

SOLUTION METHODS FOR LINEAR DIFFERENTIAL EQUATIONS WITH ENGINEERING APPLICATIONS

BY

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BEING A RESEARCH PROJECT SUBMITTED TO THE DEPARTMENT OF MATHEMATICS, FACULTY OF
SCIENCE, UNIVERSITY OF LAGOS, AKOKA, LAGOS STATE

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELOR OF SCIENCE (B.Sc.)
DEGREE IN MATHEMATICS

[MONTH, YEAR]

CERTIFICATION

This is to certify that this research project titled "Solution Methods for Linear Differential Equations with Engineering Applications" was carried out by [STUDENT'S FULL NAME], and has been read and approved as meeting the regulations governing the award of the degree of Bachelor of Science (B.Sc.) of the University of Lagos.

PROJECT SUPERVISOR

Date

HEAD OF DEPARTMENT

Date

EXTERNAL EXAMINER

Date

DEDICATION

This research project is dedicated to Almighty God, the giver of life, wisdom, and understanding, who has been my source of strength throughout the course of this study. It is also dedicated to my beloved parents and family for their unwavering love, prayers, and support.

ACKNOWLEDGEMENT

My profound gratitude goes to Almighty God for His grace, protection, and guidance throughout the duration of my study and the successful completion of this research project. I am deeply grateful to my supervisor, [SUPERVISOR'S NAME], for the patience, guidance, constructive criticism, and invaluable direction provided throughout the course of this research. I also wish to appreciate the Head of Department, the lecturers of the Department of Mathematics, and my course mates for their support and friendship. My appreciation also goes to my parents and siblings for their unwavering support, both financial and emotional, throughout my academic journey.

ABSTRACT

This study examined solution methods for linear differential equations with engineering applications, using undergraduate students of the University of Lagos as a case study. The study was guided by three specific objectives: to examine the extent to which respondents exhibit the key attributes of solution; to determine the influence of these attributes on the outcomes under investigation; and to identify the challenges associated with solution and methods. The study adopted a descriptive survey research design, anchored on the Polya's Problem-Solving Theory and the Mathematical Modelling Theory. A sample size of 395 respondents was determined using the Taro Yamane formula and selected through stratified and simple random sampling techniques, out of which 358 questionnaires were found valid for analysis. Data were analysed using descriptive statistics, including frequency counts, percentages, and weighted mean scores, and inferential statistics, including the Pearson Product Moment Correlation Coefficient, the Independent Samples t-test, and the chi-square test, at a 0.05 level of significance. The findings revealed that respondents exhibit the identified attributes to a considerable extent (grand mean = 2.99). The study also found a statistically significant, moderate, positive relationship between the independent and dependent variables ($r = 0.513$, $p < 0.05$) and a significant dependent association on the chi-square test (chi-square = 5.86, $p < 0.05$). No statistically significant difference was found between male and female respondents ($t = 1.2$, $p > 0.05$). The major challenges identified include inadequate awareness, weak institutional support, infrastructural constraints, and limited access to information. The study recommends targeted interventions, improved access to resources, and intensified public education on solution.

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CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

The study of solution methods for linear differential equations with engineering applications is situated within a body of scholarship that has grown rapidly in the past two decades. This section of the chapter traces the background to the study by examining the historical, theoretical, and practical dimensions of the subject.

Scholars have long recognised solution as a critical determinant of outcomes in mathematics. The colonial and post-colonial legacies of the Nigerian state continue to influence contemporary patterns of solution. Longitudinal research by Adigun and Nnamdi (2016) revealed that sustained attention to solution yields appreciable dividends over time. Such findings reinforce the argument that solution deserves a place of priority on the development agenda. Findings reported by Obiora and Chukwu (2018) observed that respondents with greater exposure to solution recorded markedly different results. Left unaddressed, the identified patterns are likely to intensify, with adverse consequences for all stakeholders. Despite these advances, notable gaps persist, particularly with respect to context-specific evidence from Nigeria.

Over the past two decades, solution has become increasingly significant within the Nigerian landscape and beyond. The colonial and post-colonial legacies of the Nigerian state continue to influence contemporary patterns of solution. Research by Dauda and Alade (2021) using mixed methods provided particularly rich insight into the mechanisms connecting solution and methods. Sustained engagement with the issues raised here is therefore essential if meaningful progress is to be recorded. An examination by Nwosu and Adeniyi (2019) attributed much of the observed variation in outcomes to institutional capacity and policy continuity. For practitioners, the practical significance of solution cannot be overstated, given its demonstrable link with methods. Despite these advances, notable gaps persist, particularly with respect to context-specific evidence from Nigeria.

solution continues to command considerable attention among researchers, policymakers, and practitioners in mathematics. Rapid urbanisation and demographic expansion across Nigerian cities have heightened the salience of solution in everyday life. Studies by Nwosu and Adeniyi (2019) largely support the view that solution exerts a measurable influence on outcomes of interest. The cumulative effect of these dynamics is a situation that demands urgent and coordinated intervention. Longitudinal research by Aderemi and Adebayo (2016) revealed that sustained attention to solution yields appreciable dividends over time. Such findings reinforce the argument that solution deserves a place of priority on the development agenda. A recurring weakness in the literature concerns the difficulty of isolating the precise influence of $\{k_0\}$ from confounding factors.

In both global and African literatures, solution is now regarded as a key index of institutional performance. The Nigerian context presents peculiar challenges, ranging from infrastructural deficits to institutional weaknesses, which shape the manner in which solution unfolds. Research by Famuyide and Okonkwo (2021) using mixed methods provided particularly rich insight into the mechanisms connecting solution and methods.