

lemma rev [a, b] = [b, a]

proof neg_clausify

assume rev [a, b] \neq [b, a]

hence $\exists x_3 x_2. [x_2, x_3] \neq \text{rev } [x_3, x_2]$

by metis

hence $\exists x_3 x_2. [x_2] @ [x_3] \neq \text{rev } [x_3, x_2]$

by (metis Cons_eq_appendI eq_Nil_appendI)

thus False

by (metis rev.simps(2) rev_singleton_conv)

qed

lemma rev [a, b] = [b, a]

proof -

have $\forall x_3 x_2. [x_2] @ [x_3] = \text{rev } [x_3, x_2]$

by (metis rev.simps(2) rev_singleton_conv)

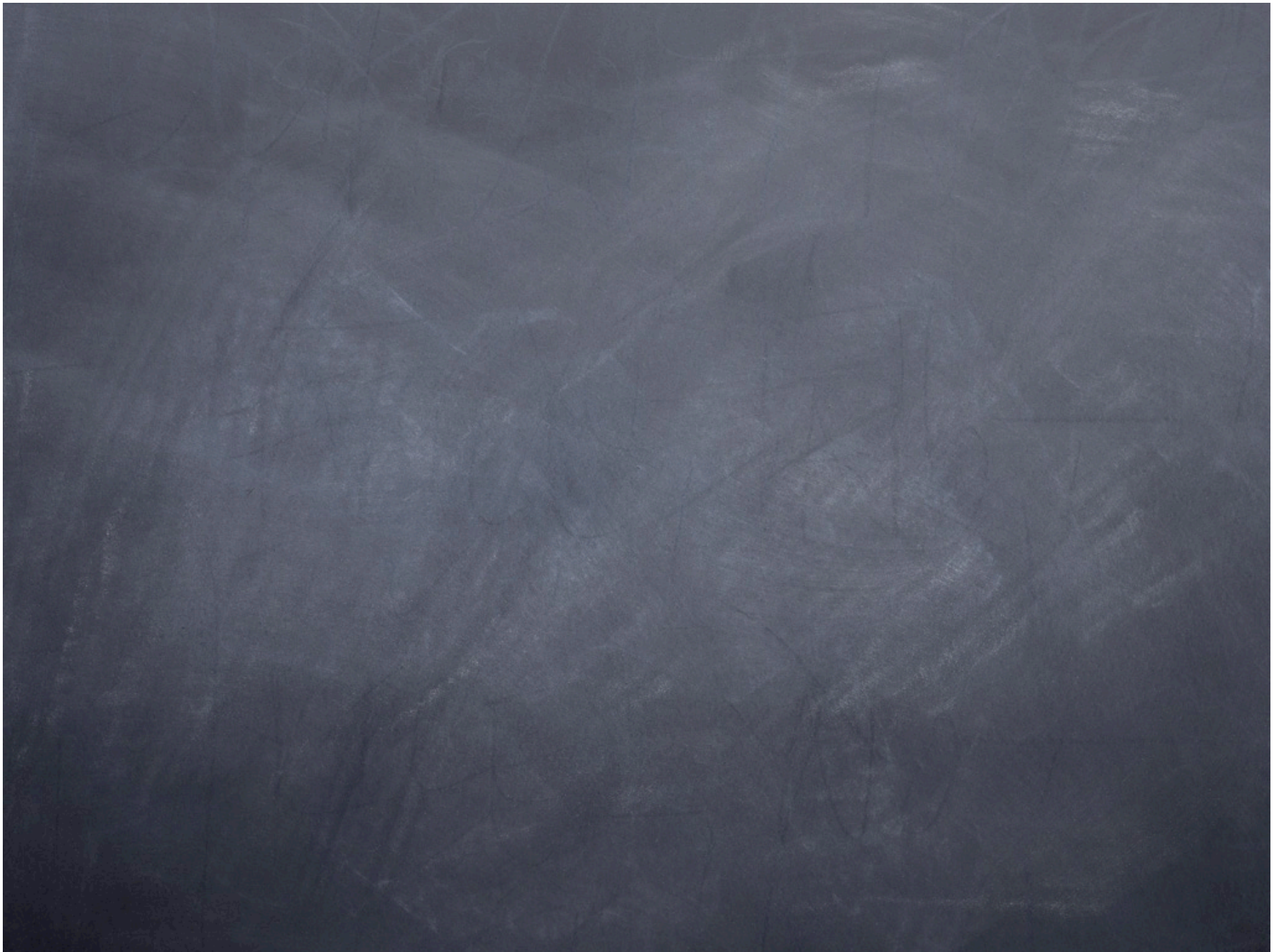
hence $\forall x_3 x_2. [x_2, x_3] = \text{rev } [x_3, x_2]$

