

## Lab 12

### Numerical methods for solving nonlinear equations

1. Solve equation

$$x = \cos x.$$

using Newton's method for:  $x_0 = \frac{\pi}{4}$ ,  $\varepsilon = 10^{-4}$  and maximum number of iterations  $N = 100$ .

2. Use the secant's method with  $x_0 = 1$  and  $x_1 = 2$  to solve  $x^3 - x^2 - 1 = 0$ , with  $\varepsilon = 10^{-4}$  and maximum number of iterations  $N = 100$ .

3. Let  $f : [1, 2] \rightarrow \mathbb{R}$ ,  $f(x) = (x - 2)^2 - \ln x$ . Solve the equation  $f(x) = 0$ , using bisection method with  $\varepsilon = 10^{-4}$  and maximum number of iterations  $N = 100$ .

4. Solve the equation from Problem 1 using the false position method with  $a_0 = 0.5$  and  $b_0 = \frac{\pi}{4}$ ,  $\varepsilon = 10^{-4}$  and maximum number of iterations  $N = 100$ .