UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

COMPARING ALTERNATIVE METHODS FOR IMPROVING THE BISECTION TECHNIQUES: MODIFIED BRACKETING METHOD AND REGULA FALSI ALGORITHM

NURUL AIN SYAFIKA BINTI JUPERI (2021100285)

NUR YASMIN HANANI BINTI MAHDIBER (2021156129)

AMYLIA NATASHA BINTI KHAIRUL NIZAM (2021100209)

P17S22

Report submitted in partial fulfillment of the requirement for the degree of
Bachelor of Science (Hons.) (Mathematics)
College of Computing, Informatic and Media

FEBRUARY 2023

ACKNOWLEDGEMENTS

IN THE NAME OF ALLAH, THE MOST GRACIOUS, THE MOST MERCIFUL

Firstly, we are grateful to Allah S.W.T for giving us the strength to complete this project successfully and thanks to Allah S.W.T for His showers of blessings throughout our report to complete the research successfully.

We would like to acknowledge our warmest thanks to our lecturer, Dr Zahari Md Rodzi for providing valuable guidance during this research and making this report possible to be completed. It has been a great privilege and honor to work and study under his guidance. We would also like to thank for his empathy and great sense of humor which facilitated us to write the report well.

Then, we would like to express our gratitude to Profesor Madya Norsaadah Binti Awang @ Md Amin, our research supervisor, for her patient guidance, enthusiasm, encouragement and useful critiques of this research work. All the knowledge and skills gained from this research project have been valuable and a lot of input has been learned from her. We also would like to thank for her kindness in helping us every step of the way, and her motivation is what helped us complete this report successfully. Without our supervisor's guidance we would not have been able to finish this report. She encouraged us to think creatively while expressing full support and provided us with the different teaching aids that were required to complete this assignment.

We are so grateful to our beloved parents for their love, continuous prayers, care, moral support and sacrifice in educating us for our future. Special thanks to our group members for the keen interest shown in completing this report successfully. Regardless of our busy schedule and a bunch of assignments, we manage to complete this report in time.

Finally, we would like to thank all the people who supported us directly or indirectly in carrying out the research work. We feel so honored to get all the support from all the people that we love.

TABLE OF CONTENTS

ABSTRACT

This study was performed to compare alternative methods for improving the Bisection techniques which are Modified Bracketing Method and Regula Falsi Algorithm. The Bisection method's calculation is quite long and can take a huge amount of time. Besides, it is almost certain that multiple iterations are required to achieve the desired accuracy. This research shows how it is being compared with other methods such as the Modified Bracketing Method and the Regula Falsi Algorithm to analyze which one is the easiest method to implement as well as having the fewest iterations to get close to the root or accuracy. Therefore, the objectives of this study are to apply the Bisection Method, the Modified Bracketing Method and the Regula Falsi Algorithm in solving the various types of nonlinear functions. Next, to identify which algorithm is the most efficient in root-finding by comparing the iteration number among the three methods. Then, some selected test functions are applied into the Bisection Method, Modified Bracketing Method and Regula Falsi Algorithm to decide which is the most practical method. It is observed from the results and comparison of the three methods including Bisection Method, Modified Bracketing Method and Regula Falsi Algorithm that the modification of Bisection method is performing better. Thus, the significance of the result is to identify which approach requires the fewest iterations and takes the least amount of time.

Keywords: *bisection method, least number of iterations, roots finding, practical method*