Logiweb codex of test

$* \Rightarrow *$

$[\mathsf{x} \Rightarrow \mathsf{y} \overset{\text{tex}}{\to}$ "#1. \Rightarrow #2."]

test

$[\text{test} \overset{\text{prio}}{\mapsto}$

Preassociative

[test], [base], [bracket $*$ end bracket], [big bracket $*$ end bracket], [$\$ * \$$], [**flush left** [$*$]], [x], [y], [z], [[$* \bowtie *$]], [[$* \overset{*}{\to} *$]], [pyk], [tex], [name], [prio], [$*$], [T], [if($*, *, *$)], [[$* \overset{*}{\Rightarrow} *$]], [val], [claim], [$\bot$], [f($*$)], [$(*)^{\mathrm{I}}$], [F], [$\underline{0}$], [$\underline{1}$], [$\underline{2}$], [$\underline{3}$], [$\underline{4}$], [$\underline{5}$], [$\underline{6}$], [$\underline{7}$], [$\underline{8}$], [$\underline{9}$], [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], [$\langle * | * := * \rangle$], [$\mathcal{M}(*)$], [$\tilde{\mathcal{U}}(*)$], [$\mathcal{U}(*)$], [$\mathcal{U}^{\mathrm{M}}(*)$], [**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], [$\mathsf{s}_0$], [**zip**($*, *$)], [**assoc**$_1$($*, *, *$)], [$(*)^{\mathbf{P}}$], [self], [[$* \overset{.}{=} *$]], [[$* \overset{.}{=} *$]], [[$* \overset{.}{=} *$]], [[$* \overset{\text{pyk}}{=} *$]], [[$* \overset{\text{tex}}{=} *$]], [[$* \overset{\text{name}}{=} *$]], [**Priority table**[$*$]], [$\tilde{\mathcal{M}}_1$], [$\tilde{\mathcal{M}}_2(*)$], [$\tilde{\mathcal{M}}_3(*)$], [$\tilde{\mathcal{M}}_4(*, *, *, *)$], [$\mathcal{M}(*, *, *)$], [$\tilde{\mathcal{Q}}(*, *, *)$], [$\tilde{\mathcal{Q}}_2(*, *, *)$], [$\tilde{\mathcal{Q}}_3(*, *, *, *)$], [$\tilde{\mathcal{Q}}^*(*, *, *)$], [$(*)$], [$(*)$], [display($*$)], [statement($*$)], [[$*$]$\dot{}$], [[$*$]$^-$], [**aspect**($*, *$)], [**aspect**($*, *, *$)], [$\langle * \rangle$], [**tuple**$_1$($*$)], [**tuple**$_2$($*$)], [let$_2$($*, *$)], [let$_1$($*, *$)],

$[[* \overset{\text{claim}}{=} *]]$, [checker], $[\mathbf{check}(*, *)]$, $[\mathbf{check}_2(*, *, *)]$, $[\mathbf{check}_3(*, *, *)]$,
$[\mathbf{check}^*(*, *)]$, $[\mathbf{check}_2^*(*, *, *)]$, $[[*]^{\cdot}]$, $[[*]^-]$, $[[*]^\circ]$, [msg], $[[* \overset{\text{msg}}{=} *]]$, [<stmt>],
[stmt], $[[* \overset{\text{stmt}}{=} *]]$, [HeadNil'], [HeadPair'], [Transitivity'], $[\perp\!\!\!\perp]$, [Contra'], $[\text{T}'_\text{E}]$,
$[\text{L}_1]$, $[\underline{*}]$, $[\mathcal{A}]$, $[\mathcal{B}]$, $[\mathcal{C}]$, $[\mathcal{D}]$, $[\mathcal{E}]$, $[\mathcal{F}]$, $[\mathcal{G}]$, $[\mathcal{H}]$, $[\mathcal{I}]$, $[\mathcal{J}]$, $[\mathcal{K}]$, $[\mathcal{L}]$, $[\mathcal{M}]$, $[\mathcal{N}]$, $[\mathcal{O}]$, $[\mathcal{P}]$, $[\mathcal{Q}]$,
$[\mathcal{R}]$, $[\mathcal{S}]$, $[\mathcal{T}]$, $[\mathcal{U}]$, $[\mathcal{V}]$, $[\mathcal{W}]$, $[\mathcal{X}]$, $[\mathcal{Y}]$, $[\mathcal{Z}]$, $[\langle * \mid * := *\rangle]$, $[\langle^* * \mid * := *\rangle]$, $[\emptyset]$, [Remainder],
$[(*)^\mathbf{v}]$, $[\text{intro}(*, *, *, *)]$, $[\text{intro}(*, *, *)]$, $[\text{error}(*, *, *)]$, $[\text{error}_2(*, *)]$, $[\text{proof}(*, *, *)]$,
$[\text{proof}_2(*, *, *)]$, $[\mathcal{S}(*, *)]$, $[\mathcal{S}^\text{I}(*, *)]$, $[\mathcal{S}^\rhd(*, *)]$, $[\mathcal{S}_1^\rhd(*, *, *)]$, $[\mathcal{S}^\text{E}(*, *)]$, $[\mathcal{S}_1^\text{E}(*, *, *)]$,
$[\mathcal{S}^+(*, *)]$, $[\mathcal{S}_1^+(*, *, *)]$, $[\mathcal{S}^-(*, *)]$, $[\mathcal{S}_1^-(*, *, *)]$, $[\mathcal{S}^*(*, *)]$, $[\mathcal{S}_1^*(*, *, *)]$,
$[\mathcal{S}_2^*(*, *, *, *)]$, $[\mathcal{S}^@(*, *)]$, $[\mathcal{S}_1^@(*, *, *)]$, $[\mathcal{S}^\vdash(*, *)]$, $[\mathcal{S}_1^\vdash(*, *, *)]$, $[\mathcal{S}^\Vdash(*, *)]$,
$[\mathcal{S}_1^\Vdash(*, *, *)]$, $[\mathcal{S}^\text{i.e.}(*, *)]$, $[\mathcal{S}_1^\text{i.e.}(*, *, *)]$, $[\mathcal{S}_2^\text{i.e.}(*, *, *)]$, $[\mathcal{S}^\forall(*, *)]$,
$[\mathcal{S}_1^\forall(*, *, *)]$, $[\mathcal{S}^\text{:}(*, *)]$, $[\mathcal{S}_1^\text{:}(*, *, *)]$, $[\mathcal{S}_2^\text{:}(*, *, *)]$, $[\mathcal{T}(*)]$, $[\text{claims}(*, *, *)]$,
$[\text{claims}_2(*, *, *)]$, [<proof>], [proof], $[[\mathbf{Lemma} *:*]]$, $[[\mathbf{Proof\ of} *:*]]$,
$[[* \mathbf{lemma} *:*]]$, $[[* \mathbf{antilemma} *:*]]$, $[[* \mathbf{rule} *:*]]$, $[[* \mathbf{antirule} *:*]]$,
[verifier], $[\mathcal{V}_1(*)]$, $[\mathcal{V}_2(*, *)]$, $[\mathcal{V}_3(*, *, *, *)]$, $[\mathcal{V}_4(*, *)]$, $[\mathcal{V}_5(*, *, *, *)]$, $[\mathcal{V}_6(*, *, *, *)]$,
$[\mathcal{V}_7(*, *, *, *)]$, $[\text{Cut}(*, *)]$, $[\text{Head}_\oplus(*)]$, $[\text{Tail}_\oplus(*)]$, $[\text{rule}_1(*, *)]$, $[\text{rule}(*, *)]$,
[Rule tactic], $[\text{Plus}(*, *)]$, $[[\mathbf{Theory} *]]$, $[\text{theory}_2(*, *)]$, $[\text{theory}_3(*, *)]$,
$[\text{theory}_4(*, *, *)]$, [HeadNil''], [HeadPair''], [Transitivity''], [Contra''], [HeadNil],
[HeadPair], [Transitivity], [Contra], $[\text{T}_\text{E}]$, [ragged right],
[ragged right expansion], $[\text{parm}(*, *, *)]$, $[\text{parm}^*(*, *, *)]$, $[\text{inst}(*, *)]$,
$[\text{inst}^*(*, *)]$, $[\text{occur}(*, *, *)]$, $[\text{occur}^*(*, *, *)]$, $[\text{unify}(* = *, *)]$, $[\text{unify}^*(* = *, *)]$,
$[\text{unify}_2(* = *, *)]$, $[\text{L}_a]$, $[\text{L}_b]$, $[\text{L}_c]$, $[\text{L}_d]$, $[\text{L}_e]$, $[\text{L}_f]$, $[\text{L}_g]$, $[\text{L}_h]$, $[\text{L}_i]$, $[\text{L}_j]$, $[\text{L}_k]$, $[\text{L}_l]$, $[\text{L}_m]$,
$[\text{L}_n]$, $[\text{L}_o]$, $[\text{L}_p]$, $[\text{L}_q]$, $[\text{L}_r]$, $[\text{L}_s]$, $[\text{L}_t]$, $[\text{L}_u]$, $[\text{L}_v]$, $[\text{L}_w]$, $[\text{L}_x]$, $[\text{L}_y]$, $[\text{L}_z]$, $[\text{L}_A]$, $[\text{L}_B]$, $[\text{L}_C]$,
$[\text{L}_D]$, $[\text{L}_E]$, $[\text{L}_F]$, $[\text{L}_G]$, $[\text{L}_H]$, $[\text{L}_I]$, $[\text{L}_J]$, $[\text{L}_K]$, $[\text{L}_L]$, $[\text{L}_M]$, $[\text{L}_N]$, $[\text{L}_O]$, $[\text{L}_P]$, $[\text{L}_Q]$, $[\text{L}_R]$,
$[\text{L}_S]$, $[\text{L}_T]$, $[\text{L}_U]$, $[\text{L}_V]$, $[\text{L}_W]$, $[\text{L}_X]$, $[\text{L}_Y]$, $[\text{L}_Z]$, $[\text{L}_?]$, [Reflexivity], [Reflexivity$_1$],
[Commutativity], [Commutativity$_1$], [<tactic>], [tactic], $[[* \overset{\text{tactic}}{=} *]]$, $[\mathcal{P}(*, *, *)]$,
$[\mathcal{P}^*(*, *, *)]$, $[\text{p}_0]$, $[\text{conclude}_1(*, *)]$, $[\text{conclude}_2(*, *, *)]$, $[\text{conclude}_3(*, *, *, *)]$,
$[\text{conclude}_4(*, *)]$, [check], $[[* \overset{\circ}{=} *]]$, $[\text{RootVisible}(*)]$, [A], [R], [C], [T], [L], $[\{*\}]$, $[\overline{*}]$,
$[a]$, $[b]$, $[c]$, $[d]$, $[e]$, $[f]$, $[g]$, $[h]$, $[i]$, $[j]$, $[k]$, $[l]$, $[m]$, $[n]$, $[o]$, $[p]$, $[q]$, $[r]$, $[s]$, $[t]$, $[u]$, $[v]$,
$[w]$, $[x]$, $[y]$, $[z]$, $[\langle * \equiv * \mid * := *\rangle]$, $[\langle * \equiv^0 * \mid * := *\rangle]$, $[\langle * \equiv^1 * \mid * := *\rangle]$, $[\langle * \equiv^* * \mid * := *\rangle]$,
$[\text{Ded}(*, *)]$, $[\text{Ded}_0(*, *)]$, $[\text{Ded}_1(*, *, *)]$, $[\text{Ded}_2(*, *, *)]$, $[\text{Ded}_3(*, *, *, *)]$,
$[\text{Ded}_4(*, *, *)]$, $[\text{Ded}_4^*(*, *, *, *)]$, $[\text{Ded}_5(*, *, *)]$, $[\text{Ded}_6(*, *, *, *)]$,
$[\text{Ded}_6^*(*, *, *, *)]$, $[\text{Ded}_7(*)]$, $[\text{Ded}_8(*, *)]$, $[\text{Ded}_8^*(*, *)]$, [S], [Neg], [MP], [Gen],
[Ded], [S1], [S2], [S3], [S4], [S5], [S6], [S7], [S8], [S9], [Repetition], [A1'], [A2'], [A4'],
[A5'], [Prop 3.2a], [Prop 3.2b], [Prop 3.2c], [Prop 3.2d], [Prop 3.2e$_1$], [Prop 3.2e$_2$],
[Prop 3.2e], [Prop 3.2f$_1$], [Prop 3.2f$_2$], [Prop 3.2f], [Prop 3.2g$_1$], [Prop 3.2g$_2$],
[Prop 3.2g], [Prop 3.2h$_1$], [Prop 3.2h$_2$], [Prop 3.2h], $[\text{Block}_1(*, *, *)]$, $[\text{Block}_2(*)]$,
[pred calc], [pc1], [pc2], [pc3], [pc4], [pc5], [pc6], [pc7], [pc8], [pc9], [pc10], [pc11],
[pc12], [pcmp], [pcunsound], [pcia], [pcie], [pcdeduction], [trivia], [repeat],
[andintro], [andelim1], [andelim2], [orintro1], [orintro2], [orelim], [notintro],
[implyintro], [notnotintro], [notnotelim], [mt], [pbc], [lem], [forallintro],
[forallelim], [existsintro], [existselim], [bottomelim], [lemnotintro], [hlplem1],
[hlplem2], [hlplem3], [hlplem4], [hlplem5], [goal1], [hlplem6], [goal2];

