot{\wedge} \mathsf{y} \doteq \mathrm{If}(\mathsf{x}, \mathsf{y}, \mathsf{F})]\rceil)]$$

$[\mathsf{x} \ddot{\wedge} \mathsf{y} \overset{\text{tex}}{\rightarrow} \text{“\#1.}$
$\backslash\text{mathrel\{\textbackslash ddot\{\textbackslash wedge\}\} \#2.”}]$

$[\mathsf{x} \ddot{\wedge} \mathsf{y} \overset{\text{pyk}}{\rightarrow} \text{“}* \text{ macro and } *\text{”}]$

$* \tilde{\bigwedge} *$

$$[\mathsf{x} \tilde{\wedge} \mathsf{y} \overset{\text{val}}{\rightarrow} \mathrm{if}(\mathsf{x}, \mathsf{y}, \mathsf{x})]$$

$[\mathsf{x} \tilde{\wedge} \mathsf{y} \overset{\text{tex}}{\rightarrow} \text{“\#1.}$
$\backslash\text{mathrel\{\textbackslash tilde\{\textbackslash wedge\}\} \#2.”}]$

$[\mathsf{x} \tilde{\wedge} \mathsf{y} \overset{\text{pyk}}{\rightarrow} \text{“}* \text{ simple and } *\text{”}]$

$* \bigwedge_{\mathrm{c}} *$

$$[\mathsf{x} \wedge_{\mathrm{c}} \mathsf{y} \overset{\text{val}}{\rightarrow} \lambda\mathsf{t}.\lambda\mathsf{c}.\ [\ [\ [\ \mathsf{x}\ '\mathsf{t}\ ]\ '\mathsf{c}\ ]\ \tilde{\wedge}\ [\ [\ \mathsf{y}\ '\mathsf{t}\ ]\ '\mathsf{c}\ ]\ ]\ ]$$

$[\mathsf{x} \wedge_{\mathrm{c}} \mathsf{y} \overset{\text{tex}}{\rightarrow} \text{“\#1.}$
$\backslash\text{wedge\_c \#2.”}]$

$[\mathsf{x} \wedge_{\mathrm{c}} \mathsf{y} \overset{\text{pyk}}{\rightarrow} \text{“}* \text{ claim and } *\text{”}]$

$* \bigvee *$

$$[\mathsf{x} \vee \mathsf{y} \overset{\text{val}}{\rightarrow} \mathsf{x} \begin{cases} \mathrm{If}(\mathsf{y}, \mathsf{T}, \mathsf{T}) \\ \mathrm{If}(\mathsf{y}, \mathsf{T}, \mathsf{F}) \end{cases}]$$

$[* \vee * \overset{\text{tex}}{\rightarrow} \text{“\#1.}$
$\backslash\text{vee \#2.”}]$

$[* \vee * \overset{\text{pyk}}{\to} \text{“}* \text{ or } *\text{”}]$

$* \mathbin{\|} *$

$[* \mathbin{\|} * \overset{\text{tex}}{\to} \text{“\#1.}$
$\text{\textbackslash parallel \#2.”}]$

$[* \mathbin{\|} * \overset{\text{pyk}}{\to} \text{“}* \text{ parallel } *\text{”}]$

$* \mathbin{\ddot{\vee}} *$

$[\mathsf{x} \mathbin{\ddot{\vee}} \mathsf{y} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\mathsf{x} \mathbin{\ddot{\vee}} \mathsf{y} \doteq \mathrm{If}(\mathsf{x},\mathsf{T},\mathsf{y})]\rceil)]$

$[\mathsf{x} \mathbin{\ddot{\vee}} \mathsf{y} \overset{\text{tex}}{\to} \text{“\#1.}$
$\text{\textbackslash mathrel\{\textbackslash ddot\{\textbackslash vee\}\} \#2.”}]$

$[\mathsf{x} \mathbin{\ddot{\vee}} \mathsf{y} \overset{\text{pyk}}{\to} \text{“}* \text{ macro or } *\text{”}]$

