Insert Your Thesis Title Here

An Undergraduate Thesis
Presented to the Faculty of the
Electrical and Electronics Engineering Department
College of Engineering
Mindanao State University- General Santos City

In Partial Fulfillment of the
Requirements for the Degree of
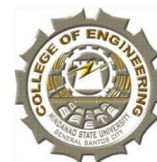Bachelor of Science in Electronics Engineering

SANGLITAN, Benjamin R.
PERATER, Blaze
AMBIA, Hashim Monir
TAGOLANAO, Abdul Ghaffar
BORJA, Glerry Paul

Dr. Cristina P. Dadula, PECE
Adviser

May, 2019

Republic of the Philippines
MINDANAO STATE UNIVERSITY
COLLEGE OF ENGINEERING

APPROVAL SHEET

This undergraduate thesis, entitled, "Insert Your Thesis Title Here", prepared by Benjamin R. Sanglitan, Blaze Perater, Hashim Monir Ambia, Abdul Ghaffar Tagolanao, and Glerry Paul Borja, in partial fulfillment of the requirements in ECE 199- Research and /or Project has been examined and approved for oral examination.

DR. CRISTINA P. DADULA, PECE
Adviser

Approved by the Panel on Oral Examination on May 17, 2019

DR. MISHELL D. LAWAS, PECE
Chairman

ENGR. JULIUS JR. V. OLANDRIA   ENGR. TANYA M. OSORIO
Member   Member

Accepted and approved in partial fulfilment of the course requirements for the degree of
BACHELOR OF SCIENCE IN ELECTRONICS ENGINEERING

DR. NOEL S. GUNAY, REE   ENGR. DIOMEDES L. TABLO
Department Chairman   Dean, College of Engineering

ACKNOWLEDGMENT

ABSTRACT

Laban iskolar ng bayan. Gawin mo na ang iyong thesis. Humayo ka at baguhin ang ating bayan.

Index Terms—keyword1, keyword2, keyword3.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS

Chapter 1

INTRODUCTION

'

Contents

1.1 Background of the Study

Aside from the usual text descriptions of the background, put here figures that will cast images to your audience about the context of your work.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam

rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

1.2   Prior Studies

Put here a narrative and a summary (not a duplicate) of your literature review chapter. In this section, summarize and highlight the gap(s) found in the literature review in Chapter 2. Preferably, a table showing the summary would be helpful.

Prior Studies or Literature Review[1] (expansion of the Prior Studies) is basically about competition. Competition.

So the suggested goals in writing the narrative of the Prior Studies in summative and highlighted forms are, in no particular order:

1. to mention briefly the problem;

2. to show the features of the existing literature in solving the problem

3. to show the weaknesses of the solutions of existing literature

4. to show how your solution is better (can be better (for proposals))

If the suggested table will be placed, please discuss it in light of the above-mentioned items.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

1.3 Problem Statement

The problem statement needs to be very clear and to the point.

A persuasive problem statement from a contextualized and intended-audience-awareness perspective consists of:

---

[1]The main difference between the Prior Studies and Literature Review is that the Prior Studies is done in a concise manner. By the way, this is also an example of a footnote usage.

1. PS1: description of the ideal scenario for your intended audience

   - Describe the goals, desired state, or the values that your audience considers important and that are relevant to the problem.

2. PS2: reality of the situation

   - Describe a condition that prevents the goal, state, or value discussed in PS1 from being achieved or realized at the present time.

   - It is imperative to make the audience feel the pain point.

3. PS3: consequences for the audience

   - Using specific details, show how the situation contains little promise of improvement unless something is done.

After the above-mentioned items, succinctly describe your solution. Please avoid describing your entire solution here since you will articulate and elucidate it by showing what you want to achieve through your objectives, and how you will make it through your methodology.

A well constructed problem statement will convince your audience that the problem is real and worth having you solve it.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

1.4 Objectives

Your objectives are the states that you desire to achieve in solving the problem. The general objective is the main state to be achieved whereas the specific ones are sub-states to be achieved.

