Homework # 13

due Wednesday, December 4

1 Reading
Please read Chapter 22 in your textbook.

2 Problems
Please do the following problems:

• Exercise 22.2.3
• Exercise 22.3.3
• Exercise 22.4.3
  For this one, check your answers against the solution in the book; do not turn them in.
• Exercise 22.5.2

3 Proofs
Prove that constraint type checking is total and sound using the SASyLF definitions and skeleton provided. We will not prove completeness for this homework. Finishing the totality theorem is easy; the soundness theorem is difficult.

You will need to use an experimental SASyLF release that’s on the class homepage (“a5”). This permits one to define judgments that use contexts as syntax. The idea is to handle pattern matching over such judgments, but this part is not implemented yet. You can do the pattern matching, but the contexts don’t change.

4 Extra
Optionally, prove the variable substitution lemma used in the proof of soundness. Only attempt this part if you complete the main proof.

5 Graduate Students
Find two “constraint-based” type systems in the literature. Cite them. What forms do the constraints take? Are proofs given for totality, soundness and completeness? Explain!