by (metis Cons_eq_appendI eq_Nil_appendI)

thus $\text{rev } [a, b] = [b, a]$

by metis

qed



conjecture (DNF): $1 \vee 2 \vee 3$

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negated conjecture

$\neg 1 \quad \neg 2 \quad \neg 3$

conjecture (DNF): $1 \vee 2 \vee 3$

negated conjecture

$\neg 1$ $\neg 2$ $\neg 3$

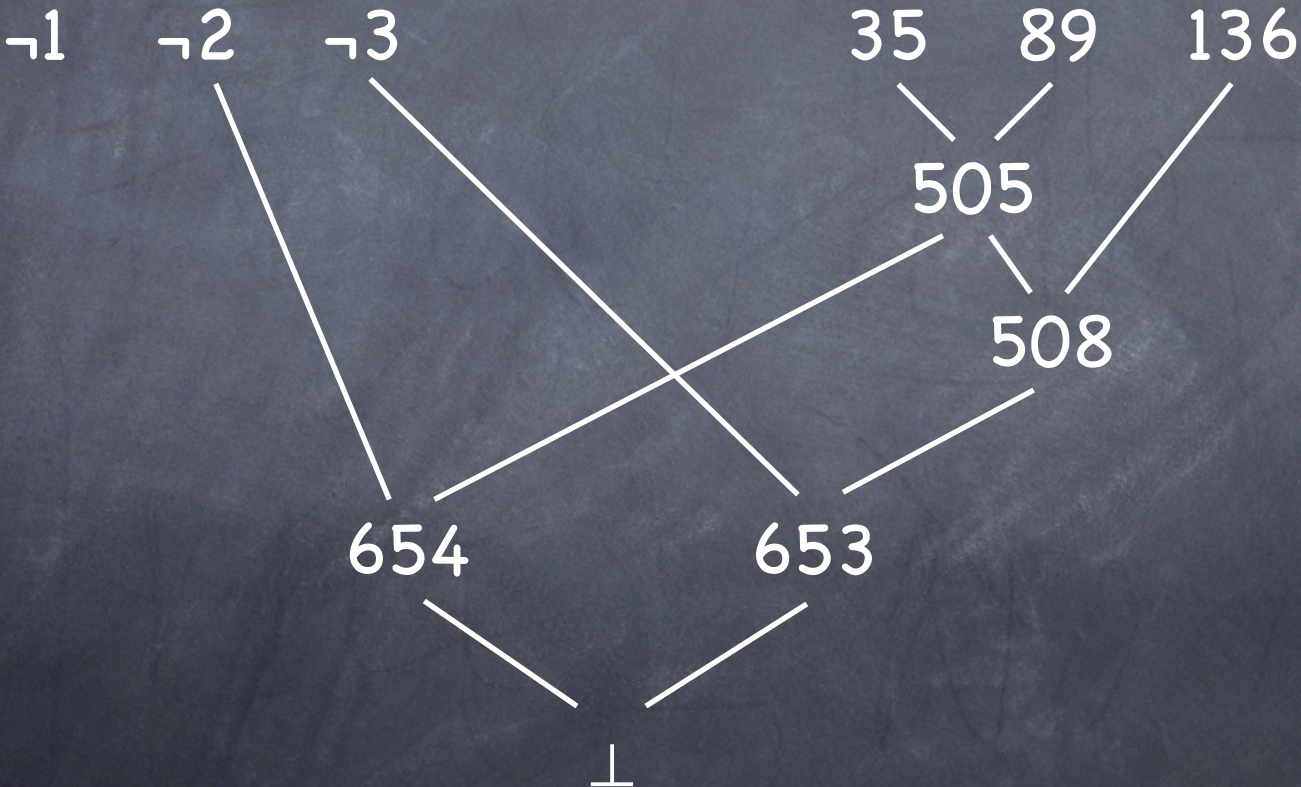
used facts (axioms)

