CSE 510
Semantics
Assignment
Due Wednesday, February 9, 2005

James Hook

February 2, 2005

Problems

1. 5.1

2. 5.6 (Omit partial functions)

3. 5.8 (Omit partial funcitons)

4. 5.13

5. Recursion

   Add recursive parameterless procedures to the while language. Assume the syntax of a recursive procedure definition is:

   $$\textbf{procrec } \rho \textbf{ is } C_0 \textbf{ in } C_1$$

   Procedure calls are as in the previous problem.

   (a) Give the new inference rule for recognizing syntactically well-formed programs.

   (b) Give an operational program congruence that recursive procedures must satisfy. My solution required a substitution operation. You may assume a substitution operation, but please outline the properties you assume it to have.

   (c) In the style of Chapter 3 give a series of approximations to the meaning of a recursive procedure definition. Argue briefly that all approximations are "reasonable" and that all "reasonable behaviors" are approximated.

(d) Use the techniques of Chapter 3 to give a compositional semantics to recursive parameterless procedures.

(e) Show that the equivalence stated in (5b) holds in your semantics.