Additional Exercises on Sentential Natural Deduction

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Exercise A.1

Show that the following obtain by giving derivations.

1. $\neg p \vdash p \rightarrow q$.

2. $p \vdash \neg\neg p$, **without** using (DN1).

3. $\vdash p \vee p \rightarrow p$. (Notice that there are no premises.)

4. $\vdash (p \rightarrow q) \rightarrow (\neg q \rightarrow \neg p)$. (Notice that there are no premises.)

5. $\neg(p \rightarrow q) \vdash p$.

6. $\neg r \rightarrow \neg(p \wedge q) \vdash p \rightarrow \neg\neg(q \rightarrow r)$.

7. $p \vee q \vdash (p \rightarrow q) \rightarrow q$.

8. $\vdash p \vee \neg p$. (No premises.)

9. $p \vee q, p \rightarrow r, q \rightarrow s \vdash r \vee s$.

10. $p \vee q, \neg p \vee r \vdash q \vee r$, **without** using Case Distinction (CD).

11. $\vdash ((p \rightarrow q) \rightarrow p) \rightarrow p$. (No premises.)