Preassociative

$[*_{\text{-}}\{*\}]$, $[*/\text{indexintro}(*, *, *, *)]$, $[*/\text{intro}(*, *, *)]$, $[*/\text{bothintro}(*, *, *, *, *)]$,
$[*/\text{nameintro}(*, *, *, *)]$, $[*']$, $[*[*]]$, $[*[*\to*]]$, $[*[*\Rightarrow*]]$, $[*0]$, $[*1]$, $[0\text{b}]$, $[*\text{-color}(*)]$,

2

[*-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}], [*$^\mathrm{E}$], [*$^\mathcal{V}$], [*$^\mathcal{C}$], [*$^{\mathcal{C}^*}$],
[*$^\mathrm{hide}$];

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 *], [MacroIndent(*)];

Preassociative

[* ' *], [* ` *];

Preassociative

[*$'$];

Preassociative

[* ' *], [* ` *];

Preassociative

[* $\cdot$ *], [* $\cdot_0$ *];

Preassociative

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

Preassociative

[* $\cup$ {*}], [* $\cup$ *], [*\{*}];

Postassociative

[* $\therefore$ *], [* $\underaccent{\dot}{\therefore}$ *], [* $\because$ *], [* $\underline{+2*}$ *], [* :: *], [* +2* *];

Postassociative

[*, *];

Preassociative

[* $\overset{\mathrm{B}}{\approx}$ *], [* $\overset{\mathrm{D}}{\approx}$ *], [* $\overset{\mathrm{C}}{\approx}$ *], [* $\overset{\mathrm{P}}{\approx}$ *], [* $\approx$ *], [* = *], [* $\overset{+}{\to}$ *], [* $\overset{\mathrm{t}}{=}$ *], [* $\overset{\mathrm{t}^*}{=}$ *], [* $\overset{\mathrm{r}}{=}$ *],
[* $\in_\mathrm{t}$ *], [* $\subseteq_\mathrm{T}$ *], [* $\overset{\mathrm{T}}{=}$ *], [* $\overset{\mathrm{s}}{=}$ *], [* free in *], [* free in* *], [* free for * in *],
[* free for* * in *], [* $\in_\mathrm{c}$ *], [* < *], [* <$'$ *], [* $\leq'$ *], [* = *], [* $\neq$ *], [*$^\mathrm{var}$],
[*#^{0} *], [*#^{1} *], [*#* *], [* $\equiv$ *], [* = *];

Preassociative

[¬*], [¬*];

Preassociative

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

Preassociative

[* $\vee$ *], [* $\parallel$ *], [* $\ddot\vee$ *], [* $\vee$ *];

Preassociative

[∃*: *], [∀*: *], [$\forall_\mathrm{obj}$*: *], [∀ * . (*)], [∃ * . (*)];

Postassociative

[* $\ddot\Rightarrow$ *], [* $\Rightarrow$ *], [* $\Leftrightarrow$ *];

Postassociative

$[* : *], [* \text{ spy } *], [*!*];$
Preassociative
$[* \left\{ \begin{array}{c} * \\ * \end{array} \right.];$

Preassociative
$[\lambda * .*], [\Lambda * .*], [\Lambda *], [\textbf{if } * \textbf{ then } * \textbf{ else } *], [\textbf{let } * = * \textbf{ in } *], [\textbf{let } * \stackrel{.}{=} * \text{ in } *];$
Preassociative
$[*\#*];$
Preassociative
$[*^{\text{I}}], [*^{\triangleright}], [*^{\text{V}}], [*^{+}], [*^{-}], [**];$
Preassociative
$[* @ *], [* \triangleright *], [* \triangleright\!\!\!\!\triangleright *], [* \gg *], [* \trianglerighteq *];$
Postassociative
$[* \vdash *], [* \Vdash *], [* \text{ i.e. } *];$
Preassociative
$[\forall *: *], [\Pi *: *];$
Postassociative
$[* \oplus *];$
Postassociative
$[*; *];$
Preassociative
$[* \text{ proves } *];$
Preassociative
$[* \textbf{ proof of } * : *], [\text{Line } * : * \gg *; *], [\text{Last line } * \gg * \square],$
$[\text{Line} * : \text{Premise} \gg *; *], [\text{Line} * : \text{Side-condition} \gg *; *], [\text{Arbitrary} \gg *; *],$
$[\text{Local} \gg * = *; *], [\text{Begin} *; * : \text{End}; *], [\text{Last block line} * \gg *;],$
$[\text{Arbitrary} \gg *; *];$
Postassociative
$[* \mid *];$
Postassociative
$[* , *], [*[*]*];$
Preassociative
$[*\&*], [\rightarrow];$
Preassociative
$[*\backslash\backslash*], [* \text{ linebreak}[4] *], [*\backslash\backslash*];$
Preassociative
$[* \in *];]$

$[\text{test} \stackrel{\text{pyk}}{\rightarrow} \text{"test"}]$

pred calc

$[\text{pred calc} \stackrel{\text{stmt}}{\rightarrow} \forall \underline{f}: \forall \underline{g}: \underline{f} \vdash \underline{g} \vdash \underline{f} \vdash \underline{g} \oplus \forall \underline{f}: \forall \underline{g}: \underline{f} \wedge \underline{g} \Rightarrow \underline{f} \oplus \forall \underline{f}: \neg\neg \underline{f} \Rightarrow \underline{f} \oplus$
$\forall \underline{f}: \forall \underline{g}: \forall \underline{h}: \underline{f} \Rightarrow \underline{g} \Rightarrow \underline{f} \Rightarrow \underline{g} \Rightarrow \underline{h} \Rightarrow \underline{f} \Rightarrow \underline{h} \oplus \forall \underline{x}: \forall \underline{r}: \forall \underline{g}: \forall \underline{f}: \lceil \underline{x} \rceil \#^0 \lceil \underline{r} \rceil \Vdash \lceil \underline{x} \rceil \#^0 \lceil \underline{g} \rceil \Vdash$

$\langle\lceil\underline{g}\rceil\equiv^0\lceil\underline{f}\rceil|\lceil\underline{x}\rceil:=\lceil\underline{r}\rceil\rangle \Vdash \underline{g} \Rightarrow \exists\underline{x}.\,(\underline{f}) \oplus \forall\underline{f}:\forall\underline{g}:\underline{f} \Rightarrow \underline{f} \vee \underline{g} \oplus \forall\underline{f}:\forall\underline{g}:\forall\underline{h}:\underline{f} \Rightarrow \underline{g} \Rightarrow \underline{h} \Rightarrow \underline{g} \Rightarrow \underline{f} \vee \underline{h} \Rightarrow \underline{g} \oplus \forall\underline{f}:\forall\underline{g}:\forall\underline{x}:\lceil\underline{x}\rceil\#^0\lceil\underline{g}\rceil \Vdash \underline{f} \Rightarrow \underline{g} \vdash \exists\underline{x}.\,(\underline{f}) \Rightarrow \underline{g} \oplus \forall\underline{f}:\forall\underline{g}:\underline{f} \vdash \underline{f} \Rightarrow \underline{g} \vdash \underline{g} \oplus \forall\underline{f}:\forall\underline{g}:\underline{f} \Rightarrow \underline{g} \vee \underline{f} \oplus \forall\underline{f}:\forall\underline{g}:\underline{f} \Rightarrow \underline{g} \Rightarrow \underline{f} \Rightarrow \neg\underline{g} \Rightarrow \neg\underline{f} \oplus \forall\underline{a}:\forall\underline{b}:\lambda x.\mathrm{Ded}_0(\lceil\underline{a}\rceil,\lceil\underline{b}\rceil) \Vdash \underline{a} \vdash \underline{b} \oplus \forall\underline{f}:\forall\underline{g}:\underline{f} \Rightarrow \underline{g} \Rightarrow \underline{f} \oplus \forall\underline{x}:\forall\underline{r}:\forall\underline{g}:\forall\underline{f}:\lceil\underline{x}\rceil\#^0\lceil\underline{r}\rceil \Vdash \lceil\underline{x}\rceil\#^0\lceil\underline{g}\rceil \oplus \langle\lceil\underline{g}\rceil\equiv^0\lceil\underline{f}\rceil|\lceil\underline{x}\rceil:=\lceil\underline{r}\rceil\rangle \Vdash \forall\underline{x}.\,(\underline{f}) \Rightarrow \underline{g} \oplus \forall\underline{f}:\forall\underline{g}:\underline{f} \Rightarrow \underline{g} \Rightarrow \underline{f} \wedge \underline{g} \oplus \forall\underline{f}:\forall\underline{g}:\underline{f} \wedge \underline{g} \Rightarrow \underline{g} \oplus \forall\underline{f}:\forall\underline{g}:\forall\underline{x}:\lceil\underline{x}\rceil\#^0\lceil\underline{g}\rceil \Vdash \underline{g} \Rightarrow \underline{f} \vdash \underline{g} \Rightarrow \forall\underline{x}.\,(\underline{f})]$

