Homework 7
Due Friday, 5/20/2011

Please turn in your homework solutions at the beginning of class on the due date.

1. (15 points) **Equivalence of Abstract Data Types**
   Please do problem 9.2 from Mitchell, page 273. Data-type induction is explained in section 9.2.5 of the text.

2. (10 points) **Subtyping and Binary Methods**
   Please do problem 11.8 from Mitchell, page 334.

3. (15 points) **Subtyping and Visibility**
   Please do problem 12.6 from Mitchell, page 375.

4. (10 points) **Subtyping and Specifications**

5. (25 points) **“Growing a Language” Reading**
   Please read the short paper entitled “Growing a Language” from the auxiliary reading page. The author, Guy Steele, is one of the designers of Java, and this was his keynote talk at the major American conference on object-oriented languages (OOPSLA) in 1998.
   This paper includes a discussion of why some items were originally left out of Java when they designed the language, but likely should have been included. It also gives some insight into programming language design in general. The following questions will guide you through the paper:
   
   (a) What is wrong with designing/using a small language like Lisp?
   (b) What is wrong with designing/using a huge language (C++)?
   (c) What was Steele’s goal in designing Java?
   (d) Why does Steele feel that overloaded operators are important. Contrast this with his conviction (expressed elsewhere) that overloaded methods might have been left out without much harm.
   (e) Discuss why generics might have been left out originally, but why he now feels they are important.

   Write a separate paragraph discussing each of these items. A few sentences on each part is sufficient.
   We will spend some time discussing these points after the homeworks are turned in.

6. (15 points) **Smalltalk Reading**
   Read “Design Principles Behind Smalltalk” by Dan Ingalls (available on the “links” page).
   Think about the Principles set forth. Which are new? Which have we seen before? What principles are reminiscent of Lisp? What is the scope of the language (ie, what is included in its definition)? A few sentences on each item is sufficient—clarity is more important than length of answer.