35 89 136

conjecture (DNF): $1 \vee 2 \vee 3$

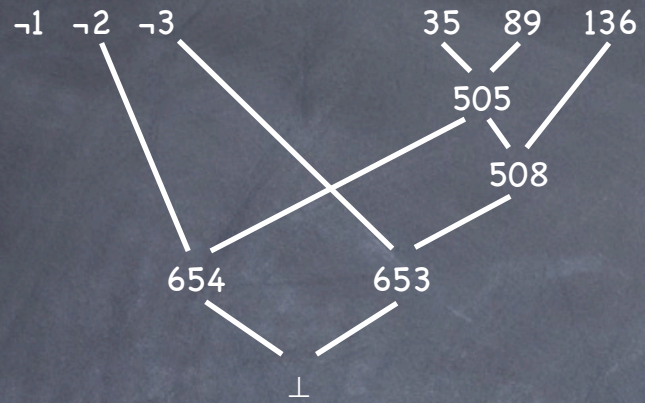
negated conjecture

used facts (axioms)



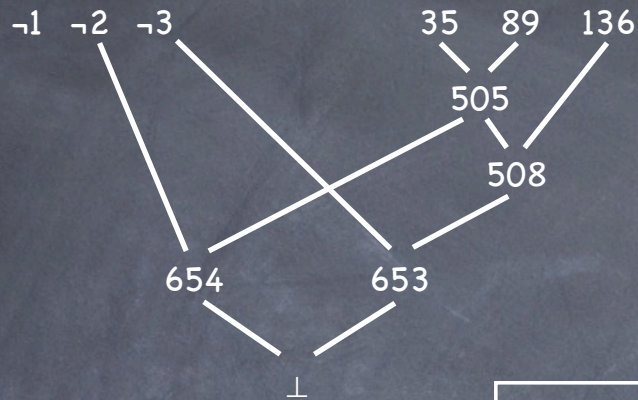
negated conjecture

used facts (axioms)



negated conjecture

used facts (axioms)



proof neg_clausify

assume $\neg 2$

assume $\neg 3$

have 505 by (metis 35 89)

have 508 by (metis 505 136)

have 653 by (metis $\neg 3$ 508)

have 654 by (metis $\neg 2$ 505)