[pred calc $\overset{\mathrm{pyk}}{\rightarrow}$ "pred calc"]

pc1

[pc1 $\overset{\mathrm{proof}}{\rightarrow}$ Rule tactic]

[pc1 $\overset{\mathrm{stmt}}{\rightarrow}$ pred calc $\vdash \forall\underline{f}:\forall\underline{g}:\underline{f} \Rightarrow \underline{g} \Rightarrow \underline{f}$]

[pc1 $\overset{\mathrm{pyk}}{\rightarrow}$ "pc1"]

pc2

[pc2 $\overset{\mathrm{proof}}{\rightarrow}$ Rule tactic]

[pc2 $\overset{\mathrm{stmt}}{\rightarrow}$ pred calc $\vdash \forall\underline{f}:\forall\underline{g}:\forall\underline{h}:\underline{f} \Rightarrow \underline{g} \Rightarrow \underline{f} \Rightarrow \underline{g} \Rightarrow \underline{h} \Rightarrow \underline{f} \Rightarrow \underline{h}$]

[pc2 $\overset{\mathrm{pyk}}{\rightarrow}$ "pc2"]

pc3

[pc3 $\overset{\mathrm{proof}}{\rightarrow}$ Rule tactic]

[pc3 $\overset{\mathrm{stmt}}{\rightarrow}$ pred calc $\vdash \forall\underline{f}:\forall\underline{g}:\underline{f} \Rightarrow \underline{g} \Rightarrow \underline{f} \wedge \underline{g}$]

[pc3 $\overset{\mathrm{pyk}}{\rightarrow}$ "pc3"]

pc4

[pc4 $\overset{\mathrm{proof}}{\rightarrow}$ Rule tactic]

[pc4 $\overset{\mathrm{stmt}}{\rightarrow}$ pred calc $\vdash \forall\underline{f}:\forall\underline{g}:\underline{f} \Rightarrow \underline{f} \vee \underline{g}$]

[pc4 $\overset{\mathrm{pyk}}{\rightarrow}$ "pc4"]

pc5

[pc5 $\overset{\text{proof}}{\rightarrow}$ Rule tactic]

[pc5 $\overset{\text{stmt}}{\rightarrow}$ pred calc ⊢ ∀$\underline{f}$: ∀$\underline{g}$: $\underline{f}$ ⇒ $\underline{g}$ ∨ $\underline{f}$]

[pc5 $\overset{\text{pyk}}{\rightarrow}$ "pc5"]

pc6

[pc6 $\overset{\text{proof}}{\rightarrow}$ Rule tactic]

[pc6 $\overset{\text{stmt}}{\rightarrow}$ pred calc ⊢ ∀$\underline{f}$: ∀$\underline{g}$: $\underline{f}$ ∧ $\underline{g}$ ⇒ $\underline{f}$]

[pc6 $\overset{\text{pyk}}{\rightarrow}$ "pc6"]

pc7

[pc7 $\overset{\text{proof}}{\rightarrow}$ Rule tactic]

[pc7 $\overset{\text{stmt}}{\rightarrow}$ pred calc ⊢ ∀$\underline{f}$: ∀$\underline{g}$: $\underline{f}$ ∧ $\underline{g}$ ⇒ $\underline{g}$]

[pc7 $\overset{\text{pyk}}{\rightarrow}$ "pc7"]

pc8

[pc8 $\overset{\text{proof}}{\rightarrow}$ Rule tactic]

[pc8 $\overset{\text{stmt}}{\rightarrow}$ pred calc ⊢ ∀$\underline{f}$: ∀$\underline{g}$: ∀$\underline{h}$: $\underline{f}$ ⇒ $\underline{g}$ ⇒ $\underline{h}$ ⇒ $\underline{g}$ ⇒ $\underline{f}$ ∨ $\underline{h}$ ⇒ $\underline{g}$]

[pc8 $\overset{\text{pyk}}{\rightarrow}$ "pc8"]

pc9

[pc9 $\overset{\text{proof}}{\rightarrow}$ Rule tactic]

[pc9 $\overset{\text{stmt}}{\rightarrow}$ pred calc ⊢ ∀$\underline{f}$: ∀$\underline{g}$: $\underline{f}$ ⇒ $\underline{g}$ ⇒ $\underline{f}$ ⇒ ¬$\underline{g}$ ⇒ ¬$\underline{f}$]

[pc9 $\overset{\text{pyk}}{\rightarrow}$ "pc9"]

pc10

[pc10 $\overset{\text{proof}}{\rightarrow}$ Rule tactic]

[pc10 $\overset{\text{stmt}}{\rightarrow}$ pred calc $\vdash \forall \underline{f}: \neg\neg\underline{f} \Rightarrow \underline{f}$]

[pc10 $\overset{\text{pyk}}{\rightarrow}$ "pc10"]

pc11

[pc11 $\overset{\text{proof}}{\rightarrow}$ Rule tactic]

[pc11 $\overset{\text{stmt}}{\rightarrow}$ pred calc $\vdash \forall \underline{x}: \forall \underline{r}: \forall \underline{g}: \forall \underline{f}: \lceil \underline{x} \rceil \#^0 \lceil \underline{r} \rceil \Vdash \lceil \underline{x} \rceil \#^0 \lceil \underline{g} \rceil \Vdash \langle \lceil \underline{g} \rceil \equiv^0 \lceil \underline{f} \rceil | \lceil \underline{x} \rceil := \lceil \underline{r} \rceil \rangle \Vdash \forall \underline{x}. (\underline{f}) \Rightarrow \underline{g}$]

[pc11 $\overset{\text{pyk}}{\rightarrow}$ "pc11"]

pc12

[pc12 $\overset{\text{proof}}{\rightarrow}$ Rule tactic]

[pc12 $\overset{\text{stmt}}{\rightarrow}$ pred calc $\vdash \forall \underline{x}: \forall \underline{r}: \forall \underline{g}: \forall \underline{f}: \lceil \underline{x} \rceil \#^0 \lceil \underline{r} \rceil \Vdash \lceil \underline{x} \rceil \#^0 \lceil \underline{g} \rceil \Vdash \langle \lceil \underline{g} \rceil \equiv^0 \lceil \underline{f} \rceil | \lceil \underline{x} \rceil := \lceil \underline{r} \rceil \rangle \Vdash \underline{g} \Rightarrow \exists \underline{x}. (\underline{f})$]

[pc12 $\overset{\text{pyk}}{\rightarrow}$ "pc12"]

pcmp

[pcmp $\overset{\text{proof}}{\rightarrow}$ Rule tactic]

[pcmp $\overset{\text{stmt}}{\rightarrow}$ pred calc $\vdash \forall \underline{f}: \forall \underline{g}: \underline{f} \vdash \underline{f} \Rightarrow \underline{g} \vdash \underline{g}$]

[pcmp $\overset{\text{pyk}}{\rightarrow}$ "pcmp"]

pcunsound

[pcunsound $\overset{\text{proof}}{\rightarrow}$ Rule tactic]

[pcunsound $\overset{\text{stmt}}{\rightarrow}$ pred calc $\vdash \forall \underline{f}: \forall \underline{g}: \underline{f} \vdash \underline{g} \vdash \underline{f} \vdash \underline{g}$]

[pcunsound $\overset{\text{pyk}}{\rightarrow}$ "pcunsound"]

pcia

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

[pcia $\overset{\text{stmt}}{\to}$ pred calc $\vdash \forall \underline{f}: \forall \underline{g}: \forall \underline{x}: \lceil \underline{x} \rceil \#^0 \lceil \underline{g} \rceil \Vdash \underline{g} \Rightarrow \underline{f} \vdash \underline{g} \Rightarrow \forall \underline{x}. (\underline{f})$]

[pcia $\overset{\text{pyk}}{\to}$ "pcia"]

pcie

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

[pcie $\overset{\text{stmt}}{\to}$ pred calc $\vdash \forall \underline{f}: \forall \underline{g}: \forall \underline{x}: \lceil \underline{x} \rceil \#^0 \lceil \underline{g} \rceil \Vdash \underline{f} \Rightarrow \underline{g} \vdash \exists \underline{x}. (\underline{f}) \Rightarrow \underline{g}$]

[pcie $\overset{\text{pyk}}{\to}$ "pcie"]

pcdeduction

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

[pcdeduction $\overset{\text{stmt}}{\to}$ pred calc $\vdash \forall \underline{a}: \forall \underline{b}: \lambda x.\text{Ded}_0(\lceil \underline{a} \rceil, \lceil \underline{b} \rceil) \Vdash \underline{a} \vdash \underline{b}$]

[pcdeduction $\overset{\text{pyk}}{\to}$ "pcdeduction"]

trivia

[trivia $\overset{\text{proof}}{\to}$ $\lambda \mathsf{c}.\lambda \mathsf{x}.\mathcal{P}(\lceil$pred calc $\vdash \forall \underline{f}: \text{pc2} \gg \underline{f} \Rightarrow \underline{f} \Rightarrow \underline{f} \Rightarrow \underline{f} \Rightarrow \underline{f} \Rightarrow \underline{f} \Rightarrow \underline{f} \Rightarrow \underline{f} \Rightarrow \underline{f}; \text{pc1} \gg \underline{f} \Rightarrow \underline{f} \Rightarrow \underline{f}; \text{pcmp} \rhd \underline{f} \Rightarrow \underline{f} \Rightarrow \underline{f} \rhd \underline{f} \Rightarrow \underline{f} \Rightarrow \underline{f} \Rightarrow \underline{f} \Rightarrow \underline{f} \Rightarrow \underline{f} \Rightarrow \underline{f} \gg \underline{f} \Rightarrow \underline{f} \Rightarrow \underline{f} \Rightarrow \underline{f} \Rightarrow \underline{f}; \text{pc1} \gg \underline{f} \Rightarrow \underline{f} \Rightarrow \underline{f} \Rightarrow \underline{f}; \text{pcmp} \rhd \underline{f} \Rightarrow \underline{f} \Rightarrow \underline{f} \Rightarrow \underline{f} \rhd \underline{f} \Rightarrow \underline{f} \Rightarrow \underline{f} \Rightarrow \underline{f} \Rightarrow \underline{f} \gg \underline{f} \Rightarrow \underline{f} \rceil, p_0, \mathsf{c})$]

