

Southeastern European Regional Programming Contest
Bucharest, Romania
October 15, 2011

Problem D
Roots Intervals

Input File: D.IN
Output File: standard output
Program Source File: D.C, D.CPP, D.JAVA

Consider the function $f(x)=\tan(\sin(x))-\sin(\tan(x))+\cos(x)^5-0.5$ defined on the interval $[a,b]$, and $nb \geq 1$ a series of subintervals $[x_i, x_{i+1}]$, $i=1,nb$, where $x_1=a$ and $x_{nb+1}=b$. Find the number of subintervals that contain "observable" roots of $f(x)$. A root in a subinterval $[x_i, x_{i+1}]$ is "observable" if the existence of that root can be decided without inspecting the behavior of $f(x)$ for $x_i<x<x_{i+1}$, i.e. a subinterval is a black box and you cannot compute inside the interval.

The program input is from a text file. Each data set in the file stands for a particular interval $[a,b]$ of $f(x)$ and specifies the limits a, b (real numbers) and the integer number nb of subintervals. For each data set the program prints the number of subintervals that contain "observable" roots of $f(x)$. Each result is printed on the standard output from the beginning of a line.

White spaces can occur freely in the input. The input data are correct and terminate with an end of file. An input/output sample for the function $f(x)=1-x^2$ is in the table bellow.

Input	Output
-2 2 2 0 100 5 -1 1 1	2 1 1