$* \mathbin{\ddot{\Rightarrow}} *$

$[\mathsf{x} \mathbin{\ddot{\Rightarrow}} \mathsf{y} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\mathsf{x} \mathbin{\ddot{\Rightarrow}} \mathsf{y} \doteq \mathrm{If}(\mathsf{x},\mathsf{y},\mathsf{T})]\rceil)]$

$[\mathsf{x} \mathbin{\ddot{\Rightarrow}} \mathsf{y} \overset{\text{tex}}{\to} \text{“\#1.}$
$\text{\textbackslash mathrel\{\textbackslash ddot\{\textbackslash Rightarrow\}\} \#2.”}]$

$[\mathsf{x} \mathbin{\ddot{\Rightarrow}} \mathsf{y} \overset{\text{pyk}}{\to} \text{“}* \text{ macro imply } *\text{”}]$

$* : *$

$[\mathsf{x} : \mathsf{y} \overset{\text{val}}{\to} \mathrm{if}(\mathsf{x},\mathsf{y},\mathsf{y})]$

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

$[* : * \overset{\text{pyk}}{\to} \text{“}* \text{ guard } *\text{”}]$

$* \text{ spy } *$

$[\mathsf{x} \text{ spy } \mathsf{y} \overset{\text{val}}{\Rightarrow} \mathsf{x}!\mathsf{y}]$

$[\mathsf{x} \text{ spy } \mathsf{y} \overset{\text{tex}}{\to} \text{“\#1.}$
$\text{\textbackslash mathrel\{spy\}\#2.”}]$

$[\mathsf{x}\ \mathrm{spy}\ \mathsf{y} \overset{\mathrm{pyk}}{\rightarrow} \text{“}*\ \mathrm{spy}\ *\text{”}]$

$*!*$

$[\mathsf{x}!\mathsf{y} \overset{\mathrm{val}}{\Rightarrow} \mathrm{If}(\mathsf{x},\mathsf{y},\mathsf{y})]$

$[*!* \overset{\mathrm{tex}}{\rightarrow} \text{“\#1.}$
$\text{!\#2.”}]$

$[*!* \overset{\mathrm{pyk}}{\rightarrow} \text{“}*\ \mathrm{tagged\ guard}\ *\text{”}]$

$* \left\{ \begin{array}{l} * \\ * \end{array} \right.$

$[\mathsf{x} \left\{ \begin{array}{l} \mathsf{y} \\ \mathsf{z} \end{array} \right. \overset{\mathrm{val}}{\Rightarrow} \mathrm{If}(\mathsf{x},\mathsf{y},\mathsf{z})]$

$[* \left\{ \begin{array}{l} * \\ * \end{array} \right. \overset{\mathrm{tex}}{\rightarrow} \text{“\#1.}$
$\text{\textbackslash left\textbackslash\{\textbackslash protect \textbackslash begin \{array\}\{l\}\#2.}$
$\text{\textbackslash\textbackslash\#3.}$
$\text{\textbackslash protect \textbackslash end \{array\}\textbackslash right.”}]$

$[* \left\{ \begin{array}{l} * \\ * \end{array} \right. \overset{\mathrm{pyk}}{\rightarrow} \text{“}*\ \mathrm{select}\ *\ \mathrm{else}\ *\ \mathrm{end\ select}\text{”}]$

$\lambda * .*$

Predef: lambda

$[\lambda * .* \overset{\mathrm{tex}}{\rightarrow} \text{“}$
$\text{\textbackslash lambda \#1.}$
$\text{.\#2.”}]$

$[\lambda * .* \overset{\mathrm{pyk}}{\rightarrow} \text{“lambda}\ *\ \mathrm{dot}\ *\text{”}]$

$\Lambda * .*$

$[\Lambda \mathsf{x}.\mathsf{y} \overset{\mathrm{macro}}{\rightarrow} \lambda \mathsf{t}.\lambda \mathsf{s}.\lambda \mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\Lambda \mathsf{x}.\mathsf{y} \doteqdot \Lambda \lambda \mathsf{x}.\mathsf{y}]\rceil)]$

