COMP 210, Spring 2002, Homework 6
Due Wednesday, February 27, 2002 at the start of class

Before you start the homework, you should remind yourself of our General Advice, Advice on Homeworks, and Grading Guidelines. All are available from the class web site (http://www.owlnet.rice.edu/~comp210).

For this assignment, you should follow all the steps of the design methodology and include the results of each step as comments or code in the final materials that you submit.

1. (4 points) Using the definitions for directory trees given in class, develop the following programs.
   a. **Num-files: directory → number** Your program should consume a directory tree and return the total number of files contained in that directory tree. Count a directory as a file
   b. **dup-names: directory → list-of-symbols** Your program should consume a directory tree and return a list containing all the names that occur more than once in the entire directory tree. (This differs from the function **any-duplicate-names?** in the lab lecture because it must check the entire directory tree. That is, if **'foo** occurs in two different subtrees of the directory, your program should find that duplication and report it by including **'foo** in the resulting list.

2. (2 points) Develop a program **first-k : list natnum → list**. Your program should consume two arguments, a list and a natural number. It should produce a list that contains the first *k* elements of the input list, where *k* is the natural number given as the second argument. That is

   (first-k (list 1 2 3 4 5 6 7 8) 3) should return (cons 1 (cons 2 (cons 3 empty)))

   Be sure to show the steps involved in developing your template for **first-k**.

3. (4 points) Work Exercise 17.6.6 from the book (page 239 in my copy) to develop the program **DNAprefix**. Show all the steps in the design methodology.