CS110: Computer Programming Lab
Department of CSE
IIT, Guwahati

Module 01 Stage 02 Exercise 04

Please read Module 01 Stage02 Practice Drill document before you work on this problem.

Problem description

We need to find a root of the expression given below that lies between 3 and 4 by repeatedly guessing an interval for the answer.

$X^4 - 17.02\ X^3 + 98.8601\ X^2 - 220.7408\ X + 137.9007$

(This information is only for the curious and is not relevant to write the program. The roots of the equation are: 1, 3.71, 5.31, and 7).

Write a program that uses two values representing the endpoints of a range containing exactly one root value (and neither end-point is the root of the equation), that returns a narrower range. The program must also print the value of the equation at both the endpoints of this narrowed range in a convenient to understand fashion. For example,

```
-13.1208 at 3.0
3.1491 at 4.0
```

The idea is to use the program repeatedly to get a very close approximation of the root.

Guiding instructions

All IITians know that functions have values with opposite signs on two sides of a root. That is, for reasonably small range (a, b) that includes root r: f(a)*f(b) < 0. We ignore the cases where r is a or b. The students also know the root lies to the left or right of the mid-point of any given range. The case where the midpoint is the root may be included in either of these two halves.

IN this program create two variables of type float and assign them the numbers representing the two end-points. The value of the expression at two endpoint can be computed. Also, we can compute the location of the midpoint and the value of the equation at the midpoint.

You can also find the values of the equation at these locations before printing the result on the screen for the user to see. An example output for this program can be:

```
-3.325875 at 3.5
3.1491 at 4.0
```