$[\Lambda \mathsf{x}.\mathsf{y} \overset{\mathrm{tex}}{\rightarrow} \text{“}$
$\text{\textbackslash Lambda \#1.}$
$\text{. \#2.”}]$

$[\Lambda x.y \overset{\text{pyk}}{\to} \text{“tagged lambda } * \text{ dot } *\text{”}]$

$\Lambda *$

$[\Lambda x \overset{\text{val}}{\Rightarrow} \mathcal{M}(\lambda u.\mathcal{U}(x\,'\,\mathcal{M}(u)))]$

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

$[\Lambda * \overset{\text{pyk}}{\to} \text{“tagging } *\text{”}]$

if $*$ then $*$ else $*$

$[\textbf{if } x \textbf{ then } y \textbf{ else } z \overset{\text{macro}}{\to} \lambda t.\lambda s.\lambda c.\tilde{\mathcal{M}}_4(t, s, c, \lceil[\textbf{if } x \textbf{ then } y \textbf{ else } z \doteq \text{If}(x, y, z)]\rceil)]$

$[\textbf{if } x \textbf{ then } y \textbf{ else } z \overset{\text{tex}}{\to} \text{“}$
$\{\backslash\text{bf if}\} \backslash \#1.$
$\backslash\ \{\backslash\text{bf then}\} \backslash \#2.$
$\backslash\ \{\backslash\text{bf else}\} \backslash \#3.\text{”}]$

$[\textbf{if } x \textbf{ then } y \textbf{ else } z \overset{\text{pyk}}{\to} \text{“open if } * \text{ then } * \text{ else } *\text{”}]$

let $*$ = $*$ in $*$

$[\textbf{let } x = y \textbf{ in } z \overset{\text{macro}}{\to} \lambda t.\lambda s.\lambda c.\tilde{\mathcal{M}}_4(t, s, c, \lceil[\textbf{let } x = y \textbf{ in } z \doteq \text{let}_1(\lambda x.z, y)]\rceil)]$

$[\textbf{let } x = y \textbf{ in } z \overset{\text{tex}}{\to} \text{“}$
$\backslash\text{mathbf\{let\ \} \#1.}$
$= \#2.$
$\backslash\text{mathbf\{\ in\ \} \#3.”}]$

$[\textbf{let } x = y \textbf{ in } z \overset{\text{pyk}}{\to} \text{“let } * \text{ be } * \text{ in } *\text{”}]$

let $*$ $\doteq$ $*$ in $*$

$[\textbf{let } x \doteq y \text{ in } z \overset{\text{macro}}{\to} \lambda t.\lambda s.\lambda c.$
$\tilde{\mathcal{M}}(t^3, s, c[t^{1r} :: [\text{"codex"} :: [t^{1r} :: [t^{1i} :: [0 :: [\text{"macro"} :: T]]]]]]$
$\Rightarrow \tilde{\mathcal{M}}_3(t)])]$

$[\textbf{let } x \doteq y \text{ in } z \overset{\text{tex}}{\to} \text{“}$
$\backslash\text{mathbf\{let\ \} \#1.}$
$\backslash\text{mathrel\{\ddot{=}\} \#2.}$
$\backslash\text{mathrel\{\ in\ \} \#3.”}]$

$[\mathbf{let}\ \mathsf{x} \doteq \mathsf{y}\ \ \mathrm{in}\ \ \mathsf{z} \overset{\mathrm{pyk}}{\rightarrow} \text{“let } * \text{ abbreviate } * \text{ in } *\text{”}]$

$*^{\mathrm{I}}$

$[\mathsf{x}^{\mathrm{I}} \overset{\mathrm{val}}{\rightarrow} \lceil \mathsf{x}^{\mathrm{I}} \rceil^{\mathrm{R}} :: [\, \mathsf{x} :: \mathsf{T}\,]\,]$

