



Department of Computer Science and Engineering
Premier University

CSE 302 : Computational Methods for Engineering Problems Laboratory

Title: Implementation of Bisection, Falsi, and Newton-Raphson Methods
for Root Finding

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Remarks

0.1 Introduction

This report presents the implementation and output of three widely used root-finding methods: the Bisection method, the False Position (Falsi) method, and the Newton-Raphson method. Each method is applied to solve a given mathematical equation, and the code along with its output is provided. The goal is to demonstrate how each algorithm approaches root finding without comparing their efficiencies or convergence rates.

0.2 Methods

0.2.1 Bisection Method

The Bisection method is a simple iterative algorithm for finding roots by repeatedly dividing an interval in half and selecting the subinterval where the root lies. The process is repeated until the interval is sufficiently small.

Source Code

Output

0.2.2 False Position (Falsi) Method

The False Position method is similar to the Bisection method but chooses the next interval based on a secant line, which improves the speed of convergence.

Source Code

Output

0.2.3 Newton-Raphson Method

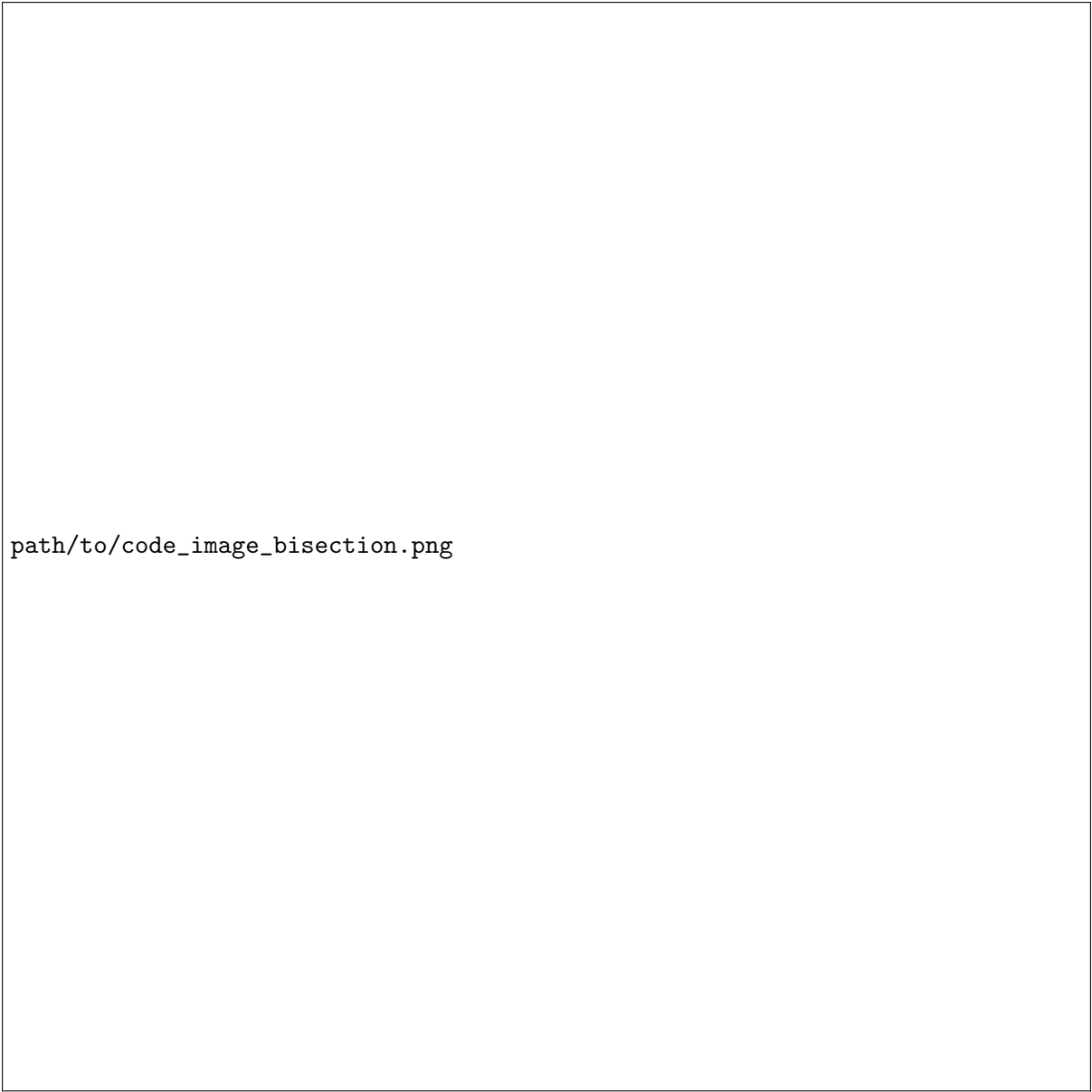
The Newton-Raphson method uses the derivative of the function to find successive approximations to the root. It typically converges faster but requires a good initial guess.