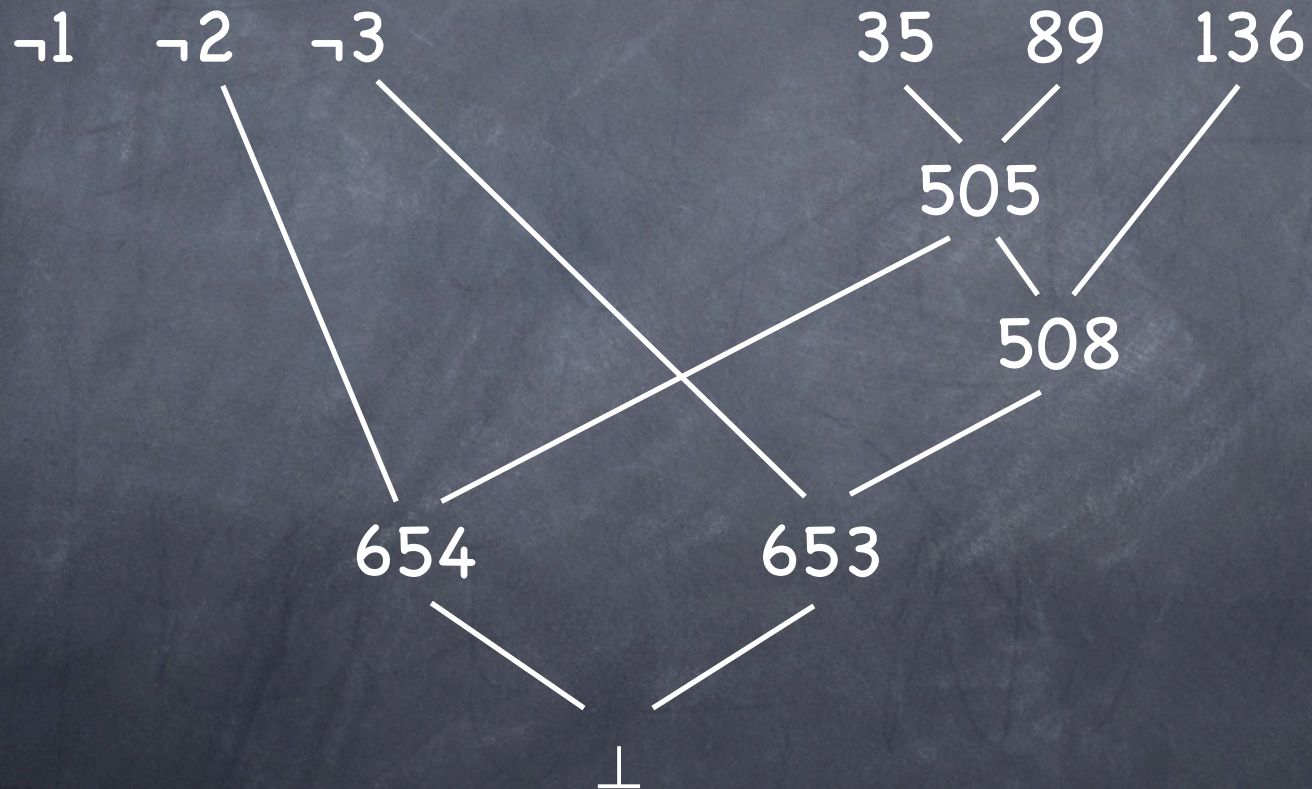
show False by (metis 654 653)

qed

conjecture (DNF): $1 \vee 2 \vee 3$

negated conjecture

used facts (axioms)



conjecture (DNF): $1 \vee 2 \vee 3$

negated conjecture

$\neg 1$ $\neg 2$ $\neg 3$

used facts (axioms)

35 89 136

505

508

654

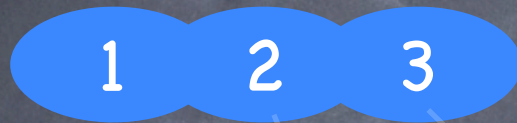
653

\perp

The diagram illustrates a logical derivation. At the top, a conjecture in Disjunctive Normal Form (DNF) is given as $1 \vee 2 \vee 3$. Below it, the negated conjecture is shown as $\neg 1$, $\neg 2$, and $\neg 3$. To the right, a set of 'used facts (axioms)' is listed: 35, 89, and 136. These axioms are used to derive intermediate results: 505 (from 35 and 89) and 508 (from 89 and 136). The negated conjecture is then combined with these intermediate results to produce 654 (from $\neg 2$ and 505) and 653 (from $\neg 3$ and 508). Finally, 654 and 653 are combined to reach the contradiction symbol \perp .

conjecture (DNF): $1 \vee 2 \vee 3$

~~negated~~ conjecture

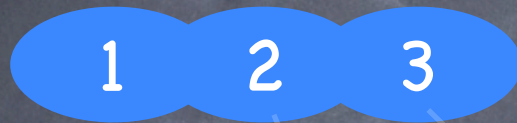


used facts (axioms)



conjecture (DNF): $1 \vee 2 \vee 3$

~~negated~~ conjecture



used facts (axioms)