$[\mathsf{x}^{\mathrm{I}} \overset{\mathrm{tex}}{\rightarrow} \text{“\#1.}$
$\{\}\ \hat{}\ \{\ \mathrm{I}\ \}\text{”}]$

$[\mathsf{x}^{\mathrm{I}} \overset{\mathrm{pyk}}{\rightarrow} \text{“} * \text{ init”}]$

$*^{\triangleright}$

$[\mathsf{x}^{\triangleright} \overset{\mathrm{val}}{\rightarrow} \lceil \mathsf{x}^{\triangleright} \rceil^{\mathrm{R}} :: [\, \mathsf{x} :: \mathsf{T}\,]\,]$

$[\mathsf{x}^{\triangleright} \overset{\mathrm{tex}}{\rightarrow} \text{“\#1.}$
$\{\}\ \hat{}\ \{\ \backslash\mathrm{rhd}\ \}\text{”}]$

$[\mathsf{x}^{\triangleright} \overset{\mathrm{pyk}}{\rightarrow} \text{“} * \text{ modus”}]$

$*^{\mathrm{V}}$

$[\mathsf{x}^{\mathrm{V}} \overset{\mathrm{val}}{\rightarrow} \lceil \mathsf{x}^{\mathrm{V}} \rceil^{\mathrm{R}} :: [\, \mathsf{x} :: \mathsf{T}\,]\,]$

$[\mathsf{x}^{\mathrm{V}} \overset{\mathrm{tex}}{\rightarrow} \text{“\#1.}$
$\{\}\ \hat{}\ \{\ \mathrm{V}\ \}\ \text{”}]$

$[\mathsf{x}^{\mathrm{V}} \overset{\mathrm{pyk}}{\rightarrow} \text{“} * \text{ verify”}]$

$*^{+}$

$[\mathsf{x}^{+} \overset{\mathrm{val}}{\rightarrow} \lceil \mathsf{x}^{+} \rceil^{\mathrm{R}} :: [\, \mathsf{x} :: \mathsf{T}\,]\,]$

$[\mathsf{x}^{+} \overset{\mathrm{tex}}{\rightarrow} \text{“\#1.}$
$\{\}\ \hat{}\ \{\ +\ \}\ \text{”}]$

$[\mathsf{x}^{+} \overset{\mathrm{pyk}}{\rightarrow} \text{“} * \text{ curry plus”}]$

$*^{-}$

$[\mathsf{x}^{-} \overset{\mathrm{val}}{\rightarrow} \lceil \mathsf{x}^{-} \rceil^{\mathrm{R}} :: [\, \mathsf{x} :: \mathsf{T}\,]\,]$

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

$[\mathsf{x}^{-} \overset{\text{pyk}}{\rightarrow} \text{“}* \text{ curry minus”}]$

$*^{*}$

$[\mathsf{x}^{*} \overset{\text{val}}{\rightarrow} \lceil \mathsf{x}^{*} \rceil^{\mathrm{R}} :: [\ \mathsf{x} :: \mathsf{T}\ ]\ ]$

$[\mathsf{x}^{*} \overset{\text{tex}}{\rightarrow} \text{“\#1.}$
$\{\}\ \hat{}\ \{\ \backslash\text{ast}\ \}\ \text{”}]$

$[\mathsf{x}^{*} \overset{\text{pyk}}{\rightarrow} \text{“}* \text{ dereference”}]$

$* \mathbin{@} *$

$[\mathsf{x} \mathbin{@} \mathsf{y} \overset{\text{val}}{\rightarrow} \lceil \mathsf{x} \mathbin{@} \mathsf{y} \rceil^{\mathrm{R}} :: [\ \mathsf{x} :: [\ \mathsf{y} :: \mathsf{T}\ ]\ ]\ ]$

$[\mathsf{x} \mathbin{@} \mathsf{y} \overset{\text{tex}}{\rightarrow} \text{“\#1.}$
$\backslash\text{mathop } \{\backslash\text{char64}\}\ \#2.\text{”}]$