Source Code

Output

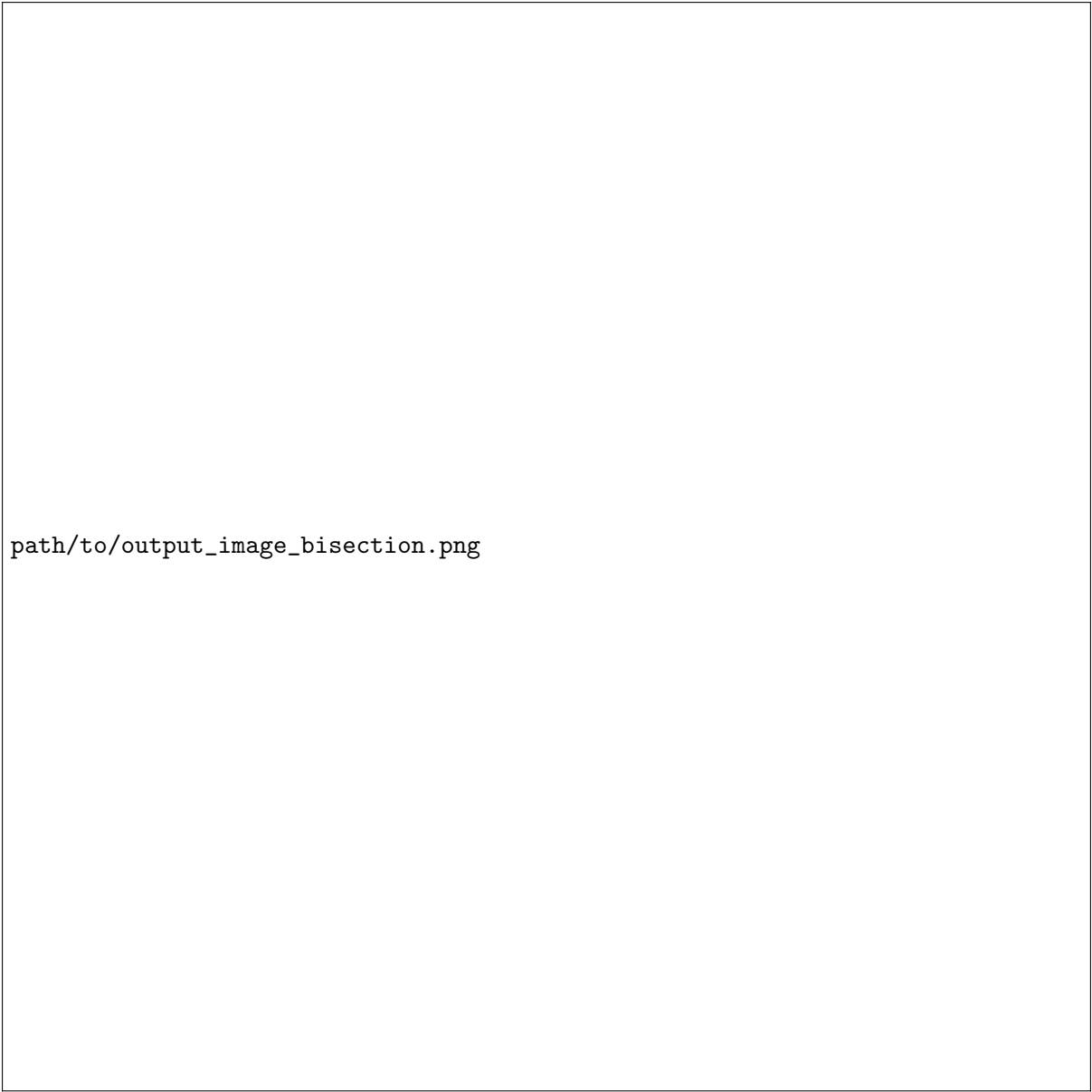
0.3 Conclusion

This report demonstrates the implementation of the Bisection, False Position, and Newton-Raphson methods for solving a root-finding problem. Each method successfully finds the root, and the code and outputs are included to show the process and results. Further analysis could compare the efficiency and convergence behavior of these methods.



