Assignment 3
CSCI 3656
due February 3, 2011

1. Write a program to find a root of a given equation $f(x) = 0$ by the method of bisection.

   Specifications
   a) It should accept as input two starting points whose function values have opposite signs and a stopping tolerance.
   b) It should print an appropriate message if the starting points have the same sign.
   c) As output it should give an interval containing a root whose length is, if possible, less than the tolerance.
   d) At each iteration, it should print out the end points a_k and b_k and their f-values.
   e) If the input tolerance is not attainable this fact should be reported, and no wasted evaluations of f done.
   f) The program (and all other programs in this course) should be well written and commented so that anyone familiar with the method can read it. Use single precision. The output should be clearly labeled.

   Use your program on the following problems:

   $f(x) = x^3 + 2x - 61$; Starting values : 0.0, 10.0

   $f(x) = x^3 + 2.0x^2 + 1.3x - 3.1$; Starting values: 1.0, 7.0

   $f(x) = 750.0 * \sqrt{x + 26.0} - x + 37.0$; Starting values: 2000.0, 8.0E5

   Use a tolerance of 1.0E-5 for each problem, In each case, indicate how well your program did, and indicate the final interval. As usual turn in your program and the output as specified above.

2. Do problem 1 on page 43 of the text by Sauer.

3. For function (a) in the previous problem, take 5 steps of fixed point iteration starting at x=3. For function (b) in the previous problem, take 3 steps of fixed point iteration starting at x=1.1. Is this what we should expect from theory?