[trivia $\overset{\text{stmt}}{\to}$ pred calc $\vdash \forall \underline{f}: \underline{f} \Rightarrow \underline{f}$]

[trivia $\overset{\text{pyk}}{\to}$ "trivia"]

repeat

[repeat $\overset{\text{proof}}{\to}$ $\lambda \mathsf{c}.\lambda \mathsf{x}.\mathcal{P}(\lceil$pred calc $\vdash \forall \underline{f}: \underline{f} \vdash \text{trivia} \gg \underline{f} \Rightarrow \underline{f}; \text{pcmp} \rhd \underline{f} \rhd \underline{f} \Rightarrow \underline{f} \gg \underline{f} \rceil, p_0, \mathsf{c})$]

[repeat $\overset{\text{stmt}}{\to}$ pred calc $\vdash \forall \underline{f}: \underline{f} \vdash \underline{f}$]

[repeat $\overset{\text{pyk}}{\to}$ "repeat"]

andintro

[andintro $\overset{\text{proof}}{\rightarrow}$ λc.λx.$\mathcal{P}$($\ulcorner$pred calc $\vdash \forall\underline{f}: \forall\underline{g}: \underline{f} \vdash \underline{g} \vdash \text{pc3} \gg \underline{f} \Rightarrow \underline{g} \Rightarrow$
$\underline{f} \wedge \underline{g}$; pcmp $\triangleright \underline{f} \triangleright \underline{f} \Rightarrow \underline{g} \Rightarrow \underline{f} \wedge \underline{g} \gg \underline{g} \Rightarrow \underline{f} \wedge \underline{g}$; pcmp $\triangleright \underline{g} \triangleright \underline{g} \Rightarrow \underline{f} \wedge \underline{g} \gg \underline{f} \wedge \underline{g}\urcorner, p_0, c)$]

[andintro $\overset{\text{stmt}}{\rightarrow}$ pred calc $\vdash \forall\underline{f}: \forall\underline{g}: \underline{f} \vdash \underline{g} \vdash \underline{f} \wedge \underline{g}$]

[andintro $\overset{\text{pyk}}{\rightarrow}$ "andintro"]

andelim1

[andelim1 $\overset{\text{proof}}{\rightarrow}$ λc.λx.$\mathcal{P}$($\ulcorner$pred calc $\vdash \forall\underline{f}: \forall\underline{g}: \underline{f} \wedge \underline{g} \vdash \text{pc6} \gg \underline{f} \wedge \underline{g} \Rightarrow$
$\underline{f}$; pcmp $\triangleright \underline{f} \wedge \underline{g} \triangleright \underline{f} \wedge \underline{g} \Rightarrow \underline{f} \gg \underline{f}\urcorner, p_0, c)$]

[andelim1 $\overset{\text{stmt}}{\rightarrow}$ pred calc $\vdash \forall\underline{f}: \forall\underline{g}: \underline{f} \wedge \underline{g} \vdash \underline{f}$]

[andelim1 $\overset{\text{pyk}}{\rightarrow}$ "andelim1"]

andelim2

[andelim2 $\overset{\text{proof}}{\rightarrow}$ λc.λx.$\mathcal{P}$($\ulcorner$pred calc $\vdash \forall\underline{f}: \forall\underline{g}: \underline{f} \wedge \underline{g} \vdash \text{pc7} \gg \underline{f} \wedge \underline{g} \Rightarrow$
$\underline{g}$; pcmp $\triangleright \underline{f} \wedge \underline{g} \triangleright \underline{f} \wedge \underline{g} \Rightarrow \underline{g} \gg \underline{g}\urcorner, p_0, c)$]

[andelim2 $\overset{\text{stmt}}{\rightarrow}$ pred calc $\vdash \forall\underline{f}: \forall\underline{g}: \underline{f} \wedge \underline{g} \vdash \underline{g}$]

[andelim2 $\overset{\text{pyk}}{\rightarrow}$ "andelim2"]

orintro1

[orintro1 $\overset{\text{proof}}{\rightarrow}$ λc.λx.$\mathcal{P}$($\ulcorner$pred calc $\vdash \forall\underline{f}: \forall\underline{g}: \underline{f} \vdash \text{pc4} \gg \underline{f} \Rightarrow \underline{f} \vee \underline{g}$; pcmp $\triangleright \underline{f} \triangleright \underline{f} \Rightarrow$
$\underline{f} \vee \underline{g} \gg \underline{f} \vee \underline{g}\urcorner, p_0, c)$]

[orintro1 $\overset{\text{stmt}}{\rightarrow}$ pred calc $\vdash \forall\underline{f}: \forall\underline{g}: \underline{f} \vdash \underline{f} \vee \underline{g}$]

[orintro1 $\overset{\text{pyk}}{\rightarrow}$ "orintro1"]

orintro2

[orintro2 $\overset{\text{proof}}{\rightarrow}$ λc.λx.$\mathcal{P}$($\ulcorner$pred calc $\vdash \forall\underline{f}: \forall\underline{g}: \underline{g} \vdash \text{pc5} \gg \underline{g} \Rightarrow$
$\underline{f} \vee \underline{g}$; pcmp $\triangleright \underline{g} \triangleright \underline{g} \Rightarrow \underline{f} \vee \underline{g} \gg \underline{f} \vee \underline{g}\urcorner, p_0, c)$]

[orintro2 $\overset{\text{stmt}}{\rightarrow}$ pred calc $\vdash \forall\underline{f}: \forall\underline{g}: \underline{g} \vdash \underline{f} \vee \underline{g}$]

[orintro2 $\overset{\mathrm{pyk}}{\rightarrow}$ "orintro2"]

orelim

[orelim $\overset{\mathrm{proof}}{\rightarrow}$ $\lambda\mathsf{c}.\lambda\mathsf{x}.\mathcal{P}(\lceil$pred calc $\vdash \forall\underline{f}\colon\forall\underline{g}\colon\forall\underline{h}\colon\underline{f}\vee\underline{g}\vdash\underline{f}\vdash\underline{h}\vdash\underline{g}\vdash\underline{h}\vdash$ implyintro $\rhd$ $\underline{f}\vdash\underline{h}\gg\underline{f}\Rightarrow\underline{h}$; implyintro $\rhd\underline{g}\vdash\underline{h}\gg\underline{g}\Rightarrow\underline{h}$; pc8 $\gg\underline{f}\Rightarrow\underline{h}\Rightarrow\underline{g}\Rightarrow\underline{h}\Rightarrow\underline{f}\vee\underline{g}\Rightarrow$ $\underline{h}$; pcmp$\rhd\underline{f}\Rightarrow\underline{h}\rhd\underline{f}\Rightarrow\underline{h}\Rightarrow\underline{g}\Rightarrow\underline{h}\Rightarrow\underline{f}\vee\underline{g}\Rightarrow\underline{h}\gg\underline{g}\Rightarrow\underline{h}\Rightarrow\underline{f}\vee\underline{g}\Rightarrow\underline{h}$; pcmp$\rhd\underline{g}\Rightarrow$ $\underline{h}\rhd\underline{g}\Rightarrow\underline{h}\Rightarrow\underline{f}\vee\underline{g}\Rightarrow\underline{h}\gg\underline{f}\vee\underline{g}\Rightarrow\underline{h}$; pcmp $\rhd\underline{f}\vee\underline{g}\rhd\underline{f}\vee\underline{g}\Rightarrow\underline{h}\gg\underline{h}\rceil, \mathsf{p}_0, \mathsf{c})]$

[orelim $\overset{\mathrm{stmt}}{\rightarrow}$ pred calc $\vdash \forall\underline{f}\colon\forall\underline{g}\colon\forall\underline{h}\colon\underline{f}\vee\underline{g}\vdash\underline{f}\vdash\underline{h}\vdash\underline{g}\vdash\underline{h}\vdash\underline{h}]$

[orelim $\overset{\mathrm{pyk}}{\rightarrow}$ "orelim"]

notintro

[notintro $\overset{\mathrm{proof}}{\rightarrow}$ $\lambda\mathsf{c}.\lambda\mathsf{x}.\mathcal{P}(\lceil$pred calc $\vdash \forall\underline{f}\colon\forall\underline{g}\colon\underline{f}\vdash\underline{g}\vdash\underline{f}\vdash\neg\underline{g}\vdash$ implyintro $\rhd\underline{f}\vdash$ $\underline{g}\gg\underline{f}\Rightarrow\underline{g}$; implyintro $\rhd\underline{f}\vdash\neg\underline{g}\gg\underline{f}\Rightarrow\neg\underline{g}$; pc9 $\gg\underline{f}\Rightarrow\underline{g}\Rightarrow\underline{f}\Rightarrow\neg\underline{g}\Rightarrow$ $\neg\underline{f}$; pcmp $\rhd\underline{f}\Rightarrow\underline{g}\rhd\underline{f}\Rightarrow\underline{g}\Rightarrow\underline{f}\Rightarrow\neg\underline{g}\Rightarrow\neg\underline{f}\gg\underline{f}\Rightarrow\neg\underline{g}\Rightarrow\neg\underline{f}$; pcmp $\rhd\underline{f}\Rightarrow$ $\neg\underline{g}\rhd\underline{f}\Rightarrow\neg\underline{g}\Rightarrow\neg\underline{f}\gg\neg\underline{f}\rceil, \mathsf{p}_0, \mathsf{c})]$

[notintro $\overset{\mathrm{stmt}}{\rightarrow}$ pred calc $\vdash \forall\underline{f}\colon\forall\underline{g}\colon\underline{f}\vdash\underline{g}\vdash\underline{f}\vdash\neg\underline{g}\vdash\neg\underline{f}]$

