Homework # 8
due October 28

1 Reading
Please read Chapter 13 in your textbook.

2 Problem
Please do the following problem:

• Exercise 13.1.1, and include the effects of evaluating

   \[ c = (\lambda x: \text{Nat} \ . \ \{\text{ref } x, \text{ref } x\}) \ 0 \]

   Explain your answer!

• Counter examples:

   The textbook says (page 167) that we must include a well typing of the store in the requirements for progress and preservation. Give two counter-examples, one for Progress (Theorem 13.5.7) and one for Preservation (Theorem 13.5.3) if they omit any mention of well typing. Recall that a counter-example must involve only ground terms (and ground stores and ground store typing).

3 Proofs
Put together the proofs of progress and preservation with several lemmas. You only need to complete the proofs labeled TODO. The EXTRA proofs may be completed to make up previous homework assignment proofs, but only if you finish the required proofs.

4 Graduate Students
The model in the textbook doesn’t handle pointer arithmetic. Find and cite one published proof of soundness of systems with pointer arithmetic. How does the model handle pointer arithmetic? What new types are needed? Does it include any mechanized proofs?