$[\mathsf{x} \mathbin{@} \mathsf{y} \overset{\text{pyk}}{\rightarrow} \text{“}* \text{ at } *\text{”}]$

$* \rhd *$

$[\mathsf{x} \rhd \mathsf{y} \overset{\text{val}}{\rightarrow} \lceil \mathsf{x} \rhd \mathsf{y} \rceil^{\mathrm{R}} :: [\ \mathsf{x} :: [\ \mathsf{y} :: \mathsf{T}\ ]\ ]\ ]$

$[\mathsf{x} \rhd \mathsf{y} \overset{\text{tex}}{\rightarrow} \text{“\#1.}$
$\backslash\text{rhd } \#2.\text{”}]$

$[\mathsf{x} \rhd \mathsf{y} \overset{\text{pyk}}{\rightarrow} \text{“}* \text{ modus ponens } *\text{”}]$

$* \mathbin{\mathbb{\rhd}} *$

$[\mathsf{x} \mathbin{\mathbb{\rhd}} \mathsf{y} \overset{\text{val}}{\rightarrow} \lceil \mathsf{x} \mathbin{\mathbb{\rhd}} \mathsf{y} \rceil^{\mathrm{R}} :: [\ \mathsf{x} :: [\ \mathsf{y} :: \mathsf{T}\ ]\ ]\ ]$

$[\mathsf{x} \mathbin{\mathbb{\rhd}} \mathsf{y} \overset{\text{tex}}{\rightarrow} \text{“\#1.}$
$\backslash\text{mathrel } \{\backslash\text{makebox [0mm][l]}\{\$\backslash\text{rhd }\$\}\backslash,\{\backslash\text{rhd }\}\}\ \#2.\text{”}]$

$[\mathsf{x} \mathbin{\mathbb{\rhd}} \mathsf{y} \overset{\text{pyk}}{\rightarrow} \text{“}* \text{ modus probans } *\text{”}]$

$* \gg *$

$[\mathsf{x} \gg \mathsf{y} \overset{\text{tactic}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\mathrm{conclude}_1(\mathsf{t},\mathsf{c})]$

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

$[\mathsf{x} \gg \mathsf{y} \overset{\text{pyk}}{\to} \text{“}* \text{ conclude } *\text{”}]$

$* \vdash *$

$[\mathsf{x} \vdash \mathsf{y} \overset{\text{val}}{\to} \lceil \mathsf{x} \vdash \mathsf{y} \rceil^{\mathrm{R}} :: [\, \mathsf{x} :: [\, \mathsf{y} :: \mathsf{T} \,] \,] \,]$

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

$[\mathsf{x} \vdash \mathsf{y} \overset{\text{pyk}}{\to} \text{“}* \text{ infer } *\text{”}]$

$* \Vdash *$

$[\mathsf{x} \Vdash \mathsf{y} \overset{\text{val}}{\to} \lceil \mathsf{x} \Vdash \mathsf{y} \rceil^{\mathrm{R}} :: [\, \mathsf{x} :: [\, \mathsf{y} :: \mathsf{T} \,] \,] \,]$

$[\mathsf{x} \Vdash \mathsf{y} \overset{\text{tex}}{\to} \text{“\#1.}$
$\backslash\text{mathrel \{\textbackslash makebox [0mm][l]\{\$\textbackslash vdash \$\}\textbackslash,\{\textbackslash vdash \}\} \#2.”}]$

$[\mathsf{x} \Vdash \mathsf{y} \overset{\text{pyk}}{\to} \text{“}* \text{ endorse } *\text{”}]$

$* \text{ i.e. } *$

$[\mathsf{x} \text{ i.e. } \mathsf{y} \overset{\text{val}}{\to} \lceil \mathsf{x} \text{ i.e. } \mathsf{y} \rceil^{\mathrm{R}} :: [\, \mathsf{x} :: [\, \mathsf{y} :: \mathsf{T} \,] \,] \,]$