[notintro $\overset{\mathrm{pyk}}{\rightarrow}$ "notintro"]

implyintro

[implyintro $\overset{\mathrm{proof}}{\rightarrow}$ $\lambda\mathsf{c}.\lambda\mathsf{x}.\mathcal{P}(\lceil$pred calc $\vdash \forall\underline{f}\colon\forall\underline{g}\colon\underline{f}\vdash\underline{g}\vdash\forall\underline{f}\colon\forall\underline{g}\colon\underline{f}\vdash$ pcunsound $\rhd\underline{f}\vdash$ $\underline{g}\rhd\underline{f}\gg\underline{g}$; pcdeduction $\rhd\forall\underline{f}\colon\forall\underline{g}\colon\underline{f}\vdash\underline{g}\gg\underline{f}\Rightarrow\underline{g}\rceil, \mathsf{p}_0, \mathsf{c})]$

[implyintro $\overset{\mathrm{stmt}}{\rightarrow}$ pred calc $\vdash \forall\underline{f}\colon\forall\underline{g}\colon\underline{f}\vdash\underline{g}\vdash\underline{f}\Rightarrow\underline{g}]$

[implyintro $\overset{\mathrm{pyk}}{\rightarrow}$ "implyintro"]

notnotintro

[notnotintro $\overset{\mathrm{proof}}{\rightarrow}$ $\lambda\mathsf{c}.\lambda\mathsf{x}.\mathcal{P}(\lceil$pred calc $\vdash \forall\underline{f}\colon\underline{f}\vdash\forall\underline{f}\colon\underline{f}\vdash\neg\underline{f}\vdash$ repeat $\rhd\underline{f}\gg$ $\underline{f}$; pcdeduction $\rhd\forall\underline{f}\colon\underline{f}\vdash\neg\underline{f}\vdash\underline{f}\gg\underline{f}\Rightarrow\neg\underline{f}\Rightarrow\underline{f}$; pcmp $\rhd\underline{f}\rhd\underline{f}\Rightarrow\neg\underline{f}\Rightarrow\underline{f}\gg\neg\underline{f}\Rightarrow$ $\underline{f}$; trivia $\gg\neg\underline{f}\Rightarrow\neg\underline{f}$; pc9 $\gg\neg\underline{f}\Rightarrow\underline{f}\Rightarrow\neg\underline{f}\Rightarrow\neg\underline{f}\Rightarrow\neg\neg\underline{f}$; pcmp $\rhd\neg\underline{f}\Rightarrow\underline{f}\rhd\neg\underline{f}\Rightarrow$ $\underline{f}\Rightarrow\neg\underline{f}\Rightarrow\neg\underline{f}\Rightarrow\neg\neg\underline{f}\gg\neg\underline{f}\Rightarrow\neg\underline{f}\Rightarrow\neg\neg\underline{f}$; pcmp $\rhd\neg\underline{f}\Rightarrow\neg\underline{f}\rhd\neg\underline{f}\Rightarrow\neg\underline{f}\Rightarrow\neg\neg\underline{f}\gg$ $\neg\neg\underline{f}\rceil, \mathsf{p}_0, \mathsf{c})]$

[notnotintro $\overset{\mathrm{stmt}}{\rightarrow}$ pred calc $\vdash \forall\underline{f}\colon\underline{f}\vdash\neg\neg\underline{f}]$

[notnotintro $\overset{\text{pyk}}{\rightarrow}$ "notnotintro"]

notnotelim

[notnotelim $\overset{\text{proof}}{\rightarrow}$ $\lambda\mathsf{c}.\lambda\mathsf{x}.\mathcal{P}(\lceil$pred calc $\vdash \forall\underline{f}: \neg\neg\underline{f} \vdash$ pc10 $\gg \neg\neg\underline{f} \Rightarrow$ $\underline{f}$; pcmp $\rhd \neg\neg\underline{f} \rhd \neg\neg\underline{f} \Rightarrow \underline{f} \gg \underline{f}\rceil, p_0, \mathsf{c})]$

[notnotelim $\overset{\text{stmt}}{\rightarrow}$ pred calc $\vdash \forall\underline{f}: \neg\neg\underline{f} \vdash \underline{f}$]

[notnotelim $\overset{\text{pyk}}{\rightarrow}$ "notnotelim"]

mt

[mt $\overset{\text{proof}}{\rightarrow}$ $\lambda\mathsf{c}.\lambda\mathsf{x}.\mathcal{P}(\lceil$pred calc $\vdash \forall\underline{f}: \forall\underline{g}: \underline{f} \Rightarrow \underline{g} \vdash \neg\underline{g} \vdash \forall\underline{f}: \forall\underline{g}: \underline{f} \vdash$ pcmp $\rhd \underline{f} \rhd \underline{f} \Rightarrow$ $\underline{g} \gg \underline{g}$; pcdeduction $\rhd \forall\underline{f}: \forall\underline{g}: \underline{f} \vdash \underline{g} \gg \underline{f} \vdash \underline{g}; \forall\underline{f}: \forall\underline{g}: \underline{f} \vdash$ repeat $\rhd \neg\underline{g} \gg$ $\neg\underline{g}$; pcdeduction $\rhd \forall\underline{f}: \forall\underline{g}: \underline{f} \vdash \neg\underline{g} \gg \underline{f} \vdash \neg\underline{g}$; notintro $\rhd \underline{f} \vdash \underline{g} \rhd \underline{f} \vdash \neg\underline{g} \gg \neg\underline{f}\rceil, p_0, \mathsf{c})]$

[mt $\overset{\text{stmt}}{\rightarrow}$ pred calc $\vdash \forall\underline{f}: \forall\underline{g}: \underline{f} \Rightarrow \underline{g} \vdash \neg\underline{g} \vdash \neg\underline{f}$]

[mt $\overset{\text{pyk}}{\rightarrow}$ "mt"]

pbc

[pbc $\overset{\text{proof}}{\rightarrow}$ $\lambda\mathsf{c}.\lambda\mathsf{x}.\mathcal{P}(\lceil$pred calc $\vdash \forall\underline{f}: \forall\underline{g}: \neg\underline{f} \vdash \underline{g} \vdash \neg\underline{f} \vdash \neg\underline{g} \vdash$ notintro $\rhd \neg\underline{f} \vdash$ $\underline{g} \rhd \neg\underline{f} \vdash \neg\underline{g} \gg \neg\neg\underline{f}$; notnotelim $\rhd \neg\neg\underline{f} \gg \underline{f}\rceil, p_0, \mathsf{c})]$

[pbc $\overset{\text{stmt}}{\rightarrow}$ pred calc $\vdash \forall\underline{f}: \forall\underline{g}: \neg\underline{f} \vdash \underline{g} \vdash \neg\underline{f} \vdash \neg\underline{g} \vdash \underline{f}$]

[pbc $\overset{\text{pyk}}{\rightarrow}$ "pbc"]

lem

[lem $\overset{\text{proof}}{\rightarrow}$ $\lambda\mathsf{c}.\lambda\mathsf{x}.\mathcal{P}(\lceil$pred calc $\vdash \forall\underline{f}: \forall\underline{f}: \neg\underline{f} \vee \neg\underline{f} \vdash \forall\underline{f}: \underline{f} \vdash$ orintro1 $\rhd \underline{f} \gg$ $\underline{f} \vee \neg\underline{f}$; pcdeduction $\rhd \forall\underline{f}: \underline{f} \vdash \underline{f} \vee \neg\underline{f} \gg \underline{f} \vdash \underline{f} \vee \neg\underline{f}; \forall\underline{f}: \underline{f} \vdash$ repeat $\rhd \neg\underline{f} \vee \neg\underline{f} \gg$ $\neg\underline{f} \vee \neg\underline{f}$; pcdeduction $\rhd \forall\underline{f}: \underline{f} \vdash \neg\underline{f} \vee \neg\underline{f} \gg \underline{f} \vdash \neg\underline{f} \vee \neg\underline{f}$; notintro $\rhd \underline{f} \vdash \underline{f} \vee \neg\underline{f} \rhd \underline{f} \vdash$ $\neg\underline{f}\vee\neg\underline{f} \gg \neg\underline{f}$; orintro2 $\rhd \neg\underline{f} \gg \underline{f}\vee\neg\underline{f}$; pcdeduction $\rhd \forall\underline{f}: \neg\underline{f}\vee\neg\underline{f} \vdash \underline{f}\vee\neg\underline{f} \gg \neg\underline{f}\vee\neg\underline{f} \vdash$ $\underline{f} \vee \neg\underline{f}; \forall\underline{f}: \neg\underline{f} \vee \neg\underline{f} \vdash$ repeat $\rhd \neg\underline{f} \vee \neg\underline{f} \gg \neg\underline{f} \vee \neg\underline{f}$; pcdeduction $\rhd \forall\underline{f}: \neg\underline{f} \vee \neg\underline{f} \vdash$ $\neg\underline{f} \vee \neg\underline{f} \gg \neg\underline{f} \vee \neg\underline{f} \vdash \neg\underline{f} \vee \neg\underline{f}$; notintro $\rhd \neg\underline{f} \vee \neg\underline{f} \vdash \underline{f} \vee \neg\underline{f} \rhd \neg\underline{f} \vee \neg\underline{f} \vdash \neg\underline{f} \vee \neg\underline{f} \gg$ $\neg\neg\underline{f} \vee \neg\underline{f}$; notnotelim $\rhd \neg\neg\underline{f} \vee \neg\underline{f} \gg \underline{f} \vee \neg\underline{f}\rceil, p_0, \mathsf{c})]$

[lem $\overset{\text{stmt}}{\rightarrow}$ pred calc $\vdash \forall\underline{f}: \underline{f} \vee \neg\underline{f}$]

[lem $\overset{\text{pyk}}{\rightarrow}$ "lem"]

forallintro

[forallintro $\overset{\text{proof}}{\rightarrow}$ λc.λx.$\mathcal{P}$($\lceil$pred calc $\vdash \forall\underline{f}$: $\forall\underline{g}$: $\forall\underline{x}$: $[\underline{x}]\#^0\lceil\underline{g} \vee \neg\underline{g}\rceil \Vdash \underline{f} \vdash$ lem $\gg$
$\underline{g} \vee \neg\underline{g}$; $\forall\underline{g}$: $\forall\underline{f}$: $\underline{g} \vee \neg\underline{g} \vdash$ repeat $\triangleright \underline{f} \gg \underline{f}$; pcdeduction $\triangleright \forall\underline{g}$: $\forall\underline{f}$: $\underline{g} \vee \neg\underline{g} \vdash \underline{f} \gg$
$\underline{g} \vee \neg\underline{g} \Rightarrow \underline{f}$; pcia $\rhd \lceil\underline{x}\rceil\#^0\lceil\underline{g} \vee \neg\underline{g}\rceil \rhd \underline{g} \vee \neg\underline{g} \Rightarrow \underline{f} \gg \underline{g} \vee \neg\underline{g} \Rightarrow$
$\forall\underline{x}.(\underline{f})$; pcmp $\triangleright \underline{g} \vee \neg\underline{g} \rhd \underline{g} \vee \neg\underline{g} \Rightarrow \forall\underline{x}.(\underline{f}) \gg \forall\underline{x}.(\underline{f})\rceil$, p_0, c)]

