

Problem Set 1, Part 1

cs112

Posted: Tues, September 5, 2006

Due Date: Tues, September 12, 2006 **IN CLASS**

Exercise 1 Propositional Logic

Part 1.1 Natural Deduction

Give a formal proof of validity for each of the following sequents. Check the website under Readings and Handouts for a list of rules you may use and some suggested strategies. For these problems, you may only use the ND rules listed on the handout and no derived rules.

1. $(p \wedge q) \wedge r, s \wedge t \vdash q \wedge s$
2. $p \rightarrow (p \rightarrow q), p \vdash q$
3. $p \vdash q \rightarrow (p \wedge q)$
4. $p \rightarrow (q \rightarrow r), p \rightarrow q \vdash p \rightarrow r$
5. $\neg(\neg p \vee q) \vdash p$
6. $\neg p, p \vee q \vdash q$
7. $p \wedge q, \neg(p \wedge r) \vdash \neg r$
8. $\vdash q \rightarrow (p \rightarrow (p \rightarrow (q \rightarrow p)))$
9. $p \rightarrow q, \neg q \wedge r, p \vee s \vdash s$
10. $p \vee q \vdash r \rightarrow ((p \vee q) \wedge r)$
11. **EXTRA CREDIT** $(a \vee b) \wedge \neg c, \neg c \rightarrow (d \wedge \neg a), b \rightarrow (a \vee e) \vdash e \vee f$