

Homework # 6

due April 1, 13:00

As usual, turn in your answers to written problems (§3,4) on paper in lecture, and send your SASyLF proofs (§2) as a file `sumprod.slf` to `scmalte@inf.ethz.ch`.

1 Reading

Please read Chapter 11 in your textbook.

2 Proofs

Modify the proofs of type soundness of the simply-typed lambda calculus with “unit” types to add sums (See Figure 11-9). A skeleton file is available which gives the syntax. Your evaluation and types rules should follow the book as closely as possible.

3 Problems

Please do the following problems

1. Enums can be seen as a variation on “variants”. Write new evaluation and typing rules (on paper, not SASyLF) for a type τ written like `[red,green,blue]` with new syntax:

$$\begin{aligned} \tau & ::= \dots \\ & \quad | [n_1, \dots, n_m] \\ \\ t & ::= \dots \\ & \quad | n_i \text{ as } [n_1, \dots, n_m] \quad (\text{a new kind of value}), \\ & \quad | \text{ case } t \text{ of } n_1 \rightarrow t_1 \mid \dots \mid n_m \rightarrow t_m. \end{aligned}$$

The identifier n_i by itself is *not* a legal term.

2. Explain informally why these type rules should be sound. (You might wish to write the SASyLF proofs for sum types first; otherwise your explanations may not be convincing!)

4 Literature Survey

Look at *two* papers (if possible selected from those used in Homework #4) and indicate which of the extensions from Chapter 11 (1,2,3,4,5,6,7,8,9,10,11,12) or minor variants are used in the languages. What other extensions are not covered by this list? Skim ahead in the book to see topics that may be relevant to these other extensions.