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AE 227 – Engineering Digital Computation

4/15/2023

**Problem 1:**

Output to the command window:

How many roots to solve for? >4

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Left bound of the starting interval? >-1.5

Right bound of the starting interval? >-0.5

Tolerance? (Example: 0.0001) >0.000001

The bisection method used 20 iterations.

The interval was -1.5 to -0.5 with a tolerance of 1e-06.

There is a root at -0.874

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Left bound of the starting interval? >-0.5

Right bound of the starting interval? >0

Tolerance? (Example: 0.0001) >0.000001

The bisection method used 19 iterations.

The interval was -0.5 to 0 with a tolerance of 1e-06.

There is a root at -0.499999

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Left bound of the starting interval? >0

Right bound of the starting interval? >0.5

Tolerance? (Example: 0.0001) >0.000001

The bisection method used 19 iterations.

The interval was 0 to 0.5 with a tolerance of 1e-06.

There is a root at 0.222388

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Left bound of the starting interval? >0.5

Right bound of the starting interval? >1.5

Tolerance? (Example: 0.0001) >0.000001

The bisection method used 20 iterations.

The interval was 0.5 to 1.5 with a tolerance of 1e-06.

There is a root at 1.5

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Plot:

Graphical user interface, chart

Description automatically generated

**Program 2:**

f(305) = -4000, f(500) = 4,8143.40083. Because one value is positive and the other negative, the graph of the function must pass through the X-axis between the values, thus yielding a root between the values of T.

Output to the command window:

Left bound? > 305

Right bound? > 500

Relative error tolerance? (Example: 0.01%) > 0.0001

Relative error for iteration 1 was 324.294972515.

Relative error for iteration 2 was 326.084609147.

Relative error for iteration 3 was 326.066496845.

Relative error for iteration 4 was 326.066550365.

The root is 326.066550365.

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**Program 3:**

Output to the command window, which answers all three questions:

a.

What is the initial guess? > 0

The root is 0.124 with a tolerance of 1e-05 using Newtons method.

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b.

What is the initial guess? > -2

The root is -3.94191 with a tolerance of 1e-05 using Newtons method.

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c.

What is the initial guess? > 2

The root is 4.31047 with a tolerance of 1e-05 using Newtons method.

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