CSE 305 Programming Languages Spring, 2010
Homework 4
Maximum Points: 21
Due 10:30 AM, Friday, February 12, 2010

Professor Shapiro

February 5, 2010

Write the answers in a file named `hw4.txt`. Put your name and user name at the top of the file, and submit the file, using the UNIX command, `submit_cse305 hw4.txt`.

1. (7)

   (a) (3) In any programming language **except** Fortran, C, Java, or Lisp, write a program like `count.f` in the lecture notes, in which a function keeps track of the number of times it is called and prints that count each time it is called. List that program at this point in your homework file.

   (b) (1) What programming language did you use?

   (c) (1) Append a transcript of a run of your program at this point in your homework file. The counting function should be called 5 times.

   (d) (2) Was the variable that kept track of the count a static variable, a stack-dynamic variable, or a heap-dynamic variable? If none of these, where was the memory for your variable allocated, and what was the lifetime of your variable?

2. (6) Consider the assignment statement, `x = y * z` in some programming language, and say that when the values of `y` and `z` are multiplied, this must be done either by the hardware integer multiplication operation, or the hardware floating-point multiplication operation.

   (a) (3) If the language uses static typing, by what program and when, is the decision made as to which hardware operation will be used?

   (b) (3) If the language uses "dynamic typing", by what program and when, is the decision made as to which hardware operation will be used?

3. (4)

   (a) (3) What are all the values that Python considers True and all that it considers False when evaluating the condition of an `if` statement?

   (b) (1) What is your source of this information?

[Continued on next page.]

4. (4) Erlang has strings:

```
Erlang R13B03 (erts-5.7.4) [source] [64-bit] [smp:2:2] [rq:2]...

Eshell V5.7.4  (abort with ^G)
1> Str = "hello".
"hello"
2> length(Str).
5
```

(a) (3) Are Erlang strings mutable or immutable? Explain.

(b) (1) What is your source for this information?