

Problem 6.3 (Calculi Comparison)

60 pt *Formeln auswendig für Klausur*

Prove (or disprove) the validity of the following formulae in i) Natural Deduction ii) Tableau and iii) Resolution. \rightarrow 1. in CNF umformen, 2. Resolution

- $(P \wedge Q) \Rightarrow (P \vee Q)$ (to be done in the tutorial, not part of grading)
- $((A \vee B) \wedge (A \Rightarrow C) \wedge (B \Rightarrow C)) \Rightarrow C$
- $((P \Rightarrow Q) \Rightarrow P) \Rightarrow P$

Tutorium: $(P \wedge Q) \Rightarrow (P \vee Q)$

andere Beispiel:

$$\frac{\frac{\frac{}{P \wedge Q \vdash P \wedge Q} Ax}{P \wedge Q \vdash P} \wedge E_i}{P \wedge Q \vdash P} \wedge E_i$$

$$\frac{P \wedge Q \vdash P}{P \wedge Q \vdash P \vee Q} \vee I$$

$$\frac{P \wedge Q \vdash P \vee Q}{\vdash P \wedge Q \Rightarrow P \vee Q} \Rightarrow I$$

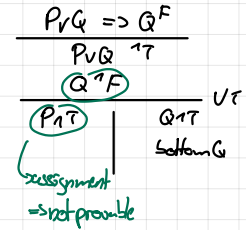
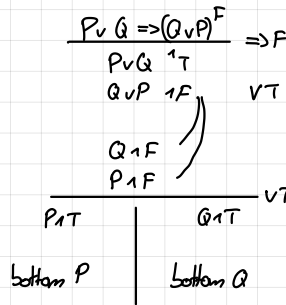
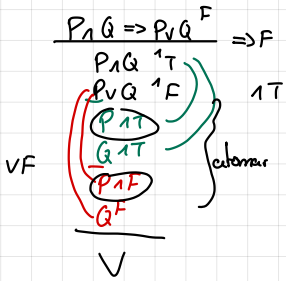
$$\frac{\frac{\frac{}{P \vee Q \vdash P \vee Q} Ax}{P \vee Q \vdash P} \vee E_L}{P \vee Q \vdash P} \vee E_L$$

$$\frac{\frac{\frac{}{P \vee Q \vdash P \vee Q} Ax}{P \vee Q \vdash P \vee Q} Ax}{P \vee Q \vdash P \vee Q} \vee E_R$$

$$\frac{\frac{\frac{}{P \vee Q \vdash P \vee Q} Ax}{P \vee Q \vdash P \vee Q} Ax}{P \vee Q \vdash P \vee Q} \vee E$$

$$\frac{P \vee Q \vdash P \vee Q}{\vdash P \vee Q \Rightarrow Q \vee P} \Rightarrow I$$

Tableaux: Slide 315ff.



Resolution: $P \vee Q \Rightarrow Q \vee P$ p. 326

1) Negate conjecture: $\neg(P \vee Q \Rightarrow Q \vee P)$

2) CNF: $(P \vee Q) \wedge \neg(Q \vee P)$

$$P \vee Q \wedge \neg Q \wedge \neg P$$

clauses: $\{P^T, Q^T\}, \{Q^F\}, \{P^F\}$

3) Apply resolution rules

- | | |
|--------------------|---------------------|
| (1) $\{P^T, Q^T\}$ | Initial |
| (2) $\{Q^F\}$ | Initial |
| (3) $\{P^F\}$ | Initial |
| (4) $\{Q^T\}$ | resolve (1) and (3) |
| (5) $\{\}$ | Resolve (2) and (4) |