[forallintro $\overset{\text{stmt}}{\rightarrow}$ pred calc $\vdash \forall\underline{f}$: $\forall\underline{g}$: $\forall\underline{x}$: $[\underline{x}]\#^0\lceil\underline{g} \vee \neg\underline{g}\rceil \Vdash \underline{f} \vdash \forall\underline{x}.(\underline{f})$]

[forallintro $\overset{\text{pyk}}{\rightarrow}$ "forallintro"]

forallelim

[forallelim $\overset{\text{proof}}{\rightarrow}$ λc.λx.$\mathcal{P}$($\lceil$pred calc $\vdash \forall\underline{x}$: $\forall\underline{r}$: $\forall\underline{g}$: $\forall\underline{f}$: $[\underline{x}]\#^0\lceil\underline{r}\rceil \Vdash [\underline{x}]\#^0\lceil\underline{g}\rceil \Vdash$
$\langle\lceil\underline{g}\rceil\equiv^0\lceil\underline{f}\rceil\vert[\underline{x}]:=\lceil\underline{r}\rceil\rangle \Vdash$ pc11 $\rhd [\underline{x}]\#^0\lceil\underline{r}\rceil \rhd [\underline{x}]\#^0\lceil\underline{g}\rceil \rhd \langle\lceil\underline{g}\rceil\equiv^0\lceil\underline{f}\rceil\vert[\underline{x}]:=\lceil\underline{r}\rceil\rangle \gg$
$\forall\underline{x}.(\underline{f}) \Rightarrow \underline{g}$; $\forall\underline{x}$: $\forall\underline{g}$: $\forall\underline{f}$: $\forall\underline{x}.(\underline{f}) \vdash$ pcmp $\triangleright \forall\underline{x}.(\underline{f}) \rhd \forall\underline{x}.(\underline{f}) \Rightarrow \underline{g} \gg$
$\underline{g}$; pcdeduction $\triangleright \forall\underline{x}$: $\forall\underline{g}$: $\forall\underline{f}$: $\forall\underline{x}.(\underline{f}) \vdash \underline{g} \gg \forall\underline{x}.(\underline{f}) \vdash \underline{g}\rceil$, p_0, c)]

[forallelim $\overset{\text{stmt}}{\rightarrow}$ pred calc $\vdash \forall\underline{x}$: $\forall\underline{r}$: $\forall\underline{g}$: $\forall\underline{f}$: $[\underline{x}]\#^0\lceil\underline{r}\rceil \Vdash [\underline{x}]\#^0\lceil\underline{g}\rceil \Vdash$
$\langle\lceil\underline{g}\rceil\equiv^0\lceil\underline{f}\rceil\vert[\underline{x}]:=\lceil\underline{r}\rceil\rangle \Vdash \forall\underline{x}.(\underline{f}) \vdash \underline{g}$]

[forallelim $\overset{\text{pyk}}{\rightarrow}$ "forallelim"]

existsintro

[existsintro $\overset{\text{proof}}{\rightarrow}$ λc.λx.$\mathcal{P}$($\lceil$pred calc $\vdash \forall\underline{x}$: $\forall\underline{r}$: $\forall\underline{g}$: $\forall\underline{f}$: $[\underline{x}]\#^0\lceil\underline{r}\rceil \Vdash [\underline{x}]\#^0\lceil\underline{g}\rceil \Vdash$
$\langle\lceil\underline{g}\rceil\equiv^0\lceil\underline{f}\rceil\vert[\underline{x}]:=\lceil\underline{r}\rceil\rangle \Vdash$ pc12 $\rhd [\underline{x}]\#^0\lceil\underline{r}\rceil \rhd [\underline{x}]\#^0\lceil\underline{g}\rceil \rhd \langle\lceil\underline{g}\rceil\equiv^0\lceil\underline{f}\rceil\vert[\underline{x}]:=\lceil\underline{r}\rceil\rangle \gg$
$\underline{g} \Rightarrow \exists\underline{x}.(\underline{f})$; $\forall\underline{x}$: $\forall\underline{g}$: $\forall\underline{f}$: $\underline{g} \vdash$ pcmp $\triangleright \underline{g} \rhd \underline{g} \Rightarrow \exists\underline{x}.(\underline{f}) \gg$
$\exists\underline{x}.(\underline{f})$; pcdeduction $\triangleright \forall\underline{x}$: $\forall\underline{g}$: $\forall\underline{f}$: $\underline{g} \vdash \exists\underline{x}.(\underline{f}) \gg \underline{g} \vdash \exists\underline{x}.(\underline{f})\rceil$, p_0, c)]

[existsintro $\overset{\text{stmt}}{\rightarrow}$ pred calc $\vdash \forall\underline{x}$: $\forall\underline{r}$: $\forall\underline{g}$: $\forall\underline{f}$: $[\underline{x}]\#^0\lceil\underline{r}\rceil \Vdash [\underline{x}]\#^0\lceil\underline{g}\rceil \Vdash$
$\langle\lceil\underline{g}\rceil\equiv^0\lceil\underline{f}\rceil\vert[\underline{x}]:=\lceil\underline{r}\rceil\rangle \Vdash \underline{g} \vdash \exists\underline{x}.(\underline{f})$]

[existsintro $\overset{\text{pyk}}{\rightarrow}$ "existsintro"]

existselim

[existselim $\overset{\text{proof}}{\rightarrow}$ λc.λx.$\mathcal{P}$($\lceil$pred calc $\vdash \forall\underline{x}$: $\forall\underline{f}$: $\forall\underline{g}$: $[\underline{x}]\#^0\lceil\underline{g}\rceil \Vdash \exists\underline{x}.(\underline{f}) \vdash \underline{f} \vdash \underline{g} \vdash$
implyintro $\triangleright \underline{f} \vdash \underline{g} \gg \underline{f} \Rightarrow \underline{g}$; pcie $\rhd [\underline{x}]\#^0\lceil\underline{g}\rceil \rhd \underline{f} \Rightarrow \underline{g} \gg \exists\underline{x}.(\underline{f}) \Rightarrow$
$\underline{g}$; pcmp $\triangleright \exists\underline{x}.(\underline{f}) \rhd \exists\underline{x}.(\underline{f}) \Rightarrow \underline{g} \gg \underline{g}\rceil$, p_0, c)]

[existselim $\overset{\text{stmt}}{\rightarrow}$ pred calc $\vdash \forall\underline{x}$: $\forall\underline{f}$: $\forall\underline{g}$: $[\underline{x}]\#^0\lceil\underline{g}\rceil \Vdash \exists\underline{x}.(\underline{f}) \vdash \underline{f} \vdash \underline{g} \vdash \underline{g}$]

[existselim $\overset{\text{pyk}}{\rightarrow}$ "existselim"]

bottomelim

[bottomelim $\overset{\text{proof}}{\rightarrow}$ λc.λx.$\mathcal{P}$($\lceil$pred calc $\vdash$ $\forall\underline{f}$: $\forall\underline{g}$: $\underline{f}$ $\wedge$ $\neg\underline{f}$ $\vdash$ $\forall\underline{f}$: $\forall\underline{g}$: $\neg\underline{g}$ $\vdash$ andelim1 $\triangleright$ $\underline{f}$ $\wedge$ $\neg\underline{f}$ $\gg$ $\underline{f}$; pcdeduction $\triangleright$ $\forall\underline{f}$: $\forall\underline{g}$: $\neg\underline{g}$ $\vdash$ $\underline{f}$ $\gg$ $\neg\underline{g}$ $\vdash$ $\underline{f}$; $\forall\underline{f}$: $\forall\underline{g}$: $\neg\underline{g}$ $\vdash$ andelim2 $\triangleright$ $\underline{f}$ $\wedge$ $\neg\underline{f}$ $\gg$ $\neg\underline{f}$; pcdeduction $\triangleright$ $\forall\underline{f}$: $\forall\underline{g}$: $\neg\underline{g}$ $\vdash$ $\neg\underline{f}$ $\gg$ $\neg\underline{g}$ $\vdash$ $\neg\underline{f}$; notintro $\triangleright$ $\neg\underline{g}$ $\vdash$ $\underline{f}$ $\triangleright$ $\neg\underline{g}$ $\vdash$ $\neg\underline{f}$ $\gg$ $\neg\neg\underline{g}$; notnotelim $\triangleright$ $\neg\neg\underline{g}$ $\gg$ $\underline{g}\rceil$, p_0, c)]

[bottomelim $\overset{\text{stmt}}{\rightarrow}$ pred calc $\vdash$ $\forall\underline{f}$: $\forall\underline{g}$: $\underline{f}$ $\wedge$ $\neg\underline{f}$ $\vdash$ $\underline{g}$]

[bottomelim $\overset{\text{pyk}}{\rightarrow}$ "bottomelim"]

lemnotintro

[lemnotintro $\overset{\text{proof}}{\rightarrow}$ λc.λx.$\mathcal{P}$($\lceil$pred calc $\vdash$ $\forall\underline{f}$: $\forall\underline{g}$: $\underline{f}$ $\Rightarrow$ $\underline{g}$ $\wedge$ $\neg\underline{g}$ $\vdash$ $\forall\underline{f}$: $\forall\underline{g}$: $\underline{f}$ $\vdash$ pcmp $\triangleright$ $\underline{f}$ $\triangleright$ $\underline{f}$ $\Rightarrow$ $\underline{g}$ $\wedge$ $\neg\underline{g}$ $\gg$ $\underline{g}$ $\wedge$ $\neg\underline{g}$; andelim1 $\triangleright$ $\underline{g}$ $\wedge$ $\neg\underline{g}$ $\gg$ $\underline{g}$; pcdeduction $\triangleright$ $\forall\underline{f}$: $\forall\underline{g}$: $\underline{f}$ $\vdash$ $\underline{g}$ $\gg$ $\underline{f}$ $\vdash$ $\underline{g}$; $\forall\underline{f}$: $\forall\underline{g}$: $\underline{f}$ $\vdash$ pcmp $\triangleright$ $\underline{f}$ $\triangleright$ $\underline{f}$ $\Rightarrow$ $\underline{g}$ $\wedge$ $\neg\underline{g}$ $\gg$ $\underline{g}$ $\wedge$ $\neg\underline{g}$; andelim2 $\triangleright$ $\underline{g}$ $\wedge$ $\neg\underline{g}$ $\gg$ $\neg\underline{g}$; pcdeduction $\triangleright$ $\forall\underline{f}$: $\forall\underline{g}$: $\underline{f}$ $\vdash$ $\neg\underline{g}$ $\gg$ $\underline{f}$ $\vdash$ $\neg\underline{g}$; notintro $\triangleright$ $\overline{\underline{f}}$ $\vdash$ $\underline{g}$ $\triangleright$ $\underline{f}$ $\vdash$ $\neg\underline{g}$ $\gg$ $\neg\underline{f}\rceil$, p_0, c)]

