```
member_append  THM

⊢  ∀T:Type, x:T, l1,l2:T List. (x ∈ l1 @ l2) ⟺ (x ∈ l1) ∨ (x ∈ l2)
| by D 0 THENM D 0 THENM D 0 THENA Auto

|    THEN ListInd (-1) THEN Reduce 0
|
|\
| 1. T : Type
| 2. x : T
| 3. T List
| ⊢  ∀l2:T List. (x ∈ l2) ⟺ (x ∈ nil) ∨ (x ∈ l2)  by Auto
| |
| |\
| | 1. T : Type
| | 2. x : T
| | 3. T List
| | 4. l2 : T List
| | 5. (x ∈ l2)
| | ⊢  (x ∈ nil) ∨ (x ∈ l2)  by Sel 2 (D 0) THEN Auto
| |
| .\
| . 1. T : Type
| . 2. x : T
| . 3. T List
| . 4. l2 : T List
| . 5. (x ∈ nil) ∨ (x ∈ l2)
| . ⊢  (x ∈ l2)  by D (-1) THEN Auto
| . |
| . 1. T : Type
| . 2. x : T
| . 3. T List
| . 4. l2 : T List
| . 5. (x ∈ nil)
| . ⊢  (x ∈ l2)
| .   by Unfold `l_member` (-1) THEN Reduce (-1)
| .
| .      THEN ExRepD THEN Auto
|
.\
. 1. T : Type
. 2. x : T
. 3. T List
. 4. u : T
. 5. v : T List
. 6. ∀l2:T List. (x ∈ v @ l2) ⟺ (x ∈ v) ∨ (x ∈ l2)
. ⊢  ∀l2:T List. (x ∈ [u / (v @ l2)]) ⟺ (x ∈ [u / v]) ∨ (x ∈ l2)
. | by RWW "cons_member" 0 THEN Auto
. |
. |\
. | 1. T : Type
. | 2. x : T
. | 3. T List
. | 4. u : T
. | 5. v : T List
```

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. | 6. ∀l2:T List. (x ∈ v @ l2) ⟺ (x ∈ v) ∨ (x ∈ l2)
. | 7. l2 : T List
. | 8. x = u ∨ (x ∈ v @ l2)
. | ⊢  x = u ∨ (x ∈ v) ∨ (x ∈ l2)  by D (-1)
. | |
. | |\
. | | 1. T : Type
. | | 2. x : T
. | | 3. T List
. | | 4. u : T
. | | 5. v : T List
. | | 6. ∀l2:T List. (x ∈ v @ l2) ⟺ (x ∈ v) ∨ (x ∈ l2)
. | | 7. l2 : T List
. | | 8. x = u
. | | ⊢  x = u ∨ (x ∈ v) ∨ (x ∈ l2)
. | |   by Sel 1 (D 0) THENM Sel 1 (D 0) THEN Auto
. | |
. | .\
. | . 1. T : Type
. | . 2. x : T
. | . 3. T List
. | . 4. u : T
. | . 5. v : T List
. | . 6. ∀l2:T List. (x ∈ v @ l2) ⟺ (x ∈ v) ∨ (x ∈ l2)
. | . 7. l2 : T List
. | . 8. (x ∈ v @ l2)
. | . ⊢  x = u ∨ (x ∈ v) ∨ (x ∈ l2)
. | . | by FwdThruHyp 6 [(-1)]
. | . THENM D (-1)
. | . THENA Auto
. | . |
. | . |\
. | . | 1. T : Type
. | . | 2. x : T
. | . | 3. T List
. | . | 4. u : T
. | . | 5. v : T List
. | . | 6. ∀l2:T List. (x ∈ v @ l2) ⟺ (x ∈ v) ∨ (x ∈ l2)
. | . | 7. l2 : T List
. | . | 8. (x ∈ v @ l2)
. | . | 9. (x ∈ v)
. | . | ⊢  x = u ∨ (x ∈ v) ∨ (x ∈ l2)
. | . |   by Sel 1 (D 0) THENM Sel 2 (D 0) THEN Auto
. | . |
. | . .\
. | . . 1. T : Type
. | . . 2. x : T
. | . . 3. T List
. | . . 4. u : T
. | . . 5. v : T List
. | . . 6. ∀l2:T List. (x ∈ v @ l2) ⟺ (x ∈ v) ∨ (x ∈ l2)
. | . . 7. l2 : T List
. | . . 8. (x ∈ v @ l2)
. | . . 9. (x ∈ l2)
. | . . ⊢  x = u ∨ (x ∈ v) ∨ (x ∈ l2)  by Sel 2 (D 0) THEN Auto
```

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. |
. .\
. . 1. T : Type
. . 2. x : T
. . 3. T List
. . 4. u : T
. . 5. v : T List
. . 6. ∀l2:T List. (x ∈ v @ l2) ⟺ (x ∈ v) ∨ (x ∈ l2)
. . 7. l2 : T List
. . 8. x = u ∨ (x ∈ v) ∨ (x ∈ l2)
. . ⊢  x = u ∨ (x ∈ v @ l2)  by D (-1)
. . |
. . |\
. . | 1. T : Type
. . | 2. x : T
. . | 3. T List
. . | 4. u : T
. . | 5. v : T List
. . | 6. ∀l2:T List. (x ∈ v @ l2) ⟺ (x ∈ v) ∨ (x ∈ l2)
. . | 7. l2 : T List
. . | 8. x = u ∨ (x ∈ v)
. . | ⊢  x = u ∨ (x ∈ v @ l2)  by D (-1)
. . | |
. . | |\
. . | | 1. T : Type
. . | | 2. x : T
. . | | 3. T List
. . | | 4. u : T
. . | | 5. v : T List
. . | | 6. ∀l2:T List. (x ∈ v @ l2) ⟺ (x ∈ v) ∨ (x ∈ l2)
. . | | 7. l2 : T List
. . | | 8. x = u
. . | | ⊢  x = u ∨ (x ∈ v @ l2)  by Sel 1 (D 0) THEN Auto
. . | |
. . | .\
. . | . 1. T : Type
. . | . 2. x : T
. . | . 3. T List
. . | . 4. u : T
. . | . 5. v : T List
. . | . 6. ∀l2:T List. (x ∈ v @ l2) ⟺ (x ∈ v) ∨ (x ∈ l2)
. . | . 7. l2 : T List
. . | . 8. (x ∈ v)
. . | . ⊢  x = u ∨ (x ∈ v @ l2)
. . | .   by Sel 2 (D 0) THENA Auto
. . | . THEN BackThruSomeHyp
. . | .
. . | .      THEN Sel 1 (D 0) THEN Auto
. . |
. . .\
. . . 1. T : Type
. . . 2. x : T
. . . 3. T List
. . . 4. u : T
. . . 5. v : T List
```

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. . . 6. ∀l2:T List. (x ∈ v @ l2) ⟺ (x ∈ v) ∨ (x ∈ l2)
. . . 7. l2 : T List
. . . 8. (x ∈ l2)
. . . ⊢  x = u ∨ (x ∈ v @ l2)
. . .   by Sel 2 (D 0) THENA Auto
. . . THEN BackThruSomeHyp
. . .
. . .      THEN Sel 2 (D 0) THEN Auto
END
```