

Chapter 2 Solutions of Equations in One Variable

Bisection Method

Suppose f is a continuous function defined on the interval $[a, b]$, with $f(a)$ and $f(b)$ of opposite sign. By the Intermediate Value Theorem, there exists p in (a, b) with $f(p) = 0$. Although the procedure will work for the case when $f(a)$ and $f(b)$ have opposite signs and there is more than one root in the interval (a, b) .

$$p_n = (a_n + b_n) / 2$$

If $f(a_n)f(p_n) < 0$, set $a_{n+1} = a_n, b_{n+1} = p_n$

Otherwise, set $a_{n+1} = p_n, b_{n+1} = b_n$

Then $f(x)$ has a zero in the interval $[a_{n+1}, b_{n+1}]$

References:

- 【1】 R. L. Burden and J. D. Faires, *Numerical Analysis*, PWS, Boston, 1993.