1.4.1 General Objective(s)

To . . . ;

1.4.2 Specific Objectives

1. To . . . ;

2. To . . . ;

3. To . . . ;

4. To . . . ;

5. To . . . ;

1.5 Significance of the Study

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

1.6 Assumptions, Scope and Delimitations

Bulletize your assumptions in one group, and then bulletize the scope in another, and do the same for your delimitations. The assumptions to put here are those major facts or statements that are *key* for your proposed solution to work. Scope refers to the space(s) for the operation of your proposed solution, whereas delimitations are the limits of the operation of your proposed solution.

1.6.1 Assumptions

1. …;

2. …;

3. …;

1.6.2 Scope

1. …;

2. …;

3. …;

1.6.3 Delimitations

1. …;

2. …;

3. …;

1.7 Description and Methodology of the Thesis

A purpose of the description here is to re-steer/remind the panelist/reader again by tersely describing what your thesis is about (i.e. the problem and the main goal you want to achieve) in another way without sounding repetitive.

Your methodology is your means of achieving your stated objectives.

Note that each stated objective should have a corresponding methodology of achieving it.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

1.8 Overview of the Thesis

Provide here a brief summary and what the reader should expect from each succeeding chapter. Show how each chapter is connected with each other.

Chapter 2

LITERATURE REVIEW

Contents

It is to be noted that each subsection in this chapter should discuss in narrative form each table that is presented.

2.1 Existing Work

Cite and summarize here relevant and significant literature (dissertations, theses, journals, patents, notable conference papers) through a table and descriptions to prove that no one has done your work yet and/or that your work is not a duplication of existing ones. Your focus here is what has *been done*.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem.

Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

2.2 Lacking in the Approaches

You can summarize the weaknesses of existing approaches by a tabular comparison of the literature. Your focus here is what has *not been done*, i.e. what features were missed, what solutions were not considered, what the demerits are, etc. Through these items, you then can introduce the necessity for doing your proposed solution.

It is to be noted that degree of novelty for undergraduate thesis is lower than those for graduate school. If a PhD dissertation/thesis has a high degree of novelty and that for an undergraduate is low, then a master's thesis is somewhere between the two.

Briefly include here the following in order to remind the reader why you are highlighting the weaknesses of the solutions of existing literature.

- mentioning of the problem

- showing how your solution is better (can be better (for proposals))

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut

porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut

porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

2.3 Summary

Provide the gist of this chapter such that it reflects the contents and the message.

Chapter 3

METHODOLOGY

Contents

Put an overview of the contents of chapter. Mention here your methodology flow through a figure and provide an overview of it and how your methodology achieves your objectives. How your methodology achieves each of your specific objective is what your panelists/examiners will be looking for. Specify how your methodology achieves your general objective, and specific objectives. A point-by-point comparison how your methodology achieves each of your specific objective is expected in the final Thesis.

Also make sure that you refer clearly to the chapters on the Literature Review, Theoretical Considerations, and Design Considerations showing how your methodology ties with those that you have discussed in those chapters.

Make an overview of the contents of chapter. Put here your methodology flow through a figure and provide an overview of it.

3.1 Implementation

Summarize the process used to create/set-up the work with an explanation of such process, instruments, and materials that you used if any. If the description is lengthy, use condensed bullet points.

Rule of thumb: Implementation is how you made your work; (keywords: implemented, created, made, soldered, programmed, etc.).

If you wrote a program or made a simulation, you must state how the program or simulation functions in this section. An algorithm or a pseudocode as shown in Table B.2 is a good example.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam

rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam

rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

3.2   Evaluation

Describe the procedures for evaluating the correct behavior and outcome of your work, including what information you need to gather and how you will obtain or measure it.

Rule of thumb: Evaluation is how you tested your work; (keywords: measured, tested, compared, simulated, etc.).

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

3.3   Summary

Provide the gist of this chapter such that it reflects the contents and the message.

