Laboratory-1 (Bisection Method for root finding)

August 24, 2020

1. **Write a code** to find roots of an arbitrary function using Bisection method. Stop iterating further when the difference $|x_L - x_R| < \epsilon$ and $f(x_{1/2}) < \delta$ where ϵ and δ are small enough values specified by you.

   Get the code to inform you about the (a) $|x_L - x_R|$, the magnitude of the difference between successive approximations to the root, (b)number of steps N taken to get a desired accuracy.

2. **Testing your code** is critical. Never assume and fool yourself into believing that you cannot go wrong in coding (even if it a tiny piece of code). DO NOT proceed without testing the code against a problem with known results. So, here is what you should do now. Use your code to find roots of (and compare against exact result).

   (a) $f(x) = x^2 - 4$

   (b) $f(x) = x^2 - 3x + 1$

   Record the number of steps N. For each of the above, how does N change on altering ϵ.

3. Now **find the roots** of $x^6 - x - 1 = 0$. What are the number of roots that the equations must possess? Were you able to locate all the roots?