Reading

Please read pp. 57–65 in Smullyan for Tuesday, March 24.

Project Work

During the second half of this course you should work on a self-chosen project related to the topic of applied logic. This could, for instance, be a literature study about an interesting or the implementation (and documentation) of a proof environment. We will discuss a few possibilities in class. Please prepare a project proposal (about half a page) for Tuesday, March 31.

Questions

(1) Reduce these P^2 formulas to purely propositional formulas.

(a) $(\forall p)\ p \supset \bot$

(b) $(\forall p)(\forall q)\ ((\sim p \vee q) \supset (p \supset q))$

(c) $(\forall p)(\forall q)\ ((p \supset p \vee q) \wedge (p \wedge q \supset p))$

(2) Give Refinement logic rules for P^2.

(3) Construct an example of a formula that is satisfiable in a denumerable universe but not in any finite one (exercise 3, page 50 of Smullyan).

(4) Show that a first-order formula A is valid if and only if $\sim A$ is satisfiable. Show that A is satisfiable if and only if $\sim A$ is valid (exercise 4, page 50 of Smullyan).

(5) **Bonus (1)**: There is a simple proof for cut elimination in P^2.
State the theorem and outline a proof. Details are not necessary.

(6) **Bonus (2)**: Solve exercise 3, page 52 of Smullyan.