```
hd_is_member_lemma  THM

⊢  ∀eq:{T≡₂}, L:T List. ||L||≥1 ⇒ hd(L)(∈eq) L  by UnivCD
|
1. T : Type
2. eq : {T≡₂}
3. L : T List
4. ||L||≥1
⊢  hd(L)(∈eq) L  by ListInd 3
|
|\
| 3. T List
| ⊢  ||nil||≥1 ⇒ hd(nil)(∈eq) nil
|   by Rewrite (HigherC length_unrollC) 0
|
.\
. 4. u : T
. 5. v : T List
. 6. ||v||≥1 ⇒ hd(v)(∈eq) v
. ⊢  ||u.v||≥1 ⇒ hd((u.v))(∈eq) (u.v)
. | by Analyze 0 THEN Rewrite (HigherC hd_evalC) 0
. |
. 7. ||u.v||≥1
. ⊢  u(∈eq) (u.v)  by Rewrite (HigherC is_member_unrollC) 0
. |
. ⊢  if eq(u,u)→ true₂ else u(∈eq) v fi  by Equivalence 2
. |
. 3. eq ∈ T→T→𝔹
. 4. ∀x:T. eq(x,x)
. 5. ∀x,y:T. eq(x,y) ⟺ eq(y,x)
. 6. ∀x,y,z:T. eq(x,y) ⇒ eq(y,z) ⇒ eq(x,z)
. 7. T List
. 8. u : T
. 9. v : T List
. 10. ||v||≥1 ⇒ hd(v)(∈eq) v
. 11. ||u.v||≥1
. ⊢  if eq(u,u)→ true₂ else u(∈eq) v fi  by IfThenElseCases 0
. |
. |\
. | .....truecase .....
. | 12. eq(u,u) = true₂
. | ⊢  true₂  by Rewrite (HigherC assert_evalC) 0 THEN Trivial
. |
. .\
. . .....falsecase .....
. . 12. eq(u,u) = false₂
. . ⊢  u(∈eq) v  by Witness4 u
. . |
. . 4. ∀x,y:T. eq(x,y) ⟺ eq(y,x)
. . 5. ∀x,y,z:T. eq(x,y) ⇒ eq(y,z) ⇒ eq(x,z)
. . 6. T List
. . 7. u : T
. . 8. v : T List
. . 9. ||v||≥1 ⇒ hd(v)(∈eq) v
. . 10. ||u.v||≥1
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. . 11. eq(u,u) = false₂
. . 12. eq(u,u)
. . ⊢  u(∈eq) v
. . | by HypSubst -2 -1 THEN Rewrite (HigherC assert_evalC) -1
. . |
. . 12. False
. . ⊢  u(∈eq) v  by Trivial
END
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