Inference at $*$ 1 2
of proof for Lemma append_overlapping_sublists:

1. T : Type
2. L_1 : T List
3. L_2 : T List
4. L : T List
5. x : T
6. $\forall i, j{:}\mathbb{N}.\ (i < \|L\|) \Rightarrow (j < \|L\|) \Rightarrow (\neg(i = j)) \Rightarrow (\neg(L[i] = L[j]))$
7. f_1 : $\{0..\|L_1$ @ $[x]\|^-\}\rightarrow\{0..\|L\|^-\}$
8. increasing(f_1;$\|L_1$ @ $[x]\|$)
9. $\forall j{:}\{0..\|L_1$ @ $[x]\|^-\}.\ (L_1$ @ $[x])[j] = L[(f_1(j))]$
10. f : $\{0..(\|L_2\|+1)^-\}\rightarrow\{0..\|L\|^-\}$
11. increasing(f;$\|L_2\|$+1)
12. $\forall j{:}\{0..(\|L_2\|+1)^-\}.\ [x\ /\ L_2][j] = L[(f(j))]$
13. $\|L_1$ @ $[x\ /\ L_2]\| = \|L_1\|+\|L_2\|+1$

$\vdash\exists f{:}\{0..\|L_1$ @ $[x\ /\ L_2]\|^-\}\rightarrow\{0..\|L\|^-\}$
(increasing(f;$\|L_1$ @ $[x\ /\ L_2]\|$)
& ($\forall j{:}\{0..\|L_1$ @ $[x\ /\ L_2]\|^-\}.\ (L_1$ @ $[x\ /\ L_2])[j] = L[(f(j))]$))

by ((AssertBY $\|[]\| \geq 0$ ((Reduce 0)
CollapseTHEN ((Auto_aux (first_nat 1:n
) ((first_nat 2:n),(first_nat 3:n)) (first_tok :t) inil_term)))·)
CollapseTHEN (
InstConcl [λi.if $i \leq$z $\|L_1\|$ then $f_1(i)$ else $f(i$ - $\|L_1\|)$ fi]))·

1: .....wf..... NILNIL

14. $\|[]\| \geq 0$
$\vdash$ (λi.if $i \leq$z $\|L_1\|$ then $f_1(i)$ else $f(i$ - $\|L_1\|)$ fi)
$\in \{0..\|L_1$ @ $[x\ /\ L_2]\|^-\}\rightarrow\{0..\|L\|^-\}$

2:

14. $\|[]\| \geq 0$
$\vdash$ increasing(λi.if $i \leq$z $\|L_1\|$ then $f_1(i)$ else $f(i$ - $\|L_1\|)$ fi ;$\|L_1$ @ $[x\ /\ L_2]\|$)
& ($\forall j{:}\{0..\|L_1$ @ $[x\ /\ L_2]\|^-\}$.
$(L_1$ @ $[x\ /\ L_2])[j]$
=
$L[((\lambda i$.if $i \leq$z $\|L_1\|$ then $f_1(i)$ else $f(i$ - $\|L_1\|)$ fi $)(j))]$)

3: .....wf..... NILNIL

14. $\|[]\| \geq 0$
15. f_2 : $\{0..\|L_1$ @ $[x\ /\ L_2]\|^-\}\rightarrow\{0..\|L\|^-\}$
$\vdash$ (increasing(f_2;$\|L_1$ @ $[x\ /\ L_2]\|$)
& ($\forall j{:}\{0..\|L_1$ @ $[x\ /\ L_2]\|^-\}.\ (L_1$ @ $[x\ /\ L_2])[j] = L[(f_2(j))]$))

$\in \mathbb{P}$

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