```
formula_or_left_falsifiable  THM

⊢  ∀concl,M,N:Formula List, q,r:Formula, a:Assignment.
|  a |≠ <q.(M @ N),concl> ∨ a |≠ <r.(M @ N),concl>
|  ⟺
|  a |≠ <M @ (q⌈∨⌉r.N),concl>
| by UnivCD THEN Analyze 0 THEN Analyze 0
|
|\
| 1. concl : Formula List
| 2. M : Formula List
| 3. N : Formula List
| 4. q : Formula
| 5. r : Formula
| 6. a : Assignment
| 7. a |≠ <q.(M @ N),concl> ∨ a |≠ <r.(M @ N),concl>
| ⊢  a |≠ <M @ (q⌈∨⌉r.N),concl>  by Analyze -1
| |
| |\
| | 7. a |≠ <q.(M @ N),concl>
| | ⊢
| | | by OnHyps [-1;0]
| | |    (λi.
| | |     UnfoldTopAb i THEN AbReduce i
| | |     THEN
| | |     Rewrite
| | |     (HigherC
| | |      (LemmaC
| | |       Thm* ∀P:(T→Prop), L,M:T List.
| | |            ∀x∈(L @ M).P(x) ⟺ ∀x∈L.P(x) & ∀x∈M.P(x)
| | |       {list_all_append_lemma})
| | |      THENC
| | |      AbReduceC
| | |      THENC
| | |      TryC
| | |      (HigherC
| | |       (LemmaC
| | |        Thm* ∀a:Assignment, q,r:Formula.
| | |             a |= q⌈∨⌉r  ⟺ a |= q  ∨ a |= r
| | |        {formula_or_sat_lemma})))
| | |     i)
| | |
| | 7. a |= q  & ∀F∈M.a |= F  & ∀F∈N.a |= F  & ∀F∈concl.a |≠ F
| | ⊢  ∀F∈M.a |= F  & a |= q  ∨ a |= r  & ∀F∈N.a |= F
| | |  & ∀F∈concl.a |≠ F  by Auto
| | |
| | 7. a |= q
| | 8. ∀F∈M.a |= F
| | 9. ∀F∈N.a |= F
| | 10. ∀F∈concl.a |≠ F
| | ⊢  a |= q  ∨ a |= r   by Choose [1] THEN Trivial
| |
| .\
| . 7. a |≠ <r.(M @ N),concl>
| . ⊢
```

```
| . | by OnHyps [-1;0]
| . |    (λi.
| . |     UnfoldTopAb i THEN AbReduce i
| . |     THEN
| . |     Rewrite
| . |     (HigherC
| . |      (LemmaC
| . |       Thm* ∀P:(T→Prop), L,M:T List.
| . |            ∀x∈(L @ M).P(x) ⟺ ∀x∈L.P(x) & ∀x∈M.P(x)
| . |       {list_all_append_lemma}))
| . |     i
| . |     THEN
| . |     AbReduce i)
| . |
| . 7. a |= r  & ∀F∈M.a |= F  & ∀F∈N.a |= F  & ∀F∈concl.a |≠ F
| . ⊢  ∀F∈M.a |= F  & a |= q⌈∨⌉r  & ∀F∈N.a |= F  & ∀F∈concl.a |≠ F
| . | by Auto
| . |
| . 7. a |= r
| . 8. ∀F∈M.a |= F
| . 9. ∀F∈N.a |= F
| . 10. ∀F∈concl.a |≠ F
| . ⊢  a |= q⌈∨⌉r
| . | by BackThru
| . |    Thm* ∀a:Assignment, q,r:Formula.
| . |         a |= q⌈∨⌉r  ⟺ a |= q  ∨ a |= r
| . |    {formula_or_sat_lemma}
| . |
| . ⊢  a |= q  ∨ a |= r   by Choose [2] THEN Trivial
|
.\
. 1. concl : Formula List
. 2. M : Formula List
. 3. N : Formula List
. 4. q : Formula
. 5. r : Formula
. 6. a : Assignment
. 7. a |≠ <M @ (q⌈∨⌉r.N),concl>
. ⊢  a |≠ <q.(M @ N),concl> ∨ a |≠ <r.(M @ N),concl>
. | by OnHyps [-1;0]
. |    (λi.
. |     Unfold `sequent_falsifiable` i THEN AbReduce i
. |     THEN
. |     Rewrite
. |     (HigherC
. |      (LemmaC
. |       Thm* ∀P:(T→Prop), L,M:T List.
. |            ∀x∈(L @ M).P(x) ⟺ ∀x∈L.P(x) & ∀x∈M.P(x)
. |       {list_all_append_lemma}))
. |     i
. |     THEN
. |     AbReduce i)
. |
. 7. ∀F∈M.a |= F  & a |= q⌈∨⌉r  & ∀F∈N.a |= F  & ∀F∈concl.a |≠ F
. ⊢  a |= q  & ∀F∈M.a |= F  & ∀F∈N.a |= F  & ∀F∈concl.a |≠ F
```

```
. |  ∨ a |= r  & ∀F∈M.a |= F  & ∀F∈N.a |= F  & ∀F∈concl.a |≠ F
. | by Analyze -1 THEN Analyze -2 THEN Analyze -2
. |
. 7. ∀F∈M.a |= F
. 8. a |= q⌈∨⌉r
. 9. ∀F∈N.a |= F
. 10. ∀F∈concl.a |≠ F
. ⊢
. | by FwdThru
. |    Thm* ∀a:Assignment, q,r:Formula.
. |         a |= q⌈∨⌉r  ⟺ a |= q  ∨ a |= r
. |    {formula_or_sat_lemma}
. |    [-3]
. |    THEN
. |    Analyze -1
. |
. |\
. | 11. a |= q
. | ⊢   by Choose [1]
. |
. .\
. . 11. a |= r
. . ⊢   by Choose [2]
END
```