[lemnotintro $\overset{\text{stmt}}{\rightarrow}$ pred calc $\vdash$ $\forall\underline{f}$: $\forall\underline{g}$: $\underline{f}$ $\Rightarrow$ $\underline{g}$ $\wedge$ $\neg\underline{g}$ $\vdash$ $\neg\underline{f}$]

[lemnotintro $\overset{\text{pyk}}{\rightarrow}$ "lemnotintro"]

hlplem1

[hlplem1 $\overset{\text{proof}}{\rightarrow}$ λc.λx.$\mathcal{P}$($\lceil$pred calc $\vdash$ $\forall\underline{p}$: $\forall\underline{q}$: $\underline{p}$ $\Rightarrow$ $\underline{q}$ $\Rightarrow$ $\underline{q}$ $\vdash$ $\underline{q}$ $\Rightarrow$ $\underline{p}$ $\vdash$ $\underline{p}$ $\Rightarrow$ $\underline{q}$ $\vdash$ pcmp $\triangleright$ $\underline{p}$ $\Rightarrow$ $\underline{q}$ $\triangleright$ $\underline{p}$ $\Rightarrow$ $\underline{q}$ $\Rightarrow$ $\underline{q}$ $\gg$ $\underline{q}$; pcmp $\triangleright$ $\underline{q}$ $\triangleright$ $\underline{q}$ $\Rightarrow$ $\underline{p}$ $\gg$ $\underline{p}\rceil$, p_0, c)]

[hlplem1 $\overset{\text{stmt}}{\rightarrow}$ pred calc $\vdash$ $\forall\underline{p}$: $\forall\underline{q}$: $\underline{p}$ $\Rightarrow$ $\underline{q}$ $\Rightarrow$ $\underline{q}$ $\vdash$ $\underline{q}$ $\Rightarrow$ $\underline{p}$ $\vdash$ $\underline{p}$ $\Rightarrow$ $\underline{q}$ $\vdash$ $\underline{p}$]

[hlplem1 $\overset{\text{pyk}}{\rightarrow}$ "hlplem1"]

hlplem2

[hlplem2 $\overset{\text{proof}}{\rightarrow}$ λc.λx.$\mathcal{P}$($\lceil$pred calc $\vdash$ $\forall\underline{p}$: $\forall\underline{q}$: $\underline{p}$ $\vdash$ $\neg\underline{p}$ $\vdash$ andintro $\triangleright$ $\underline{p}$ $\triangleright$ $\neg\underline{p}$ $\gg$ $\underline{p}$ $\wedge$ $\neg\underline{p}$; bottomelim $\triangleright$ $\underline{p}$ $\wedge$ $\neg\underline{p}$ $\gg$ $\underline{q}\rceil$, p_0, c)]

[hlplem2 $\overset{\text{stmt}}{\rightarrow}$ pred calc $\vdash$ $\forall\underline{p}$: $\forall\underline{q}$: $\underline{p}$ $\vdash$ $\neg\underline{p}$ $\vdash$ $\underline{q}$]

[hlplem2 $\overset{\text{pyk}}{\rightarrow}$ "hlplem2"]

hlplem3

[hlplem3 $\overset{\text{proof}}{\rightarrow}$ $\lambda c.\lambda x.\mathcal{P}(\lceil$ pred calc $\vdash \forall \underline{p}: \forall \underline{q}: \neg \underline{p} \Rightarrow \underline{q} \vdash \neg \underline{p} \vdash \forall \underline{p}: \forall \underline{q}: \underline{p} \vdash$ hlplem2 $\triangleright \underline{p} \triangleright \neg \underline{p} \gg \underline{q}$; pcdeduction $\triangleright \forall \underline{p}: \forall \underline{q}: \underline{p} \vdash \underline{q} \gg \underline{p} \Rightarrow \underline{q}$; andintro $\triangleright \underline{p} \Rightarrow \underline{q} \triangleright \neg \underline{p} \Rightarrow \underline{q} \gg \underline{p} \Rightarrow \underline{q} \wedge \neg \underline{p} \Rightarrow \underline{q} \rceil, p_0, c)]$

[hlplem3 $\overset{\text{stmt}}{\rightarrow}$ pred calc $\vdash \forall \underline{p}: \forall \underline{q}: \neg \underline{p} \Rightarrow \underline{q} \vdash \neg \underline{p} \vdash \underline{p} \Rightarrow \underline{q} \wedge \neg \underline{p} \Rightarrow \underline{q}]$

[hlplem3 $\overset{\text{pyk}}{\rightarrow}$ "hlplem3"]

hlplem4

[hlplem4 $\overset{\text{proof}}{\rightarrow}$ $\lambda c.\lambda x.\mathcal{P}(\lceil$ pred calc $\vdash \forall \underline{p}: \forall \underline{q}: \neg \underline{p} \Rightarrow \underline{q} \vdash \forall \underline{p}: \forall \underline{q}: \neg \underline{p} \vdash$ hlplem3 $\triangleright \neg \underline{p} \Rightarrow \underline{q} \triangleright \neg \underline{p} \gg \underline{p} \Rightarrow \underline{q} \wedge \neg \underline{p} \Rightarrow \underline{q}$; pcdeduction $\triangleright \forall \underline{p}: \forall \underline{q}: \neg \underline{p} \vdash \underline{p} \Rightarrow \underline{q} \wedge \neg \underline{p} \Rightarrow \underline{q} \gg \neg \underline{p} \Rightarrow \underline{p} \Rightarrow \underline{q} \wedge \neg \underline{p} \Rightarrow \underline{q}$; lemnotintro $\triangleright \neg \underline{p} \Rightarrow \underline{p} \Rightarrow \underline{q} \wedge \neg \underline{p} \Rightarrow \underline{q} \gg \neg\neg \underline{p}$; notnotelim $\triangleright \neg\neg \underline{p} \gg \underline{p} \rceil, p_0, c)]$

[hlplem4 $\overset{\text{stmt}}{\rightarrow}$ pred calc $\vdash \forall \underline{p}: \forall \underline{q}: \neg \underline{p} \Rightarrow \underline{q} \vdash \underline{p}]$

[hlplem4 $\overset{\text{pyk}}{\rightarrow}$ "hlplem4"]

hlplem5

[hlplem5 $\overset{\text{proof}}{\rightarrow}$ $\lambda c.\lambda x.\mathcal{P}(\lceil$ pred calc $\vdash \forall \underline{p}: \forall \underline{q}: \underline{p} \Rightarrow \underline{q} \Rightarrow \underline{q} \vdash \underline{q} \Rightarrow \underline{p} \vdash \forall \underline{p}: \forall \underline{q}: \underline{p} \Rightarrow \underline{q} \Rightarrow \underline{q} \vdash \underline{q} \Rightarrow \underline{p} \vdash \underline{p} \Rightarrow \underline{q} \vdash$ hlplem1 $\triangleright \underline{p} \Rightarrow \underline{q} \Rightarrow \underline{q} \triangleright \underline{q} \Rightarrow \underline{p} \triangleright \underline{p} \Rightarrow \underline{q} \gg \underline{p}$; pcdeduction $\triangleright \forall \underline{p}: \forall \underline{q}: \underline{p} \Rightarrow \underline{q} \Rightarrow \underline{q} \vdash \underline{q} \Rightarrow \underline{p} \vdash \underline{p} \Rightarrow \underline{q} \vdash \underline{p} \gg \underline{p} \Rightarrow \underline{q} \Rightarrow \underline{q} \Rightarrow \underline{q} \Rightarrow \underline{p} \Rightarrow \underline{p} \Rightarrow \underline{q} \Rightarrow \underline{p}$; pcmp $\triangleright \underline{p} \Rightarrow \underline{q} \Rightarrow \underline{q} \triangleright \underline{p} \Rightarrow \underline{q} \Rightarrow \underline{q} \Rightarrow \underline{q} \Rightarrow \underline{p} \Rightarrow \underline{p} \Rightarrow \underline{q} \Rightarrow \underline{p} \gg \underline{q} \Rightarrow \underline{p} \Rightarrow \underline{p} \Rightarrow \underline{q} \Rightarrow \underline{p}$; pcmp $\triangleright \underline{q} \Rightarrow \underline{p} \triangleright \underline{q} \Rightarrow \underline{p} \Rightarrow \underline{p} \Rightarrow \underline{q} \Rightarrow \underline{p} \gg \underline{p} \Rightarrow \underline{q} \Rightarrow \underline{p}$; $\forall \underline{p}: \forall \underline{q}: \underline{p} \Rightarrow \underline{q} \vdash$ pcmp $\triangleright \underline{p} \Rightarrow \underline{q} \triangleright \underline{p} \Rightarrow \underline{q} \Rightarrow \underline{p} \gg \underline{p}$; pcdeduction $\triangleright \forall \underline{p}: \forall \underline{q}: \underline{p} \Rightarrow \underline{q} \vdash \underline{p} \gg \underline{p} \Rightarrow \underline{q} \vdash \underline{p}$; $\forall \underline{p}: \forall \underline{q}: \neg \underline{p} \Rightarrow \underline{q} \vdash$ hlplem4 $\triangleright \neg \underline{p} \Rightarrow \underline{q} \gg \underline{p}$; pcdeduction $\triangleright \forall \underline{p}: \forall \underline{q}: \neg \underline{p} \Rightarrow \underline{q} \vdash \underline{p} \gg \neg \underline{p} \Rightarrow \underline{q} \vdash \underline{p}$; lem $\gg \underline{p} \Rightarrow \underline{q} \vee \neg \underline{p} \Rightarrow \underline{q}$; orelim $\triangleright \underline{p} \Rightarrow \underline{q} \vee \neg \underline{p} \Rightarrow \underline{q} \triangleright \underline{p} \Rightarrow \underline{q} \vdash \underline{p} \triangleright \neg \underline{p} \Rightarrow \underline{q} \vdash \underline{p} \gg \underline{p} \rceil, p_0, c)]$

