Numerical Methods, project B No. 32

I Find all zeros of the function

$$f(x) = -2.1 + 0.3x - xe^{-x}$$

in the interval [–5, 10] using:
a) the false position method,
b) the Newton's method.

II Find all (real and complex) roots of the polynomial

$$f(x) = a_4x^4 + a_3x^3 + a_2x^2 + a_1x + a_0, \quad [a_4\ a_3\ a_2\ a_1\ a_0] = [-2\ \ 12\ \ 4\ \ 1\ \ 3]$$

using the Müller's method implementing both the MM1 and MM2 versions. Compare the results. Find also real roots using the Newton's method and compare the results with the MM2 version of the Müller's method (using the same initial points).

III Find all (real and complex) roots of the polynomial f(x) from II using the Laguerre's method. Compare the results with the MM2 version of the Müller's method (using the same initial points).

All programs should be written in MATLAB. The report should contain:
- an approximate plot of the functions with marked zeroes and initial points (or initial intervals) for the zero-finding algorithms,
- a comparison of the results containing a table with all successive iteration points (number of iteration, argument and function values) for the methods being compared for one representative initial point (or interval),
- a discussion of the results,
- a printout of the (commented) programs.

The report is to be uploaded in the PDF format to the 'Reports' module on the 'Studia' server by Dec. 3, 2 p.m. Project B carries 15 points. Each day of delay results in deduction of 1 point.