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\perp

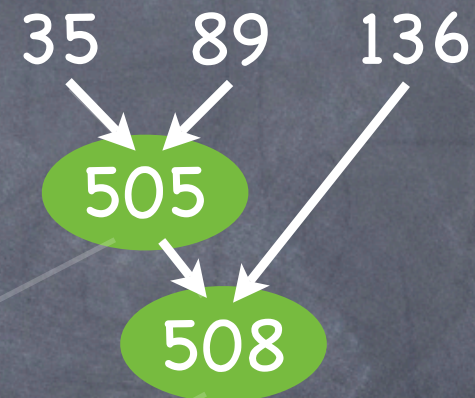


conjecture (DNF): $1 \vee 2 \vee 3$

~~negated~~ conjecture



used facts (axioms)



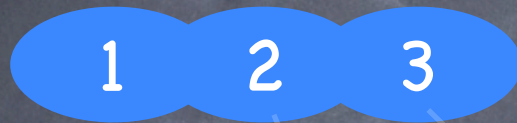
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653

\perp

conjecture (DNF): $1 \vee 2 \vee 3$

~~negated~~ conjecture

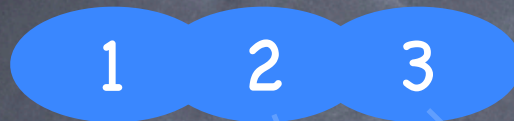


used facts (axioms)

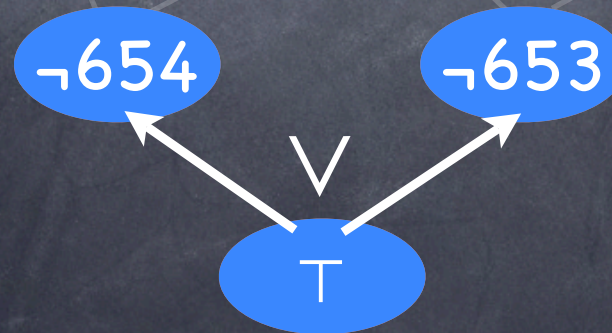
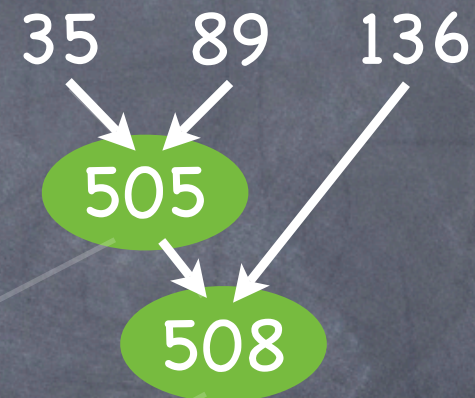


