

Computational Logic

Assignment 2

Due: 8/03/2006

1. Make a proof of satisfiability or unsatisfiability the following sequents in sequent calculus:
 - $\vdash (\neg A \vee A)$
 - $\vdash ((A \Rightarrow B) \wedge (B \Rightarrow C)) \Rightarrow (A \Rightarrow C)$
 - $\vdash (A \Rightarrow (B \Rightarrow C)) \Rightarrow ((A \Rightarrow B) \Rightarrow (A \Rightarrow C))$
2. Prove using DPLL satisfiability or unsatisfiability of the same formulas as done for sequent calculus. Compare the proofs.
3. Prove that the DPLL calculus is sound.
4. Prove the completeness of the resolution calculus.
5. Formalization and Proof: represent in propositional logic and use propositional resolution.
 - Heads, I win. Tails, you lose. Use propositional resolution to prove that I always win.
 - There are three suspects for a murder: Adams, Brown, and Clark. Adams says "I didn't do it. The victim was old acquaintance of Brown's. But Clark hated him." Brown states "I didn't do it. I didn't know the guy. Besides I was out of town all the week." Clark says "I didn't do it. I saw both Adams and Brown downtown with the victim that day; one of them must have done it." Assume that the two innocent men are telling the truth, but that the guilty man might not be. Use resolution to solve the crime.
6. Install one of the SAT solvers listed in SATLIB

<http://www.intellektik.informatik.tu-darmstadt.de/SATLIB/>

Test it with the benchmark problems available also on this site. Write a report describing the characteristics of the selected solver, and the performance on the different benchmarks.