CSE 305 Programming Languages Spring, 2005
Homework 9
Maximum Points: 18 plus 2 Bonus points
Due 9:00 am, Monday, April 18, 2005

Professor Shapiro

April 11, 2005

Write the answers to this homework set into a file named `hw9`, and submit it using the `submit` script, by the date and time shown above.

1. (3) Rewrite the following C function so that the only control structures it uses are `if`, `while`, and `return`. Your function must return the same value for each possible input as the version below, and should express the same algorithm.

   Bonus: (2 points) Use only one return statement in your version.

```
int mystery(int x) {
  int r, w, z = 2;
 one: w = 2;
 two: if (w*z == x) goto three;
  w++;
  if (w <= z) goto two;
  if (z+z > x) goto four;
  z++;
  goto one;
 three: r = 0;
  goto five;
 four: r = 1;
 five: return r;
}
```

2. (6) In lecture, I said that changing the value of a variable that is used in any of the loop parameters within the body of the loop will not affect the number of times Fortran's `Do` loop is executed, but will change the number of times the `for` loop of any of the C-based languages is executed. Design a loop that will demonstrate this difference (by changing a variable in the terminal expression—trying to change the loop variable in Fortran doesn't work too well), implement it, and run it

   (a) (3) in Fortran;

   (b) (3) in either Java, C, or C++.

   Submit both the two versions of the program and their runs.

3. (6) Using a case (switch) statement, write a function that implements the code of Chapter 8, Programming Exercise 3 of the text (page 350). Your function is to take one integer argument, as indicated by `k` in the text, and return the value indicated by `j` in the text. Write this function

   (a) (3) in Common Lisp;

   (b) (3) in either Java, C, or C++.

   Submit the two versions of the program. You do not have to submit the runs, but you probably will want to run them yourself to make sure they're correct.

4. (3) Modify the Python mileage program you (or I) wrote for HW7, so that instead of an interactive loop, it just prints out the mileage chart in this format:

```
Atlanta
      New York 841
      Buffalo 859
      Los Angeles 2182
      Chicago 674
Buffalo
      New York 372
      Los Angeles 2554
      Chicago 522
Los Angeles
      New York 802
Chicago
      New York 802
      Los Angeles 2054
```

   You are to use a `for` loop inside a `for` loop.

   Note that Python has the following methods for any dictionary, `d`:

   d.items(): Returns a list of key-value 2-tuples of `d`.

   d.keys(): Returns a list of the keys of `d`.

   d.values(): Returns a list of the values of `d`.

   Submit both your program and its run.