

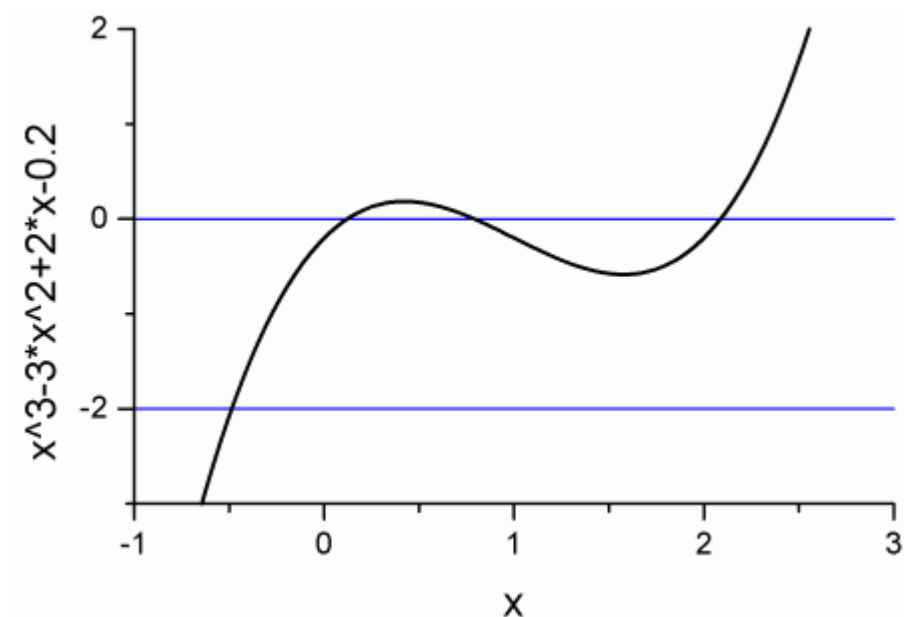
Numerical Analysis. Exercise 03

Solution of nonlinear equations

Task 1.

Find a root of the function

$$f(x) = x^3 - 3x^2 + 2x - 0.2 = 0$$



Use two iterative methods for root evaluation with error tolerance $= 1e-7$:

(a) Bisection method with $x_{\text{neg}} = 1.5$, $x_{\text{pos}} = 3$;

(b) Newton's method with $x_0 = 3$.

Print approximate root value after each iteration. Compare results and number of iterations for each method.

You can use the following empty Java code as a starting point.

[ex03.java](#) Print approximate root values after each iteration.

The results may be as follows:

$$f(x) = x^3 - 3x^2 + 2x - 0.2 = 0$$

Bisection method

Iteration	1	x =	2.2500000
Iteration	2	x =	1.8750000
Iteration	3	x =	2.0625000
Iteration	4	x =	2.1562500
Iteration	5	x =	2.1093750
Iteration	6	x =	2.0859375
Iteration	7	x =	2.0976563
Iteration	8	x =	2.0917969
Iteration	9	x =	2.0888672
Iteration	10	x =	2.0874073

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Iteration 11 x = 2.0881348
Iteration 12 x = 2.0877686
Iteration 13 x = 2.0879517
Iteration 14 x = 2.0880432
Iteration 15 x = 2.0879974
Iteration 16 x = 2.0880203
Iteration 17 x = 2.0880318
Iteration 18 x = 2.0880375
Iteration 19 x = 2.0880346
Iteration 20 x = 2.0880332
Iteration 21 x = 2.0880339
Iteration 22 x = 2.0880343
Iteration 23 x = 2.0880341
Iteration 24 x = 2.0880340

Newton's method
Iteration 1 x = 2.4727273
Iteration 2 x = 2.1964298
Iteration 3 x = 2.1004490
Iteration 4 x = 2.0882264
Iteration 5 x = 2.0880340
Iteration 6 x = 2.0880339
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Show source code and demonstrate results to your teaching assistant.