$[\mathsf{x} \text{ i.e. } \mathsf{y} \overset{\text{tex}}{\to} \text{“\#1.}$
$\backslash\text{mathrel \{i.e.\} \#2.”}]$

$[\mathsf{x} \text{ i.e. } \mathsf{y} \overset{\text{pyk}}{\to} \text{“}* \text{ id est } *\text{”}]$

$\forall * : *$

$[\forall \mathsf{x} : \mathsf{y} \overset{\text{val}}{\to} \lceil \forall \mathsf{x} : \mathsf{y} \rceil^{\mathrm{R}} :: [\, \mathsf{x} :: [\, \mathsf{y} :: \mathsf{T} \,] \,] \,]$

$[\forall \mathsf{x} : \mathsf{y} \overset{\text{tex}}{\to} \text{“}$
$\backslash\text{forall \#1.}$
$\backslash\text{colon \#2.”}]$

$[\forall \mathsf{x}\colon \mathsf{y} \overset{\text{pyk}}{\to} \text{“all } * \text{ indeed } *\text{”}]$

$* \oplus *$

$[\mathsf{x} \oplus \mathsf{y} \overset{\text{val}}{\to} \lceil \mathsf{x} \oplus \mathsf{y} \rceil^{\mathrm{R}} :: [\, \mathsf{x} :: [\, \mathsf{y} :: \mathsf{T} \,]\,]\,]$

$[\mathsf{x} \oplus \mathsf{y} \overset{\text{tex}}{\to} \text{“\#1.}$
$\text{\textbackslash mathrel \{\textbackslash oplus\} \#2.”}]$

$[\mathsf{x} \oplus \mathsf{y} \overset{\text{pyk}}{\to} \text{“} * \text{ rule plus } *\text{”}]$

$*; *$

$[\mathsf{x}; \mathsf{y} \overset{\text{val}}{\to} \lceil \mathsf{x}; \mathsf{y} \rceil^{\mathrm{R}} :: [\, \mathsf{x} :: [\, \mathsf{y} :: \mathsf{T} \,]\,]\,]$

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

$[\mathsf{x}; \mathsf{y} \overset{\text{pyk}}{\to} \text{“} * \text{ cut } *\text{”}]$

$*$ proves $*$

$[\mathsf{p} \text{ proves } \mathsf{t} \overset{\text{macro}}{\to} \lambda \mathsf{t}.\lambda \mathsf{s}.\lambda \mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t}, \mathsf{s}, \mathsf{c}, \lceil [\mathsf{p} \text{ proves } \mathsf{t} \doteqdot \mathrm{proof}(\lceil \mathsf{p} \rceil, \lceil \mathsf{t} \rceil, \mathrm{self})] \rceil)]$

$[\mathsf{p} \text{ proves } \mathsf{t} \overset{\text{tex}}{\to} \text{“\#1.}$
$\text{\textbackslash\ proves\textbackslash\ \#2.”}]$

$[\mathsf{x} \text{ proves } \mathsf{y} \overset{\text{pyk}}{\to} \text{“} * \text{ proves } *\text{”}]$

$*$ **proof of** $* : *$

$[\mathsf{t} \textbf{ proof of } \mathsf{s} : \mathsf{p} \overset{\text{name}}{\to} \text{“\#1.}$
$\text{\textbackslash mathbf\{\textbackslash\ proof\textbackslash\ of\textbackslash\ \} \#2.}$
$\text{: \#3.”}]$

$[\mathsf{t} \textbf{ proof of } \mathsf{s} : \mathsf{p} \overset{\text{macro}}{\to} \lambda \mathsf{t}.\lambda \mathsf{s}.\lambda \mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t}, \mathsf{s}, \mathsf{c}, \lceil [\mathsf{t} \textbf{ proof of } \mathsf{s} : \mathsf{p} \doteqdot$
$[\textbf{Proof of } \mathsf{s}\colon \lambda \mathsf{c}.\lambda \mathsf{x}.\mathcal{P}(\lceil \mathsf{t} \vdash \mathsf{p} \rceil, \mathrm{p}_0, \mathsf{c})]] \rceil)]$

