

1. Assume a function  $f$  has only one zero contained in an interval  $[a, b]$ . A method for the solution of nonlinear equations is referred to as the *chord method*, which generates a sequence through the recurrence relation

$$x_{k+1} = x_k - q f(x_k),$$

where  $q$  is a constant number (it doesn't change with the iteration count  $k$ ) given by

$$q = \frac{b - a}{f(b) - f(a)}.$$

- (a) **[10 points]** Similarly to what was done in our lectures for other methods, implement a `chord` function to approximate the zero of  $f$  with the chord method.

This function must receive:

- the file pointer to print the results;
- the maximum number of iterations allowed  $n_{max}$ ;
- the tolerance  $\epsilon$  on the difference in absolute value between two subsequent iterations;
- one initial guess  $x_0$ ;
- the interval extremes  $a$  and  $b$ ;
- a function pointer for  $f$ .

- (b) **[10 points]** Implement a `main` program that calls the `chord` function, where

$$f(x) = x^2 - x$$

$$a = -0.2$$

$$b = 0.5$$

$$\epsilon = 10^{-7}$$

$$x_0 = 0.2.$$

Read  $n_{max}$  from terminal using the `scanf` function.

Put both the `chord` function and the `main` function in the same file `01.c`.

The file must compile and the generated executable must run as expected.