

MA228 NUMERICAL ANALYSIS - EXERCISE SHEET 1

MARKUS KIRKILIONIS

Please do these exercises with the help of the support classes every Thursday. Put any code, results, and comments into a Latex file, print the overall result and hand in the report before next Friday 22 January 2015, 12 : 00 noon.

1. TASK

Implement the bisection method in MATLAB by transforming the pseudocode given in the lecture into MATLAB (or any other) code, as faithful as possible. Choose different stopping criteria. Document your code as good as possible.

2. TASK

Implement the Newton method in MATLAB by transforming the pseudocode given in the lecture into MATLAB (or any other) code, as faithful as possible. Choose different stopping criteria. Document your code as good as possible.

3. TASK

Choose a function $f : \mathbb{R} \rightarrow \mathbb{R}$ which has at least one root $p \in (0, 1)$, i.e. $f(p) = 0, p \in (0, 1)$. Find such an approximate root p with both the bisection method, and the Newton method. Do this for different choices of the tolerance defining your stopping criterium of the algorithms.

4. TASK

Compare the convergence speeds between the bisection method, and the Newton method by using the function f of your choice as before. We know that the bisection method has convergence rate $O(n)$. What is the convergence rate of the Newton method? Can you see the convergence speeds in your numerical implementations?