conjecture (DNF): $1 \vee 2 \vee 3$

~~negated~~ conjecture



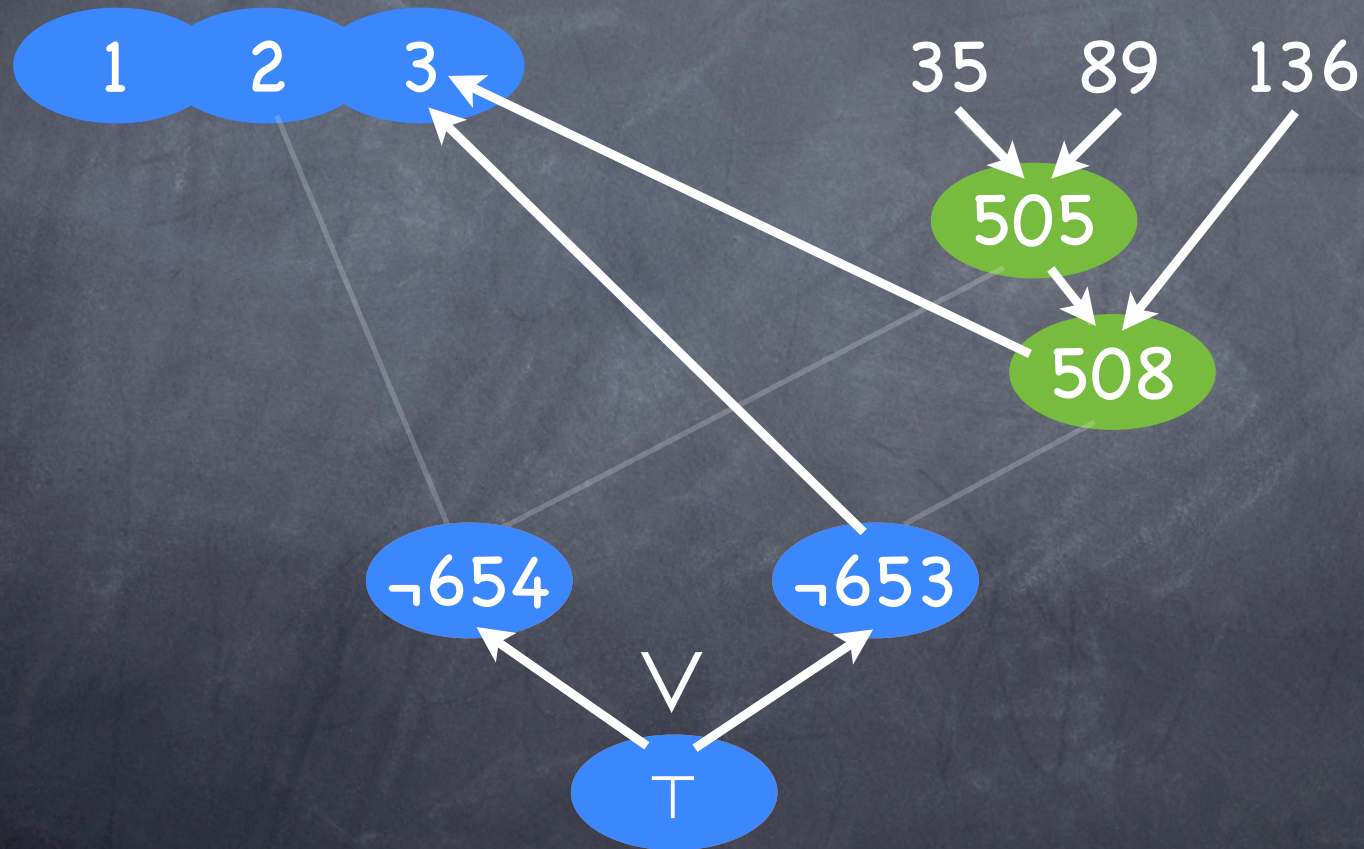
used facts (axioms)



