

**EXPLORING THE EFFICACY OF MODIFIED NEWTON
METHODS FOR NONLINEAR PROBLEM SOLVING: A
COMPARATIVE STUDY**

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**Thesis Submitted in Fulfilment of the Requirement for
Bachelor of Science
Mathematical Modelling and Analytics (Hons.)
College of Computing, Informatics and Mathematics
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January 2025

ABSTRACT

This study investigates the efficacy of six modified Newton's methods for solving nonlinear equations: Weerakoon and Fernando method, midpoint Newton's method, Homeier method, fifth-order arithmetic mean Newton's method (FAN), fifth-order midpoint Newton's method (FMN), and fifth-order harmonic mean Newton's method (FHN). All of these methods will be evaluated and tested using eight distinct types of test functions and two different tolerances. The comparison of approaches is based on the amount of CPU time utilised, the accuracy of the results, and the number of iterations required. The study observed that the FMN method required fewer iterations due to its higher convergence rate, while the Homeier technique was more efficient in CPU time because it was simpler. Most of the methods in this study have similar accuracy. This study highlights the need of balancing iteration count and computing efficiency when selecting appropriate iterative algorithms for certain computational requirements.

ACKNOWLEDGEMENT

In the name of Allah, Most Gracious and Most Merciful. Praise be to Allah, the world's Cherisher and Sustainer. I would like to thank my supervisor, Madam Noor Khairiah binti Razali, for her excellent assistance and encouragement during my thesis. I would like to thank the Universiti Teknologi MARA lecturers for helping me complete my studies. I am grateful to my friends for their encouragement and emotional support as I pursued this topic. Above all, I am grateful for my family's everlasting love and encouragement.

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