Numerical Algorithms – Complexity W4241
C1

Write and test a program that accepts an interval $[a, b]$ (a, b are postive integers) and an integer $n \in (a, b)$, and outputs a sequence of intervals converging to n. Test with at least the following:

- $[1, 2^q]$, and you select q
- $[p, 2^q]$, $p > 1$
- $[1, r]$, $r \neq 2^q$

C2

- Write a program implementing the *bisection algorithm* for zero-finding:

$$\begin{aligned} \text{Input} &: \epsilon, f(x) \\ \text{Output} &: x \ \ni \ |x - \alpha| \leq \epsilon \end{aligned}$$

- Test on at least three *different* f for which:

$$f(0) \cdot f(1) < 0$$

  and for which α is *known.*

- Does the theoretical estimate hold? Comment.