CS81 **Assignment 1**
Due Tuesday, 26 January 2010

1. Prove the following sequents using natural deduction. When possible, use only intuitionistic rules. Give both a Fitch diagram and a tree format proof for the first 2 examples. For the remainder, use the format of your choice. (You may use JAPE for formatting, if desired. However, try not to use it as a crutch. Make sure you understand how to put the proofs together without it.)

a. $p \wedge (q \vee r) \vdash (p \wedge q) \vee (p \wedge r)$

b. $(p \rightarrow r) \vee (q \rightarrow r) \vdash (p \wedge q) \rightarrow r$

c. $(p \vee q) \rightarrow r \vdash (p \rightarrow r) \wedge (q \rightarrow r)$

d. $\neg p \wedge \neg q \vdash \neg(p \vee q)$

e. $\neg(p \wedge q) \vdash \neg p \vee \neg q$

2. Show that, given only **one** of the rules RAA (reductio ad absurdum), LEM (law of the excluded middle), DNE (double not elimination, the other two rules can be derived using only intuitionistic rules in addition.