

UNIVERSITI TEKNOLOGI MARA

**POSITIVE SOLUTIONS TO SECOND
ORDER BOUNDARY VALUE
PROBLEMS**

WAN ASHRAF BIN WAN AZMI

Thesis submitted in fulfillment
of the requirements for the degree of
Master of Science

Faculty of Computer & Mathematical Sciences

April 2014

AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.


Name of Student : Wan Ashraf Bin Wan Azmi

Student I.D. No : 2010471844

Programme : Master of Science

Faculty : Computer and Mathematical Sciences

Thesis Title : Positive Solutions to Second Order Boundary Value
Problems

Signature of Student :

Date : April 2014

ABSTRACT

This thesis is concerned with the existence of positive solutions for second order boundary value problems. In particular, firstly we investigate the existence and multiplicity of positive solutions for a singular second order scalar Sturm-Liouville boundary value problem with different values of λ for a function f involve u . Then, we investigate the existence of positive solutions of a Dirichlet boundary value problem where the function f involve u and u' . Lastly, we consider the results of positive solutions for singular Dirichlet second order boundary value problem where the function f involve u and u' in terms of different values of λ . The existence results of positive solutions are proved by applying the Krasnosel'skii fixed point theorem on compression and expansion of cones.

ACKNOWLEDGEMENTS

First and foremost, all praise be to Allah, Lord of the world, the almighty because without his help, it is impossible for me to finish this thesis. I would like to thank my supervisor, Dr. Mesliza Mohamed for her guidance, support and constant help during my graduate study at Universiti Teknologi MARA Perlis. My gratitude goes to the Universiti Teknologi MARA for its financial support. Lastly, thanks to my family because of their constant support during the good and bad days, giving me the spirit to complete my master study.

TABLE OF CONTENTS

	Page
AUTHOR'S DECLARATION	ii
ABSTRACT	iii
ACKNOWLEDGEMENTS	iv
TABLE OF CONTENTS	v
CHAPTER ONE: INTRODUCTION	1
1.1 PRELIMINARIES	1
1.1.1 Boundary Value Problem	2
1.1.2 Convex Set	3
1.1.3 Arzela-Ascoli Theorem	3
1.1.4 Fixed Point Theorem	3
1.2 MOTIVATING EXAMPLES	4
1.3 PROBLEM STATEMENT	7
1.4 OBJECTIVES OF THE STUDY	7
1.5 THESIS OUTLINE	8
CHAPTER TWO: POSITIVE SOLUTIONS TO A SINGULAR SECOND ORDER BOUNDARY VALUE PROBLEM	10
2.1 INTRODUCTION	10
2.2 GREEN'S FUNCTION AND BOUNDS	12
2.3 PRELIMINARY RESULTS	16
2.4 MAIN RESULTS	19
2.5 EXAMPLE	21