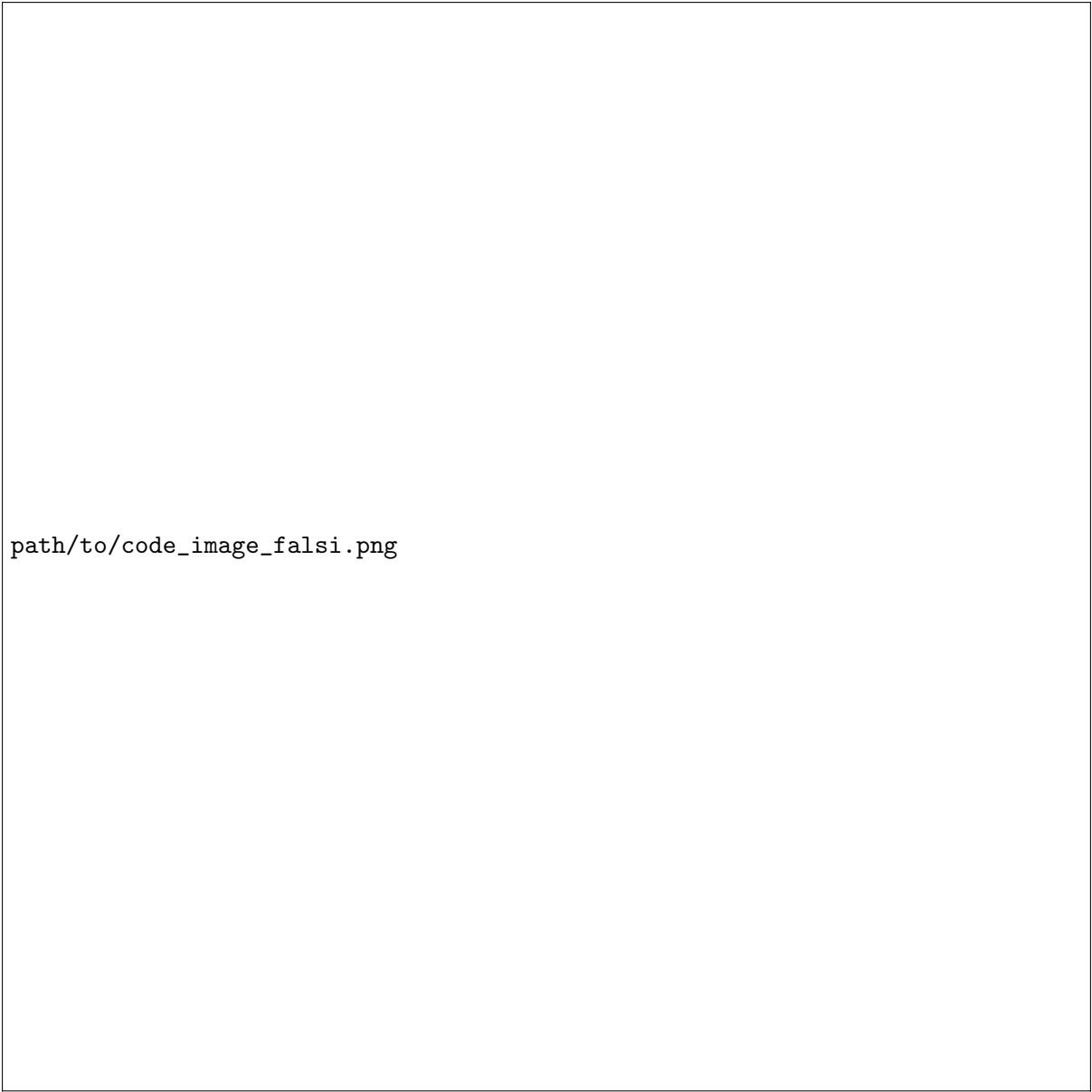
path/to/code_image_bisection.png

Figure 1: Bisection Method Source Code



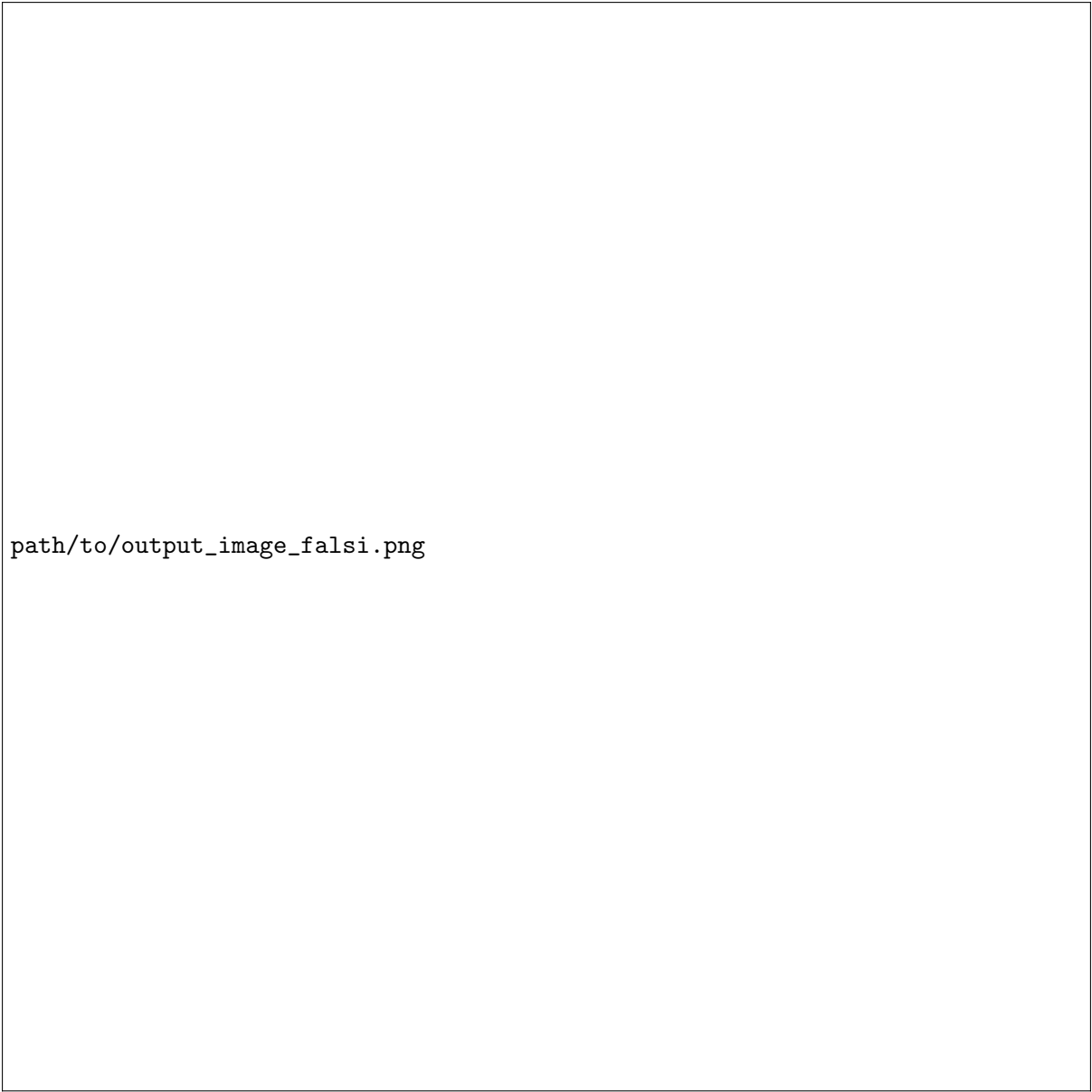
path/to/output_image_bisection.png

Figure 2: Bisection Method Output



