Numerical Methods in SciLab

Innopolis University S20 Digital Signal Processing Course

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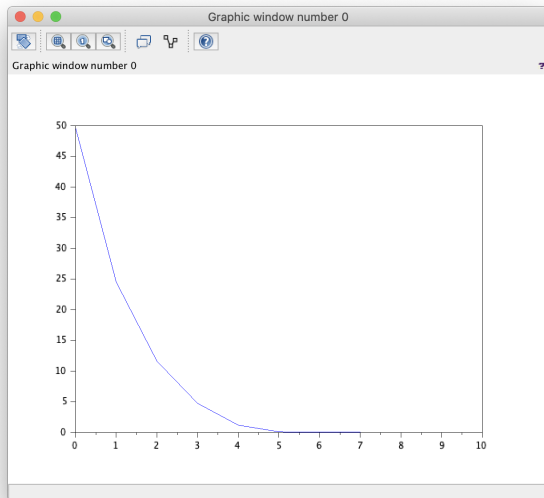Innopolis, Russia

Figure 1: Plot of numerical method error depending on step.

1 TASK DEFINITION

For the purpose of this assignment, problem featuring Newton–Raphson method was chosen. The initial problem was:

$$A * x^2 + B * x + C = 0.$$

The initial coefficients are:

$$A = 29, B = 4, C = -1999.$$

2 ANALYTICAL SOLUTION

This equation has two real roots, achievable with simple discriminant method with roots approximation to 8 decimal points:

$$x_1 = -8.37172354, x_2 = 8.23379250.$$

3 SCILAB ENVIRONMENT

The initial approximation for Newton–Raphson method was chosen as:

$$x_0 = -100.$$

Number of steps:

$$N = 10.$$

Using Scilab `roots(p)` function the solutions are the same as analytical with same precision.

4 RESULTS

The solution converged on step 9 with error less than $\epsilon = 10^-8$. The error converges to zero at some particular step with only starting conditions make this step differ.

5 SOURCE CODE

The source code is available as a part of this submission.