

COSI-101a: Programming Project #1

Fall 2007

1 Problem Statement

You should implement a propositional logic theorem prover in Prolog using the Gentzen-style sequent calculus given in section 2. The interface should be a predicate `proof(+As, +Bs, -Proof)`, where $A_1, \dots, A_n \vdash B_1, \dots, B_n$ is the theorem to be proved (`As` and `Bs` should be lists), and `Proof` should be the proof tree found.

If you wish, you may use Prolog's operator notation to add some syntactic sugar for the logical operations (e.g., infix `&` for conjunction, `==>` for implication, `&c.`).

2 Sequent calculus

	Left	Right
\wedge	$\frac{A, B \vdash}{A \wedge B \vdash}$	$\frac{\vdash A \quad \vdash B}{\vdash A \wedge B}$
\vee	$\frac{A \vdash \quad B \vdash}{A \vee B \vdash}$	$\frac{\vdash A, B}{\vdash A \vee B}$
\rightarrow	$\frac{\vdash A \quad B \vdash}{A \rightarrow B \vdash}$	$\frac{A \vdash B}{\vdash A \rightarrow B}$
\leftrightarrow	$\frac{A, B \vdash \quad \vdash A, B}{A \leftrightarrow B \vdash}$	$\frac{A \vdash B \quad B \vdash A}{\vdash A \leftrightarrow B}$
\neg	$\frac{\vdash A}{\neg A \vdash}$	$\frac{A \vdash}{\vdash \neg A}$