EECS 345 Homework #1 - due 9/13/05

1. What is the value of the expression `(append (list cons) (cons list (append)))` in Dr. Scheme? Explain how this value is obtained in terms of the Scheme evaluation rules. Draw this value using box and arrow notation.

2. Write a Scheme function `(interleave list1 list2)` that returns a list combining the elements of `list1` and `list2` in an alternating manner, starting with the first element of `list1` (if any).

   For example:

   ```
   (interleave '(1 2 3 4 5) '(a b c)) => (1 a 2 b 3 c 4 5)
   ```

3. Define a higher-order function `(functional-sum fnlist)` which, given a list of 1-argument numerical functions, returns a new *function* representing their sum. This new function can then be applied to a numerical argument to compute the actual sum.

   For example:

   ```
   (define (square x) (* x x))
   (define (cube x) (* x x x))

   (define fsum (functional-sum (list square cube)))

   (fsum 2) => 12
   ```

   or, equivalently

   ```
   ((functional-sum (list square cube)) 2) => 12
   ```

General Guidelines for Assignments

When you are asked to write a function, you may define additional functions as necessary. You should turn in a complete commented listing of all code that you write. You should also turn in a transcript of sample runs of your function on the example input data given in the assignment (if any) as well as input of your own devising. Make sure that the work you turn in is organized in the same way as the assignment, so that the TA can easily find your answers to each part. A printed copy of your assignment must be turned in during class on the day the assignment is due in order to receive full credit.