

CIS 500 — Software Foundations

Homework Assignment 9

Subtyping

Due: Monday, November 20, 2006, by noon

Reminder: You should work *all* one-star exercises in TAPL as you are reading.

1 Exercise The algorithmic subtyping judgement replaces the three rules for subtyping records (S-RCDWIDTH, S-RCDDEPTH, and S-RCDPERM) in the declarative system with one rule (SA-RCD). If our language also included variants, what new algorithmic rule for variants should replace the three rules S-VARIANTWIDTH, S-VARIANTDEPTH, and S-VARIANTPERM?

2 Exercise TAPL exercise 16.1.2.

One thing to be careful of in this problem is exactly what you are performing induction on. Usually, we just say “By induction on derivations” for such proofs. But that won’t actually work here (do you see why? it’s not obvious at first sight, but there is a case of the proof where applying the induction hypothesis doesn’t work); instead, the induction has to be on *heights* of derivations—i.e., the induction is really over natural numbers. Make sure you understand this point: it is a little subtle.

3 Exercise TAPL exercise 16.2.5.

4 Exercise [Required for PhD groups; optional for others.] TAPL exercise 16.2.6.

5 Debriefing

1. Approximately how many hours (per person, on average) did you spend on this assignment?
2. Would you rate it as easy, moderate, or difficult?
3. How deeply do you feel you understand the material it covers (0%–100%)?
4. Any other comments?