Formal Foundations of Computer Science 1

Wolfgang Schreiner
Research Institute for Symbolic Computation (RISC-Linz)
Johannes Kepler University, Linz, Austria

Wolfgang.Schreiner@risc.uni-linz.ac.at
http://www.risc.uni-linz.ac.at/people/schreine

Course Organization

- Lectures
  1. Option: Tuesday, 8:15–9:45, HS 12.
  2. Option: Tuesday, 18:30–20:00, HS 5.
- Information
  - Web: `http://www.risc.uni-linz.ac.at/courses/formal`.
  - Office: Tuesday, 17:00–18:00, KG, 4th floor, RISC-Linz rooms.
- Grades
  - Written exam at end of semester.

Presence is strongly recommended.

Exercises

- Begin: October 13 and 15.
  - Ordered hardcopies of lecture notes.
  - Master hardcopy of first exercise sheet.
- Late Registration
  - email: Wolfgang.Schreiner@risc.uni-linz.ac.at
  - Firstname, Lastname, Mat.Nr., SKZ, time constraints.
- Grades
  - 10 exercise sheets.

Presence is mandatory.

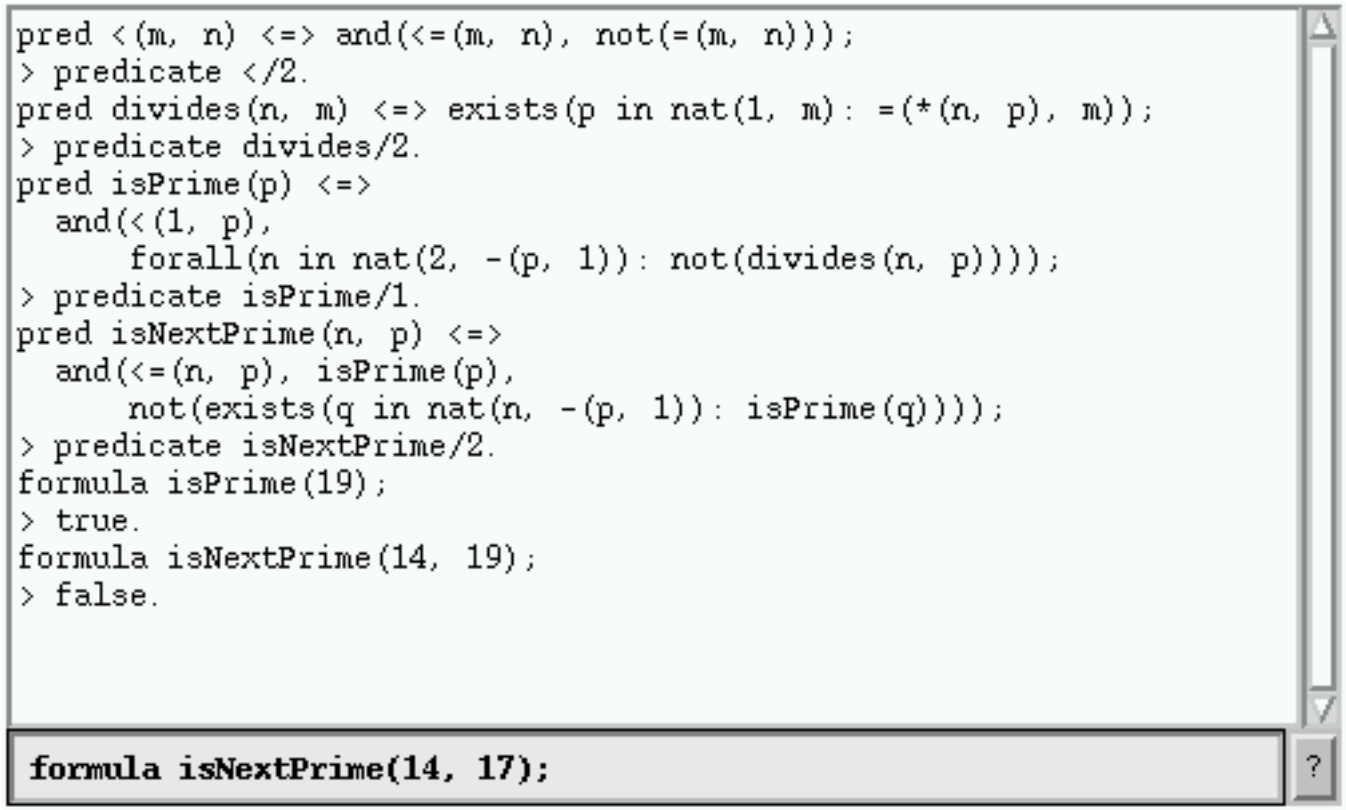
Course Materials

- Lecture notes.
  - Web page (HTML, PostScript, PDF).
  - Hardcopy (order now: ÖS 50,-).
  - Explains details for home study.
- Course slides.
  - Web page (HTML, PostScript, PDF).
  - Print yourself and bring to lecture.
  - Explains basics; use for annotations.

Listen during lecture rather than write!

Logic Evaluator

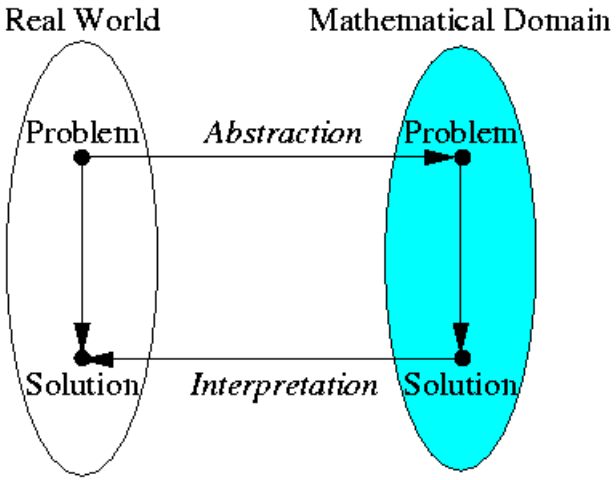
Interpreter for executing mathematical definitions.



Contents

Introduction into basic mathematical domains and techniques as a foundation for computer science.

Mathematical Domains



- Abstraction: construct a simpler image of the problem.

  Simpler but precisely defined; operation in well understood domains possible.

- Interpretation: translate solution back into real world.

  Effects as predicted by knowledge about mathematical domain.

Mathematical Techniques

- Precise language.
  - Exact definition of objects.
  - Exact statements of facts.
- Correct reasoning.
  - Rules for thinking.
  - Rules for arguing.

These techniques enable us to understand definitions and to judge the correctness of arguments in any scientific domain.

Our Goals

- Insight into mathematical domains.
  - Construction.
  - Properties.
  - Operation.
- Mastering of mathematical techniques.
  - Defining.
  - Proving.

In-depth understanding, not just learning by heart.