$[\mathsf{t} \textbf{ proof of } \mathsf{s} : \mathsf{p} \overset{\text{tex}}{\to} \text{“}$
$\text{\textbackslash if\textbackslash relax\textbackslash csname lgwprooflinep\textbackslash endcsname}$
$\text{\textbackslash def\textbackslash lgwprooflinep\{x\}}$
$\text{\textbackslash newcount\textbackslash lgwproofline}$
$\text{\textbackslash fi}$

```
\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 "]

[t **proof of** l : p $\overset{\text{pyk}}{\rightarrow}$ "∗ proof of ∗ reads ∗"]

Line ∗ : ∗ ≫ ∗; ∗

[Line l : a ≫ i; p $\overset{\text{name}}{\rightarrow}$ "
Line \, #1.
: #2.
\gg #3.
; #4."]

[Line l : a ≫ i; p $\overset{\text{macro}}{\rightarrow}$ λt.λs.λc.$\tilde{\mathcal{M}}_4$(t, s, c, ⌈[Line l : a ≫ i; p ≝ ([a ≫ i]
; **let** l ≝ i in p)]⌉)]

[Line l : a ≫ i; p $\overset{\text{tex}}{\rightarrow}$ "
\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 : a ≫ i; p $\overset{\text{pyk}}{\rightarrow}$ "line ∗ because ∗ indeed ∗ end line ∗"]

Last line ∗ ≫ ∗ □

[Last line a ≫ i □ $\overset{\text{name}}{\rightarrow}$ "
Last\ line \, #1.
\gg #2.
\, \Box"]

$[\text{Last line}\,\mathsf{a} \gg \mathsf{i} \,\square \overset{\text{macro}}{\rightarrow} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\text{Last line}\,\mathsf{a} \gg \mathsf{i} \,\square \doteqdot (\mathsf{a} \gg \mathsf{i})]\rceil)]$

$[\text{Last line}\,\mathsf{a} \gg \mathsf{i} \,\square \overset{\text{tex}}{\rightarrow}$ “
\newline \makebox [0.1\textwidth]{}%
\parbox [b]{0.4\textwidth }{\raggedright
\setlength {\parindent }{-0.1\textwidth }%
\makebox [0.1\textwidth][l]{$
\if \relax \csname lgwproofinep\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$}}}”$]

$[\text{Last line}\,\mathsf{a} \gg \mathsf{i} \,\square \overset{\text{pyk}}{\rightarrow}$ “because ∗ indeed ∗ qed”$]$

$\text{Line}\,* : \text{Premise} \gg *; *$

$[\text{Line}\,\mathsf{l} : \text{Premise} \gg \mathsf{i}; \mathsf{p} \overset{\text{name}}{\rightarrow}$ “
Line \, #1.
: Premise \gg #2.
; #3.”$]$

$[\text{Line}\,\mathsf{l} : \text{Premise} \gg \mathsf{i}; \mathsf{p} \overset{\text{macro}}{\rightarrow} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\text{Line}\,\mathsf{l} : \text{Premise} \gg \mathsf{i}; \mathsf{p} \doteqdot (\mathsf{i} \vdash \textbf{let}\ \mathsf{l} \doteqdot \mathsf{i}\ \text{ in }\ \mathsf{p})]\rceil)]$

$[\text{Line}\,\mathsf{l} : \text{Premise} \gg \mathsf{i}; \mathsf{p} \overset{\text{tex}}{\rightarrow}$ “
\newline \makebox [0.1\textwidth][l]{$#1.
$:}\makebox [0.4\textwidth][l]{$Premise{}\gg{}$}\quad
\parbox [t]{0.4\textwidth }{$#2.
$\hfill \makebox [0mm][l]{\quad ; }}#3.”$]$