[hlplem5 $\overset{\text{stmt}}{\rightarrow}$ pred calc $\vdash \forall \underline{p}: \forall \underline{q}: \underline{p} \Rightarrow \underline{q} \Rightarrow \underline{q} \vdash \underline{q} \Rightarrow \underline{p} \vdash \underline{p}]$

[hlplem5 $\overset{\text{pyk}}{\rightarrow}$ "hlplem5"]

goal1

[goal1 $\overset{\text{proof}}{\rightarrow}$ $\lambda c.\lambda x.\mathcal{P}(\lceil$ pred calc $\vdash \forall \underline{p}: \forall \underline{q}: \forall \underline{p}: \forall \underline{q}: \underline{p} \Rightarrow \underline{q} \Rightarrow \underline{q} \vdash \forall \underline{p}: \forall \underline{q}: \underline{q} \Rightarrow \underline{p} \vdash$ hlplem5 $\triangleright \underline{p} \Rightarrow \underline{q} \Rightarrow \underline{q} \triangleright \underline{q} \Rightarrow \underline{p} \gg \underline{p}$; pcdeduction $\triangleright \forall \underline{p}: \forall \underline{q}: \underline{q} \Rightarrow \underline{p} \vdash \underline{p} \gg \underline{q} \Rightarrow$

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$\underline{p} \Rightarrow \underline{p}$; pcdeduction $\triangleright \forall \underline{p} \colon \forall \underline{q} \colon \underline{p} \Rightarrow \underline{q} \Rightarrow \underline{q} \vdash \underline{q} \Rightarrow \underline{p} \Rightarrow \underline{p} \gg \underline{p} \Rightarrow \underline{q} \Rightarrow \underline{q} \Rightarrow \underline{q} \Rightarrow \underline{p} \Rightarrow \underline{p}], p_0, \mathsf{c})]$

$[\text{goal1} \overset{\text{stmt}}{\to} \text{pred calc} \vdash \forall \underline{p} \colon \forall \underline{q} \colon \underline{p} \Rightarrow \underline{q} \Rightarrow \underline{q} \Rightarrow \underline{q} \Rightarrow \underline{p} \Rightarrow \underline{p}]$

$[\text{goal1} \overset{\text{pyk}}{\to} \text{``goal1''}]$

hlplem6

$[\text{hlplem6} \overset{\text{proof}}{\to} \lambda \mathsf{c}. \lambda \mathsf{x}. \mathcal{P}(\lceil \text{pred calc} \vdash \forall \underline{x} \colon \forall \underline{f} \colon \forall \underline{g} \colon \forall \underline{h} \colon \lceil \underline{x} \rceil \#^0 \lceil \underline{g} \rceil \Vdash \lceil \underline{x} \rceil \#^0 \lceil \underline{h} \rceil \Vdash$
$\langle \lceil \underline{h} \rceil \equiv^0 \lceil \underline{f} \rceil | \lceil \underline{x} \rceil := \lceil \underline{g} \rceil \rangle \Vdash \forall \underline{x}. (\underline{f}) \vdash \text{forallelim} \,\triangleright\, \lceil \underline{x} \rceil \#^0 \lceil \underline{g} \rceil \,\triangleright\, \lceil \underline{x} \rceil \#^0 \lceil \underline{h} \rceil \,\triangleright\,$
$\langle \lceil \underline{h} \rceil \equiv^0 \lceil \underline{f} \rceil | \lceil \underline{x} \rceil := \lceil \underline{g} \rceil \rangle \triangleright \forall \underline{x}. (\underline{f}) \gg \underline{h}; \text{existsintro} \,\triangleright\, \lceil \underline{x} \rceil \#^0 \lceil \underline{g} \rceil \,\triangleright\, \lceil \underline{x} \rceil \#^0 \lceil \underline{h} \rceil \,\triangleright\,$
$\langle \lceil \underline{h} \rceil \equiv^0 \lceil \underline{f} \rceil | \lceil \underline{x} \rceil := \lceil \underline{g} \rceil \rangle \triangleright \underline{h} \gg \exists \underline{x}. (\underline{f}) \rceil, p_0, \mathsf{c})]$

$[\text{hlplem6} \overset{\text{stmt}}{\to} \text{pred calc} \vdash \forall \underline{x} \colon \forall \underline{f} \colon \forall \underline{g} \colon \forall \underline{h} \colon \lceil \underline{x} \rceil \#^0 \lceil \underline{g} \rceil \Vdash \lceil \underline{x} \rceil \#^0 \lceil \underline{h} \rceil \Vdash$
$\langle \lceil \underline{h} \rceil \equiv^0 \lceil \underline{f} \rceil | \lceil \underline{x} \rceil := \lceil \underline{g} \rceil \rangle \Vdash \forall \underline{x}. (\underline{f}) \vdash \exists \underline{x}. (\underline{f})]$

$[\text{hlplem6} \overset{\text{pyk}}{\to} \text{``hlplem6''}]$

goal2

$[\text{goal2} \overset{\text{proof}}{\to} \lambda \mathsf{c}. \lambda \mathsf{x}. \mathcal{P}(\lceil \text{pred calc} \vdash \forall \underline{f} \colon \forall \underline{g} \colon \forall \underline{x} \colon \forall \underline{h} \colon \forall \underline{k} \colon \lceil \underline{x} \rceil \#^0 \lceil \underline{g} \rceil \Vdash \lceil \underline{x} \rceil \#^0 \lceil \underline{h} \rceil \Vdash$
$\langle \lceil \underline{h} \rceil \equiv^0 \lceil \underline{f} \rceil | \lceil \underline{x} \rceil := \lceil \underline{g} \rceil \rangle \Vdash \forall \underline{x}. (\underline{f}) \vdash \text{hlplem6} \,\triangleright\, \lceil \underline{x} \rceil \#^0 \lceil \underline{g} \rceil \,\triangleright\, \lceil \underline{x} \rceil \#^0 \lceil \underline{h} \rceil \,\triangleright\,$
$\langle \lceil \underline{h} \rceil \equiv^0 \lceil \underline{f} \rceil | \lceil \underline{x} \rceil := \lceil \underline{g} \rceil \rangle \triangleright \forall \underline{x}. (\underline{f}) \gg \exists \underline{x}. (\underline{f}) \,; \forall \underline{f} \colon \forall \underline{x} \colon \forall \underline{k} \colon \exists \underline{x}. (\underline{f}) \vdash \neg \exists \underline{x}. (\underline{f}) \vdash$
$\text{andintro} \triangleright \exists \underline{x}. (\underline{f}) \triangleright \neg \exists \underline{x}. (\underline{f}) \gg \exists \underline{x}. (\underline{f}) \wedge \neg \exists \underline{x}. (\underline{f}) \,; \text{bottomelim} \triangleright \exists \underline{x}. (\underline{f}) \wedge \neg \exists \underline{x}. (\underline{f}) \gg$
$\underline{k}; \text{pcdeduction} \,\triangleright\, \forall \underline{f} \colon \forall \underline{x} \colon \forall \underline{k} \colon \exists \underline{x}. (\underline{f}) \vdash \neg \exists \underline{x}. (\underline{f}) \vdash \underline{k} \gg \exists \underline{x}. (\underline{f}) \Rightarrow \neg \exists \underline{x}. (\underline{f}) \Rightarrow$
$\underline{k}; \text{pcmp} \,\triangleright\, \exists \underline{x}. (\underline{f}) \triangleright \exists \underline{x}. (\underline{f}) \Rightarrow \neg \exists \underline{x}. (\underline{f}) \Rightarrow \underline{k} \gg \neg \exists \underline{x}. (\underline{f}) \Rightarrow \underline{k} \rceil, p_0, \mathsf{c})]$

$[\text{goal2} \overset{\text{stmt}}{\to} \text{pred calc} \vdash \forall \underline{f} \colon \forall \underline{g} \colon \forall \underline{x} \colon \forall \underline{h} \colon \forall \underline{k} \colon \lceil \underline{x} \rceil \#^0 \lceil \underline{g} \rceil \Vdash \lceil \underline{x} \rceil \#^0 \lceil \underline{h} \rceil \Vdash$
$\langle \lceil \underline{h} \rceil \equiv^0 \lceil \underline{f} \rceil | \lceil \underline{x} \rceil := \lceil \underline{g} \rceil \rangle \Vdash \forall \underline{x}. (\underline{f}) \vdash \neg \exists \underline{x}. (\underline{f}) \Rightarrow \underline{k}]$

$[\text{goal2} \overset{\text{pyk}}{\to} \text{``goal2''}]$

$* \equiv *$

$[\mathsf{y} \equiv \mathsf{b} \overset{\text{tex}}{\to} \text{``}\#1. \setminus \text{equiv} \ \#2.\text{''}]$

$[* \equiv * \overset{\text{pyk}}{\to} \text{``''} \text{ setequiv ``''}]$

$* = *$

$[y = b \overset{\text{tex}}{\rightarrow} \text{``}\#1. = \#2.\text{''}]$

$[* = * \overset{\text{pyk}}{\rightarrow} \text{``" setequals "''}]$

$\neg *$

$[\neg x \overset{\text{tex}}{\rightarrow} \text{``}\backslash\text{neg } \#1.\text{''}]$

$[\neg * \overset{\text{pyk}}{\rightarrow} \text{``lnot "''}]$

$* \wedge *$

$[x \wedge y \overset{\text{tex}}{\rightarrow} \text{``}\#1. \backslash\text{wedge } \#2.\text{''}]$

$[* \wedge * \overset{\text{pyk}}{\rightarrow} \text{``" land "''}]$

$* \vee *$

$[x \vee y \overset{\text{tex}}{\rightarrow} \text{``}\#1. \backslash\text{vee } \#2.\text{''}]$

$[* \vee * \overset{\text{pyk}}{\rightarrow} \text{``" lor "''}]$

$\forall * . \left(* \right)$

$[\forall y. (b) \overset{\text{tex}}{\rightarrow} \text{``}\backslash\text{forall } \#1. . \backslash\text{left}(\#2.\backslash\text{right})\text{''}]$

$[\forall * . (*) \overset{\text{pyk}}{\rightarrow} \text{``forall " dot " end forall''}]$

$\exists * . \left(* \right)$

$[\exists y. (b) \overset{\text{tex}}{\rightarrow} \text{``}\backslash\text{exists } \#1. . \backslash\text{left}(\#2.\backslash\text{right})\text{''}]$

$[\exists * . (*) \overset{\text{pyk}}{\rightarrow} \text{``exists " dot " end exists''}]$

$* \in *$

$[y \in b \overset{\text{tex}}{\rightarrow} \text{``}\#1. \backslash\text{in } \#2.\text{''}]$

$[* \in * \overset{\text{pyk}}{\longrightarrow} \text{``"} \text{ setin } \text{""}]$