

## Exercise Set 1

Melvin Fitting

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Give tableau proofs or counter-models constructed from failed tableaus for the following. Hand in.

1.  $((P \supset Q) \wedge (Q \supset R)) \supset \neg(\neg R \wedge P)$
2.  $((P \supset Q) \wedge (R \supset S)) \supset ((P \vee R) \supset (Q \wedge S))$
3.  $((P \supset Q) \wedge (R \supset S)) \supset ((P \vee R) \supset (Q \vee S))$
4.  $(\neg P \supset Q) \supset ((P \supset Q) \supset Q)$  **Pease note, this exercise has been corrected by omitting an initial right parenthesis.**

Try the following, but don't hand in.

5. Try and design reasonable tableau rules for the connective  $\equiv$ . This can be defined as  $P \equiv Q$  abbreviates  $(P \wedge Q) \vee (\neg P \wedge \neg Q)$ , or it abbreviates  $(P \supset Q) \wedge (Q \supset P)$ .
6. Then try and prove soundness and completeness.