HW1 solutions

1 a) See hw1.f

b) See hw1.f95

c) Programmer's productivity

It should be clear that a programmer can write more functional-style code than imperative-style code in a given time interval.

Time complexity

Both styles have the same time complexity. It is not hard to show that both the number of times the loop is executed in the imperative style and the number of times the recursive function is called in the functional style satisfy the following function:

$t(n) = 1, \text{if } n > 100; = 2(101 - n) + 1, \text{ otherwise}$

Space complexity

The imperative style function takes O(1) space; but the functional style takes $\mathrm{O}(t(n))$ space.

2 See hw1.html

3 See hw1.pl

4 [Sebesta]

The argument for using the right brace to close all compounds is simplicity—a right brace always terminates a compound. The argument against it is that when you see a right brace in a program, the location of its matching left brace is not always obvious, in part because all multiple-statement control constructs end with a right brace.

5 [Sebesta]

The reasons why a language would distinguish between uppercase and lowercase in its identifiers are: (1) So that variable identifiers may look different than identifiers that are names for constants, such as the convention of using uppercase for constant names and using lowercase for variable names in C, and (2) so that catenated words as names can have their first letter distinguished, as in TotalWords. (Some think it is better to include a connector, such as underscore.) The primary reason why a language would not distinguish between uppercase and lowercase in identifiers is it makes programs less readable, because words that look very similar are actually completely different, such as SUM and Sum.