conjecture (DNF): $1 \vee 2 \vee 3$

~~negated~~ conjecture

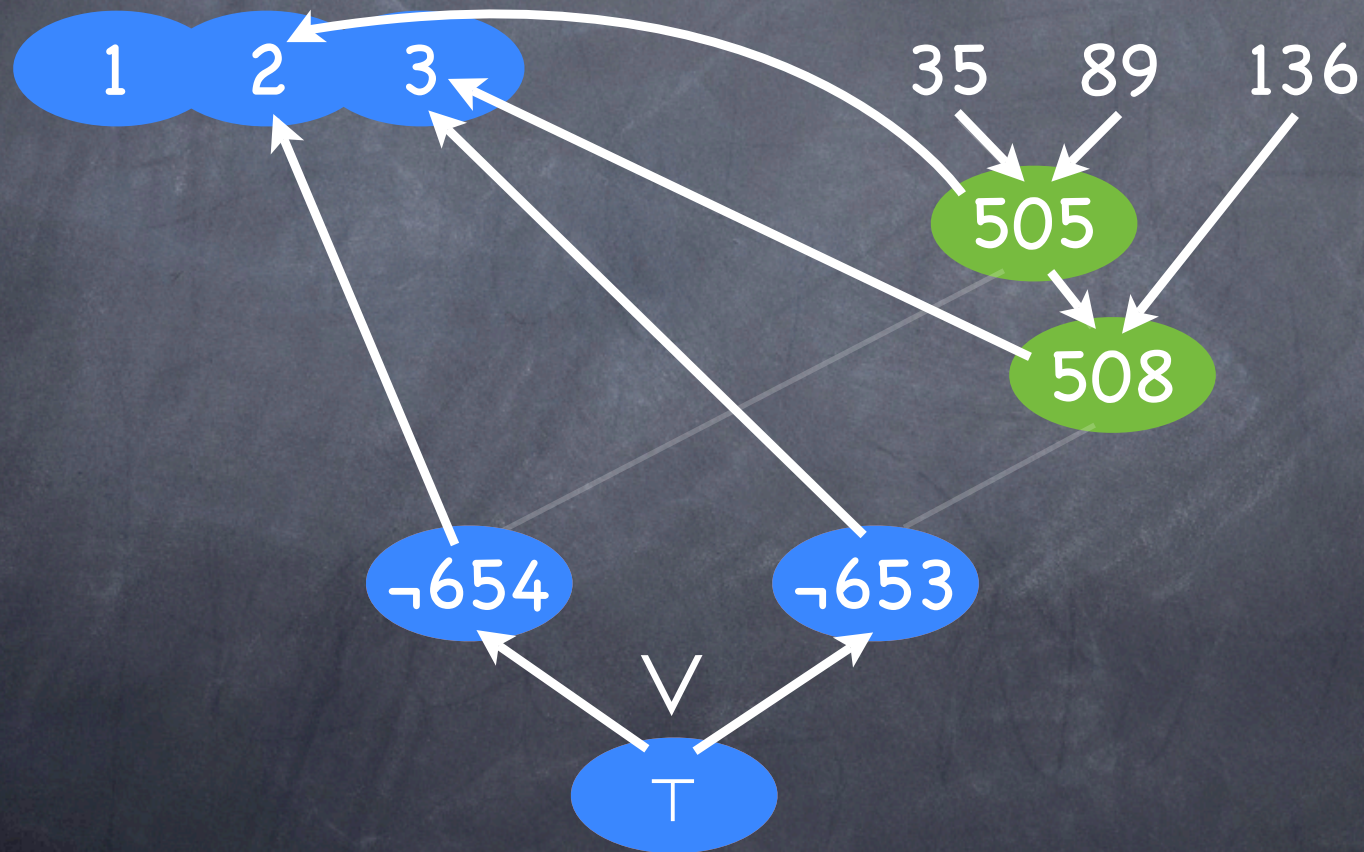
used facts (axioms)



conjecture (DNF): $1 \vee 2 \vee 3$

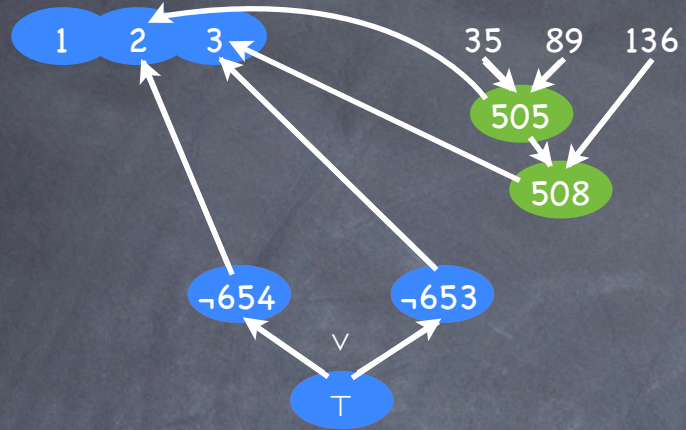
~~negated~~ conjecture

used facts (axioms)



