Assignment 1.

Problem 1. Translate the algorithm for bisection method given in Lecture 1 into a Matlab function. Use a stopping/ convergence criterion $f(x_n) \leqslant 10^{-8}$.

Use the function to find root of $f(x) = x^3 - 10x^2 + 5 = 0$ that lies in the interval (0.6,0.8).

Note:

Number of bisections required to reach a given tolerance ϵ can be computed as follows. The initial inerval Δx is halved after one bisection: $\Delta x \to \Delta x/2$.

$\Delta x \to \Delta x/2^2$ after two bisections, $\Delta x \to \Delta x/2^n$ after n bisections.

Set $\Delta x/2^n = \epsilon$.

Solve for n: $n = \frac{\ln(|\Delta x|/\epsilon)}{\ln 2}$.

Problem 2.

Find the smallest positive real root of

$$x^3 - 3.23x^2 - 5.54x + 9.84 = 0$$

by the method of bisection. Check your result using a Newton-Raphson code.