

Bisection Method and Newton's Method Combined

Arda Tiftikçi

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bisection_newton_method.m is designed for finding a numerical solution to $f(x) = 0$ (f is defined below) by using a combination of Bisection Method and Newton's Method. It takes an initial interval $[0, 10]$ which is subject to change. Then, it reduces this interval to an interval of length 0.1. Then, it uses Newton's Method. If Newton's Method can not succeed in 50 steps, then it would start to use bisection method to reduce to an interval of length 10^{-4} . After that, it again uses Newton's method. It makes use of speed of bisection method at the beginning. Then, using Newton's method in a small interval becomes efficient.

$$f(x) = 300 - 80.425x + 201.0625(1 - e^{-0.4x})$$

I set the tolerance for Newton's Method to 10^{-8} that is subject to change.

Also, one can change f function which is defined at the end of the file and g function must be changed according to rule below.

$$g(x) = x - \frac{f(x)}{f'(x)}$$