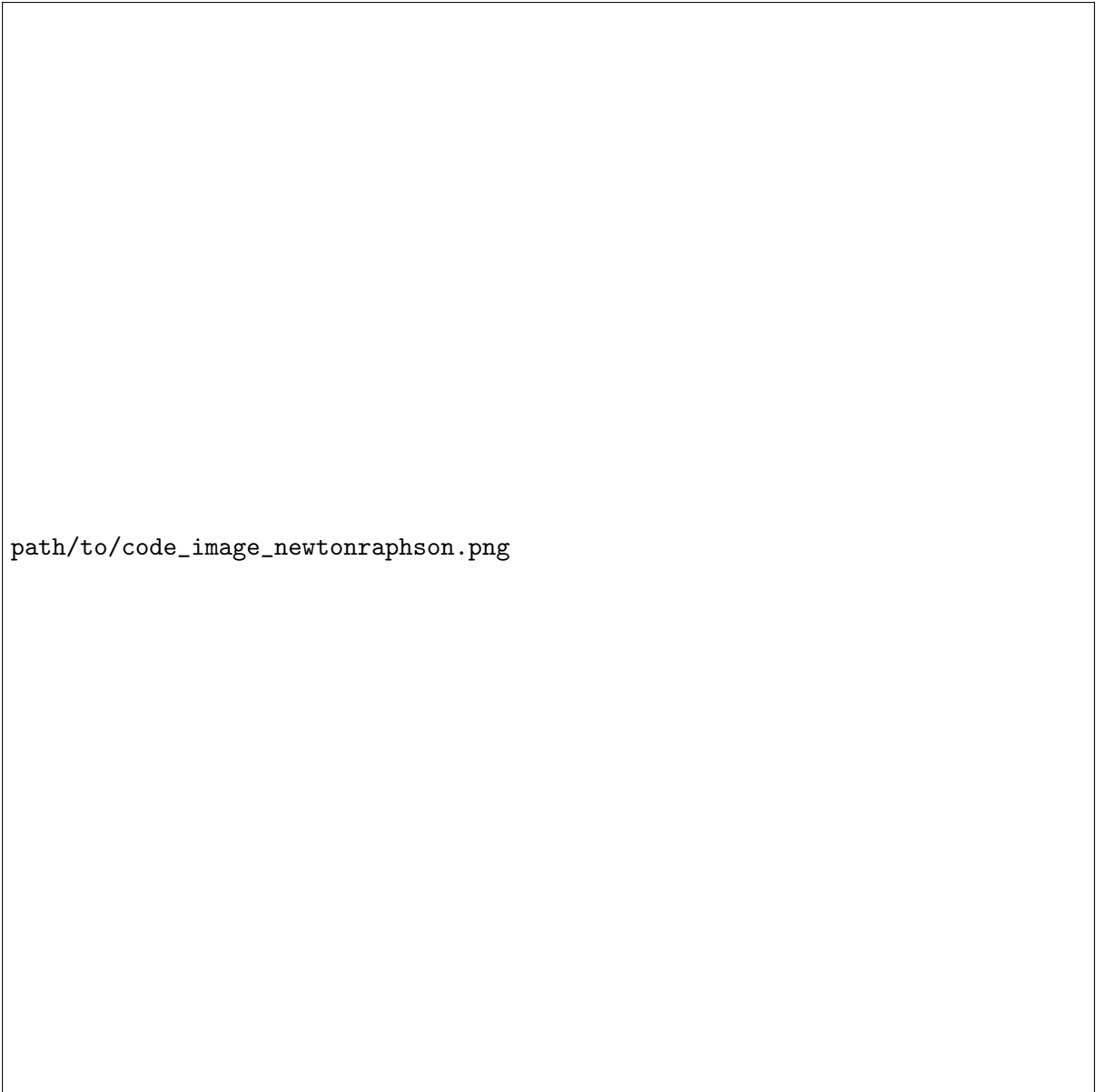
path/to/code_image_falsi.png

Figure 3: False Position Method Source Code



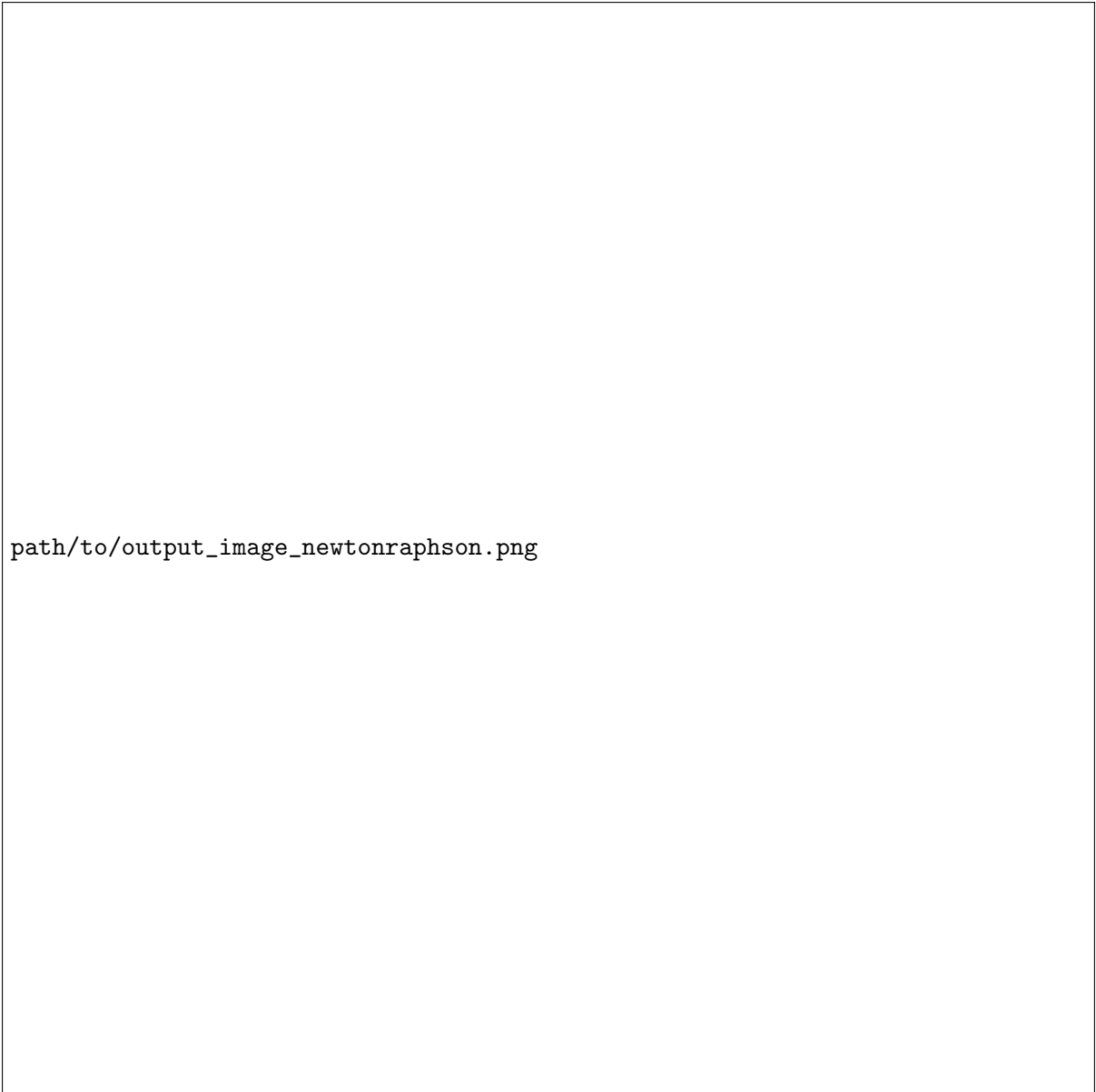
path/to/output_image_falsi.png

Figure 4: False Position Method Output

A large rectangular box with a thin black border, intended to contain the source code for the Newton-Raphson method. The text 'path/to/code_image_newtonraphson.png' is located on the left side of the box.

path/to/code_image_newtonraphson.png

Figure 5: Newton-Raphson Method Source Code

A large rectangular box with a thin black border, intended for the output of the Newton-Raphson method. It is currently empty except for a text label.

`path/to/output_image_newtonraphson.png`

Figure 6: Newton-Raphson Method Output