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is_member_equality_strengthening_lemma  THM

⊢  ∀equiv:{T≡₂}, eq:{T=₂}, u:T, L:T List.
|  u(∈equiv) L ⇒ (∃v:T. equiv(u,v) & v(∈eq) L)  by UnivCD
|
1. T : Type
2. equiv : {T≡₂}
3. eq : {T=₂}
4. u : T
5. L : T List
6. u(∈equiv) L
⊢  ∃v:T. equiv(u,v) & v(∈eq) L
| by FwdThru
|    Thm* ∀eq:{T≡₂}, L:T List, x:T.
|         x(∈eq) L ⇒ (∃M,N:T List, y:T. eq(x,y) & L = (M @ (y.N)))
|    {is_member_append_lemma1}
|    [6]
|    THEN
|    Repeat (Analyze -1)
|
7. M : T List
8. N : T List
9. y : T
10. equiv(u,y)
11. L = (M @ (y.N))
⊢  ∃v:T. equiv(u,v) & v(∈eq) L
| by Inst
|    Thm* ∀eq:{T=₂}, L:T List, x:T.
|         (∃M,N:T List. L = (M @ (x.N))) ⇒ x(∈eq) L
|    {append_is_member_lemma}
|    [T;eq;L]
|
12. ∀x:T. (∃M,N:T List. L = (M @ (x.N))) ⇒ x(∈eq) L
⊢  ∃v:T. equiv(u,v) & v(∈eq) L  by With y (Analyze -1)
|
12. (∃M,N:T List. L = (M @ (y.N))) ⇒ y(∈eq) L
⊢  ∃v:T. equiv(u,v) & v(∈eq) L  by Analyze -1
|
|\
| .....antecedent .....
| 11. L = (M @ (y.N))
| ⊢  ∃M,N:T List. L = (M @ (y.N))  by Witness M THEN Witness N
|
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. 12. y(∈eq) L
. ⊢  ∃v:T. equiv(u,v) & v(∈eq) L
.   by Analyze 3 THEN Analyze 2 THEN Witness y
END
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