

	ϕ	P^d	Q^d	R^d	S^d	T^d	U^d	V^d	TR	TRT	TRTTU
(1) PVTQUR	1	1	1	1	1	1	1	1			
(2) PVTUVUV	1	1	1	1	1	1	1	1			1
(3) PUVTVUUVTV	1	1	1	1	1	1	1	1		1	1
(4) TPVQ	u	1	1	1	1	1	1	1			
(5) RVT			1	1	1	1	1	1	unit	1	1
(6) RVTV			1	1	1	1	1	1	unit	unit	1
(7) RSVTVUUVTV				1	1	1	1	1			1
(8) TRVS			unit	1	1	1	1	1	1	1	1
(9) TRVT			unit	unit	1	1	1	1	1	1	1
(10) TSVTVUUVTV						1	1	1		1	1
(11) TVU					unit	1	1	1		unit	0
(12) TSVTVUUVTV						unit	1	1			
(13) TVUVTV						unit	0	0			
	decide	decide	unit	unit	unit	unit	unit	unit	unit	unit	fail
	prop.	prop.	prop.	prop.	prop.	prop.	prop.	prop.	prop.	prop.	(unsat) -
									backjump		(no decision
											literals
											left).

* explanations on next page.

Analyze conflict (cf. slides mop-logic3.pdf, page 42)

Conflict clause: TVUVTV

false in $M = P^d Q^d S^d T^d U^d V^d$.

- Not true that every literal is the complement of a decision literal
- TVUVTV, V deduced literal because of clause (12): TSVTVUUVTV.

Resolution step:
$$\frac{TSVTVUUVTV \quad TVUVTV}{TSVTVTVU}$$

← also false in M.

Last deduced literal: U, because of clause (11) TVU

Resolution step:
$$\frac{TVU \quad TSVTVTVU}{TSVTVT}$$

← also false in M.

Last deduced literal complementary to literal occurring in this clause: T, because of clause (9) TRVT

Resolution step:
$$\frac{TRVT \quad TSVTVT}{TRVTS}$$

← also false in M.

Last deduced literal complementary to literal occurring in this clause: S, added because of (8) TRVS

Resolution step:
$$\frac{TRVS \quad TRVTS}{TR}$$

← false in M; every literal is complement of a decision literal.

backjump: Cause of conflict

is R^d (P^d is not a cause for the conflict) → Use TR for backjump.

Backjump

cf. slides mop-logic3.pdf, page 41:

(*)

$$M, L^d, M_1 \parallel F, C \Rightarrow M, L' \parallel F, C \quad \text{if} \quad \left\{ \begin{array}{l} \cdot M, L^d, M_1, F, C \\ \cdot \text{There is some clause } C' \vee L' \\ \text{such that:} \\ \rightarrow F, C \models C' \vee L', M \models C' \\ \rightarrow L' \text{ undefined in } M \\ \quad L' \text{ or } \neg L' \text{ occurs in } F \end{array} \right.$$

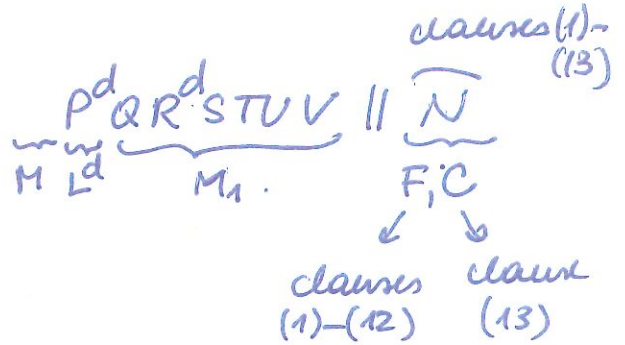
In the exercise we have: **Conflict clause** $C = \neg U \vee \neg V$. (13)

• $\underline{P}^d \underline{Q} R^d S T U V \models \neg(U \vee \neg V)$

• There is a clause **$C' \vee L' = \neg R$** (the **backjump clause** we computed before) such that the conditions $m(\oplus)$ are satisfied.

• $\left\{ \begin{array}{l} C' = \{\} \text{ (the empty clause)} \\ L' = \neg R \end{array} \right.$

• $M = \emptyset, L = P^d$, we thus have



• $F, C \models \neg R$ (because we derived $\neg R$ using resolution from clauses (1)-(13))

• $M \models \neg C'$ (because C' is the empty clause, $\neg C'$ is equiv. to verum.)

with rule (\oplus) we obtain:

$\underline{P}^d \underline{Q} R^d S T U V \parallel \neg R \Rightarrow \neg R \parallel \neg R$