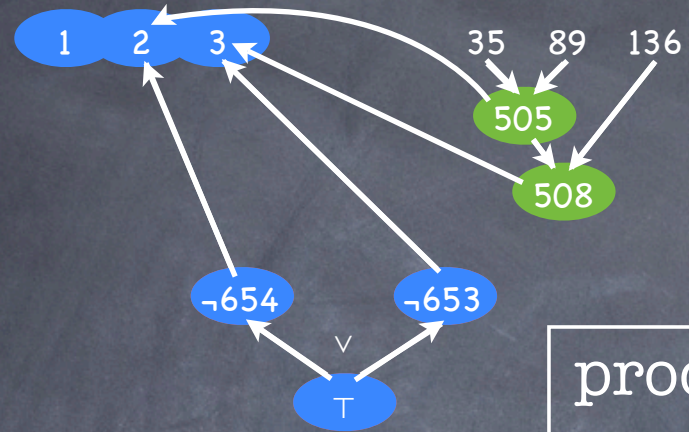
~~negated~~ conjecture

used facts (axioms)



~~negated~~ conjecture

used facts (axioms)

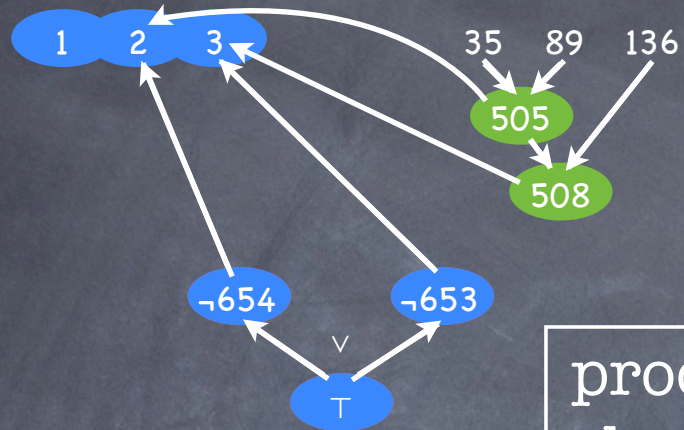


proof -

qed

~~negated~~ conjecture

used facts (axioms)

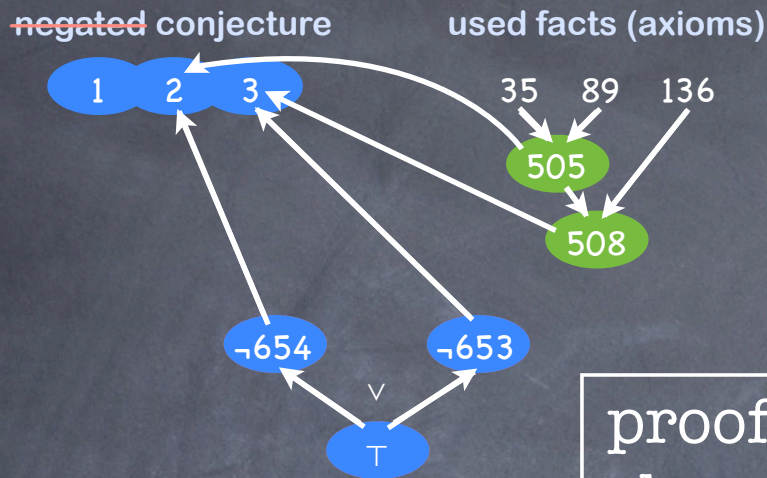


proof -

have 505 by (metis 35 89)

have 508 by (metis 505 136)

qed



proof -

have 505 by (metis 35 89)

have 508 by (metis 505 136)

{ assume $\neg 653$

have 3 by (metis $\neg 653$ 508) }

moreover

{ assume $\neg 654$

have 2 by (metis $\neg 654$ 505) }

ultimately show thesis by metis

qed