Report for Task 1

April 17, 2024

1 Convergence Analysis of Iterative Methods

1.1 Introduction

In Task 1, we analyze the convergence rates of various iterative methods used to find the roots of the function $f(x) = x^3 - 3x^2 + x - 1$. The methods under consideration includes the Bisection Method, Secant Method, Newton-Raphson's Method, and Fixed-Point Iteration Method.

1.2 Data Analysis

We begin by examining the provided data set containing the iteration numbers and the corresponding function values obtained by each method.

Table 1: Data Set for Convergence Analysis

Iteration	fx_Bisection	fx_Secant	fx_Newton	fx_FixedPoint
0	-1.625	-1.104	54.0	-2.614
1	-0.1406	-0.1959	14.919	-2.103
2	0.8418	0.02715	3.5995	-1.602
3	0.3293	-0.00053	0.5685	-1.176
4	0.0891	-1.397e-06	0.02634	-0.8416
...	...	...	...	...

1.3 Convergence Analysis

Next, we plot the convergence behavior of each method using the provided data set.

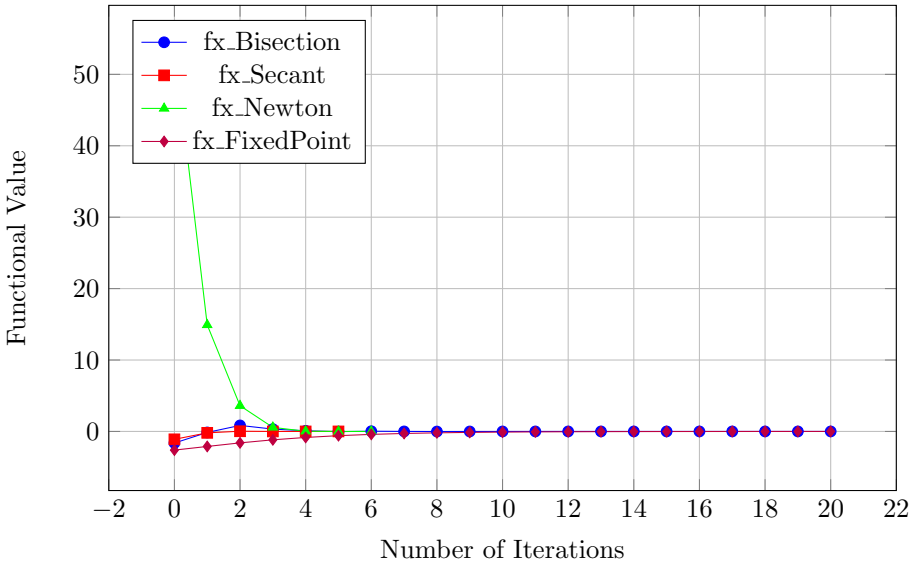

Figure 1: Convergence Behavior of Iterative Methods

1.4 Conclusion

Based on the analysis conducted in this report, we conclude that the Secant Method and Newton-Raphson's Method exhibit faster convergence rates compared to the Bisection Method and Fixed-Point Iteration Method. However, the choice of method depends on the characteristics of the function and the initial guesses provided.