Surveys in Mathematical Sciences I (Summer 2009)

Teacher: Jacques Garrigue

Course Subject

Part 2 of the course is "Introduction to lambda-calclus".

Purpose

The lambda calculus provides both a theoretical basis for the study of programming languages, and tools to manipulate logic.

In this lecture we will how both programs and proofs can be expressed in the lambda calculus, and how doing so helps in formalizing them.

The untyped lambda calculus provides a generic formalization of computation. We will see how it can simulate the execution of programs.

Typed lambda calculus is both a type programming language, and a way to express formal logical proofs. We will see the correspondence between programs and proofs.

Evaluation

Evaluation will be based on a report.
If you wish, you can send it by mail to `garrigue@math.nagoya-u.ac.jp`.

References

We will not use no textbook, but the following books may be of interest to those wishing to know more.

-       , "   ",   , 1997.
-       , "   ",   , 1991.
- Henk Barendregt, "The lambda-calculus : its syntax and semantics", North-Holland, 1981.
- Gérard Huet, "Deduction and Computation", in M. Broy ed., "Logic of Programming and Calculi of Discrete Design", Springer-Verlag, 1987.

Course Plan

The cours shall progress as indicated below

1st lecture (5/14) Lambda-caluclus syntax and evaluation

2nd lecture (5/21) Typed lambda-calculus

3rd lecture (5/28) Polymorphic lambda-calculus and dependent types

4th lecture (6/11) Application to theorem proving

Office Hour

Every Wednesday   16:30   17:30   Sc.Bld. 1, Room 405.

Course URL

Course material and other information can be found at the course URL:
  `http://www.math.nagoya-u.ac.jp/~garrigue/lecture/`