CS 245 — Assignment #3
Spring 2005

Due Date: Tuesday, May 30 at 5pm.

Use `makeCover` to produce a cover page for your assignment and hand in your assignment in the CS 245 assignment box. Assignments are to be done individually.

1. (10 points) Consider the following,

   - $\neg r \Rightarrow \neg p,\ \neg(q \vee r),\ s \Rightarrow (p \vee q) \quad \models \quad \neg(\neg q \wedge \neg r)$
   - $\neg r \Rightarrow \neg p,\ \neg(q \vee r),\ s \Rightarrow (p \vee q) \quad \models \quad \neg s$

   (a) Using a semantic tableaux, show whether the premises are consistent. Explain.

   (b) For each of the above, determine whether the conclusion logically follows from the premises. If the conclusion does logically follow from the premises, prove it using Natural Deduction. If the conclusion does not logically follow from the premises, provide a counter example that demonstrates it does not.

2. (15 points) For each of the following, determine whether the conclusion logically follows from the premises. If the conclusion does logically follow from the premises, prove it using Semantic Tableaux. If the conclusion does not logically follow from the premises, provide a counter example that demonstrates it does not.

   (a) $p \Rightarrow \neg r,\ \neg\neg r,\ s \vee \neg t,\ \neg t \Rightarrow p \quad \models \quad s$

   (b) $\neg p \Rightarrow r,\ \neg s \Rightarrow t,\ \neg t \vee \neg r \quad \models \quad s \vee p$

   (c) $\neg p \Rightarrow \neg(s \vee t) \quad \models \quad s \Rightarrow p$

   (d) $\neg p \Leftrightarrow q,\ \neg r \wedge s,\ (t \vee s) \Rightarrow (\neg p \Rightarrow r) \quad \models \quad \neg q$

   (e) $s \Rightarrow p,\ t \Rightarrow r \quad \models \quad \neg(p \vee r) \Rightarrow \neg(s \vee t)$