

January 14, 2010

Programming Languages and Types

Homework Assignment 11

Please hand in your homework by email to `mailto:pllecture@informatik.uni-marburg.de` until January 21. Please submit your solutions in appropriate file formats.

H11.1 Polymorphism

1. Write/find a meaningful program that is well-typed in a language with let polymorphism, but not in a language that only supports simple types.
2. Write/find a meaningful program that is well-typed in a language like System F, but not in a language that only supports let polymorphism.

H11.2 Curry-Howard-Isomorphism

Prove or disprove the following theorems by providing terms with the corresponding (via Curry-Howard) types in Haskell. The following formulas are all implicitly universally quantified over a, b, c etc.

Hint: Use the build-in data type “Either” for disjunctions.

- $(a \wedge a) \rightarrow a$
- $(a \rightarrow b \rightarrow c) \rightarrow b \rightarrow a \rightarrow c$
- $(a \rightarrow b \rightarrow a) \rightarrow a \rightarrow [b] \rightarrow a$
- $((((a \wedge b) \rightarrow f) \rightarrow ((a \rightarrow f) \vee (b \rightarrow f)))) \rightarrow f \rightarrow f$
- $(a \rightarrow b) \rightarrow a$
- $(a \rightarrow b) \rightarrow b$

After you have solved the exercise, you may want to google for “Djinn”.