```
assert_l_bexists  THM

⊢  ∀T:Type, L:T List, P:(T→𝔹). (∃x∈L.P(x)) ⟺ (∃i:ℕ||L||. P(L[i]))
| by InductionOnList THEN (Reduce 0)
|    THEN
|    (Try (RW assert_pushdownC 0))
|    THEN
|    ExRepD
|
|\
| 1. T : Type
| 2. T List
| 3. u : T
| 4. v : T List
| 5. ∀P:(T→𝔹). (∃x∈v.P(x)) ⟺ (∃i:ℕ||v||. P(v[i]))
| 6. P : T→𝔹
| 7. P(u) ∨ (∃x∈v.P(x))
| ⊢  ∃i:ℕ(||v||+1). P([u / v][i])
| | by (Analyze -1) THENL [(InstConcl [0]) THEN (Reduce 0);Id]
| |
| 1. T : Type
| 2. T List
| 3. u : T
| 4. v : T List
| 5. ∀P:(T→𝔹). (∃x∈v.P(x)) ⟺ (∃i:ℕ||v||. P(v[i]))
| 6. P : T→𝔹
| 7. (∃x∈v.P(x))
| ⊢  ∃i:ℕ(||v||+1). P([u / v][i])
| | by (InstHyp [P] -3) THEN ThinTrivial THEN ExRepD
| |
| 1. T : Type
| 2. T List
| 3. u : T
| 4. v : T List
| 5. ∀P:(T→𝔹). (∃x∈v.P(x)) ⟺ (∃i:ℕ||v||. P(v[i]))
| 6. P : T→𝔹
| 7. (∃x∈v.P(x))
| 8. (∃x∈v.P(x)) ⇐ (∃i:ℕ||v||. P(v[i]))
| 9. i : ℕ||v||
| 10. P(v[i])
| ⊢  ∃i:ℕ(||v||+1). P([u / v][i])  by Obvious
|
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. 1. T : Type
. 2. T List
. 3. u : T
. 4. v : T List
. 5. ∀P:(T→𝔹). (∃x∈v.P(x)) ⟺ (∃i:ℕ||v||. P(v[i]))
. 6. P : T→𝔹
. 7. i : ℕ(||v||+1)
. 8. P([u / v][i])
. ⊢  P(u) ∨ (∃x∈v.P(x))  by (CaseNat 0 ‘i’) THENL [OrLeft;OrRight]
. |
. |\
. | 1. T : Type
```

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. | 2. T List
. | 3. u : T
. | 4. v : T List
. | 5. ∀P:(T→ℙ). (∃x∈v.P(x)) ⟺ (∃i:ℕ||v||. P(v[i]))
. | 6. P : T→ℙ
. | 7. i : ℕ(||v||+1)
. | 8. P([u / v][i])
. | 9. i = 0
. | ⊢  P(u)  by Obvious
. |
. .\
. . 1. T : Type
. . 2. T List
. . 3. u : T
. . 4. v : T List
. . 5. ∀P:(T→ℙ). (∃x∈v.P(x)) ⟺ (∃i:ℕ||v||. P(v[i]))
. . 6. P : T→ℙ
. . 7. i : ℕ(||v||+1)
. . 8. P([u / v][i])
. . 9. ¬i = 0
. . ⊢  (∃x∈v.P(x))  by BackThruSomeHyp
. . |
. . 1. T : Type
. . 2. T List
. . 3. u : T
. . 4. v : T List
. . 5. ∀P:(T→ℙ). (∃x∈v.P(x)) ⟺ (∃i:ℕ||v||. P(v[i]))
. . 6. P : T→ℙ
. . 7. i : ℕ(||v||+1)
. . 8. P([u / v][i])
. . 9. ¬i = 0
. . ⊢  ∃i:ℕ||v||. P(v[i])
. . | by RWO
. . |    Thm* ∀a:T, as:T List, i:ℤ.
. . |         0<i ⇒ i≤||as|| ⇒ [a / as][i] = as[(i-1)]
. . |    {select_cons_tl}
. . |    -2
. . |
. . 1. T : Type
. . 2. T List
. . 3. T
. . 4. v : T List
. . 5. ∀P:(T→ℙ). (∃x∈v.P(x)) ⟺ (∃i:ℕ||v||. P(v[i]))
. . 6. P : T→ℙ
. . 7. i : ℕ(||v||+1)
. . 8. P(v[(i-1)])
. . 9. ¬i = 0

. . ⊢  ∃i:ℕ||v||. P(v[i])  by Obvious
END
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