$[\text{Line}\,\mathsf{l} : \text{Premise} \gg \mathsf{i}; \mathsf{p} \overset{\text{pyk}}{\rightarrow}$ “line ∗ premise ∗ end line ∗”$]$

$\text{Line}\,* : \textbf{Side-condition} \gg *; *$

$[\text{Line}\,\mathsf{l} : \text{Side-condition} \gg \mathsf{i}; \mathsf{p} \overset{\text{name}}{\rightarrow}$ “
Line \, #1.
: \mbox{Side-condition} \gg #2.
; #3.”$]$

$[\text{Line}\,\mathsf{l} : \text{Side-condition} \gg \mathsf{i}; \mathsf{p} \overset{\text{macro}}{\rightarrow} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t},\mathsf{s},\mathsf{c},\lceil[\text{Line}\,\mathsf{l} : \text{Side-condition} \gg \mathsf{i}; \mathsf{p} \doteqdot (\mathsf{i} \Vdash \textbf{let}\ \mathsf{l} \doteqdot \mathsf{i}\ \text{ in }\ \mathsf{p})]\rceil)]$

[Line l : Side-condition $\gg$ i; $\mathsf{p} \overset{\text{tex}}{\to}$ “
\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; $\mathsf{p} \overset{\text{pyk}}{\to}$ “line $*$ side condition $*$ end line $*$”]

Arbitrary $\gg *; *$

[Arbitrary $\gg$ i; $\mathsf{p} \overset{\text{name}}{\to}$ “
Arbitrary \gg #1.
; #2.”]

[Arbitrary $\gg$ i; $\mathsf{p} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t}, \mathsf{s}, \mathsf{c}, \lceil[\text{Arbitrary} \gg \mathsf{i}; \mathsf{p} \doteqdot (\forall \mathsf{i}\colon \mathsf{p})]\rceil)$]

[Arbitrary $\gg$ i; $\mathsf{p} \overset{\text{tex}}{\to}$ “
\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; $\mathsf{p} \overset{\text{pyk}}{\to}$ “arbitrary $*$ end line $*$”]

Local $\gg * = *; *$

[Local $\gg$ a = i; $\mathsf{p} \overset{\text{name}}{\to}$ “
Local \gg #1.
= #2.
; #3.”]

[Local $\gg$ a = i; $\mathsf{p} \overset{\text{macro}}{\to} \lambda\mathsf{t}.\lambda\mathsf{s}.\lambda\mathsf{c}.\tilde{\mathcal{M}}_4(\mathsf{t}, \mathsf{s}, \mathsf{c}, \lceil[\text{Local} \gg \mathsf{a} = \mathsf{i}; \mathsf{p} \doteqdot (\textbf{let } \mathsf{a} \doteqdot \mathsf{i} \text{ in } \mathsf{p})]\rceil)$]

[Local $\gg$ a = i; $\mathsf{p} \overset{\text{tex}}{\to}$ “
\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

$:}%
\makebox[0.4\textwidth][l]{$Local{}\gg{}$}%
\quad%
\parbox[t]{0.4\textwidth}{$#1.
= #2.
$\hfill\makebox[0mm][l]{\quad ;}}#3."]

[Local $\gg$ u = v; p $\overset{\text{pyk}}{\to}$ "locally define ∗ as ∗ end line ∗"]

∗&∗

[∗&∗ $\overset{\text{name}}{\to}$ "#1.
\& #2."]

[∗&∗ $\overset{\text{tex}}{\to}$ "#1.
&#2."]

[∗&∗ $\overset{\text{pyk}}{\to}$ "∗ tab ∗"]

∗\\∗

[∗\\∗ $\overset{\text{name}}{\to}$ "#1.
\backslash \backslash #2."]

[∗\\∗ $\overset{\text{tex}}{\to}$ "#1.
\\ #2."]

[∗\\∗ $\overset{\text{pyk}}{\to}$ "∗ row

∗"]

The pyk compiler, version 0.grue.20060417 by Klaus Grue
GRD-2006-02-24.UTC:10:23:46.350024 = MJD-53790.TAI:10:24:19.350024 = LGT-4647493459350024e-6