

Sequents

- S1:* $P \vee \sim R, \sim R \rightarrow S, \sim P \vdash S$
- S7:* $\sim P, R \vee \sim P \leftrightarrow P \vee Q \vdash Q$
- S9:* $\sim P \rightarrow Q \ \& \ R, \sim P \vee S \rightarrow \sim T, U \ \& \ \sim P \vdash (U \ \& \ R) \ \& \ \sim T$
- S10: $(Q \vee R) \ \& \ \sim S \rightarrow T, Q \ \& \ U, \sim S \vee \sim U \vdash T \ \& \ U$

Proofs S1 – S10 do not require use of $\rightarrow I$ or RAA. The rest may.

- S11:* $P \vdash \sim \sim P$ **Double Negation**
- S12:* $P \rightarrow Q, \sim Q \vdash \sim P$ **Modus Tolendo Tollens₁**
- S13: $P \rightarrow \sim Q, Q \vdash \sim P$ **Modus Tolendo Tollens₂**
- S16:* $P \rightarrow Q, Q \rightarrow R \vdash P \rightarrow R$ **Hypothetical Syllogism**
- S17:* $P \vdash Q \rightarrow P$ **True Consequent**
- S18:* $\sim P \vdash P \rightarrow Q$ **False Antecedent₁**
- S19: $P \vdash \sim P \rightarrow Q$ **False Antecedent₂**
- S20: $P \rightarrow Q, P \rightarrow \sim Q \vdash \sim P$ **Impossible Antecedent**
- S21:* $\sim P \vee Q \vdash P \rightarrow Q$ **v \rightarrow**
- S22: $P \vee Q \vdash \sim P \rightarrow Q$ **v \rightarrow**
- S25: $P \vee Q, P \rightarrow R, Q \rightarrow R \vdash R$ **Simple Dilemma**
- S26* $P \vee Q, P \rightarrow R, Q \rightarrow S \vdash R \vee S$ **Complex Dilemma**
- S27: $P \rightarrow Q, \sim P \rightarrow Q \vdash Q$ **Special Dilemma**
- S28:* $\sim(P \vee Q) \vdash \sim P \ \& \ \sim Q$ **DeMorgan's Law₁**
- S29: $\sim(P \ \& \ Q) \vdash \sim P \vee \sim Q$ **DM₂**
- S31: $P \vee Q \vdash \sim(\sim P \ \& \ \sim Q)$ **DM₃**
- S34: $P \rightarrow Q \vdash \sim(P \ \& \ \sim Q)$ **Neg \rightarrow**
- S36: $P \ \& \ Q \vdash Q \ \& \ P$ **& Commutativity**
- S37:* $P \vee Q \vdash Q \vee P$ **v Commutativity**
- S38:* $P \leftrightarrow Q \vdash Q \leftrightarrow P$ **\leftrightarrow Commutativity**
- S39: $P \rightarrow Q \vdash \sim Q \rightarrow \sim P$ **Transposition**
- S41:* $P \vee (Q \vee R) \vdash (P \vee Q) \vee R$ **v Associativity**
- S42:* $P \ \& \ (Q \vee R) \vdash (P \ \& \ Q) \vee (P \ \& \ R)$ **&/v Distribution**
- S43: $P \vee (Q \ \& \ R) \vdash (P \vee Q) \ \& \ (P \vee R)$ **v/& Distribution**
- S44: $P \rightarrow (Q \rightarrow R) \vdash P \ \& \ Q \rightarrow R$ **Imp/Exportation**
- S45: $P \leftrightarrow Q, P \vdash Q$ **Biconditional Ponens**
- S49: $P \leftrightarrow Q \vdash \sim Q \leftrightarrow \sim P$ **BiTransposition**

Theorems

- T1:* $\vdash P \rightarrow P$ **Identity**
- T2:* $\vdash P \vee \sim P$ **Excluded Middle**
- T3: $\vdash \sim(P \ \& \ \sim P)$ **Non-Contradiction**
- T4:* $\vdash P \rightarrow (Q \rightarrow P)$ **Weakening**
- T5:* $\vdash (P \rightarrow Q) \vee (Q \rightarrow P)$ **Paradox of Material Implication**
- T6: $\vdash P \leftrightarrow \sim \sim P$ **Double Negation**
- T7: $\vdash (P \leftrightarrow Q) \leftrightarrow (Q \leftrightarrow P)$

* answers in the back of the book