Chapter 4

RESULTS AND DISCUSSIONS

Contents

Show in this chapter proofs why your proposed solution works. However, presenting results ("It worked") without an appropriate explanation does not show thorough understanding. Aside from the data and results that you have obtained, and their explanation, the discussion includes why components of your proposed solution work did or did not work in accordance to what you described in the evaluation process, and how the proposed solution performed and faired. Interpret the results and the reasons why they were obtained. If your results are incorrect, apparent discrepancies from theory should be pointed out and explained. In essence, what do the results mean. Citing existing publication can help you compare your results and your explanations.

The next items below is not related to the description of this results and discussions chapter, but serves as an opener for the LaTeX portion of this template.

Here is an example of a citation for ISO 80000-2 standard [ISO, 2009]. Another one is [Einstein, 1905] and [Croft, 1978].

In using this template, the user is expected to have a working knowledge of LaTeX. A good introduction is in [Oetiker et al., 2014]. Its latest version can be accessed at `http://www.ctan.org/tex-archive/info/lshort`. See the Appendix of `document_guide.pdf` for examples.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem.

Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem.

Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

4.1   Summary

Provide the gist of this chapter such that it reflects the contents and the message.

Chapter 5

CONCLUSIONS, RECOMMENDATIONS, AND FUTURE

DIRECTIVES

Contents

5.1 Concluding Remarks

In this Thesis, . . .

Put here the main points that should be known and learned about the work topic. Summarize or give the gist of the essential principles and inferences drawn from your results.

5.2 Contributions

The interrelated contributions and supplements that have been developed by the author(s) in this Thesis are listed as follows. Only those that are unique to the authors' work are included.

- the ;

- the ;

- the ;

5.3 Recommendations

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

5.4 Future Prospects

There are several prospect related in this research that may be extended for further studies. ... So the suggested topics are listed in the following.

1. the ... .

2. the ... .

3. the ... .

Note that for ECE undergraduate theses, as per the directions of the thesis adviser, Recommendations and Future Directives will be removed for the hardbound copy but will be retained for database storage.

REFERENCES

[Aamport, 1986a] Aamport, L. A. (1986a). The gnats and gnus document preparation system. *G-Animal's Journal*, 41(7):73+. This is a full ARTICLE entry.

[Aamport, 1986b] Aamport, L. A. (1986b). The gnats and gnus document preparation system. *G-Animal's Journal*.

[Aamport, 2004] Aamport, L. A. (2004). The gnats and gnus document preparation system. In [GAJ, 1986], pages 73+. This is a cross-referencing ARTICLE entry.

[ABCM, 1959] ABCM (1959). *British chemicals and their manufacturers*.

[Aksın et al., 2006] Aksın, Ö., Türkmen, H., Artok, L., Çetinkaya, B., Ni, C., Büyükgüngör, O., and Özkal, E. (2006). Effect of immobilization on catalytic characteristics of saturated pd-n-heterocyclic carbenes in mizoroki-heck reactions. *Journal of Organometallic Chemistry*, 691(13):3027–3036.

[Almendro et al., 1998] Almendro, J. L., Martín, J., Sánchez, A., and Nozal, F. (1998). Elektromagnetisches signalhorn.

[Angenendt, 2002] Angenendt, A. (2002). In honore salvatoris – vom sinn und unsinn der patrozinienkunde. *Revue d'Histoire Ecclésiastique*, 97:431–456, 791–823.

[Aristotle, 1877] Aristotle (1877). *The Rhetoric of Aristotle with a commentary by the late Edward Meredith Cope*.

[Aristotle, 1907] Aristotle (1907). *De Anima*.

[Aristotle, 1929] Aristotle (1929). *Physics*. G. P. Putnam.

[Aristotle, 1968] Aristotle (1968). *Poetics*. Clarendon Aristotle. Clarendon Press.

[Aslin, 1949] Aslin, E. J. (1949). Photostat recording in library work. *Aslib Proceedings*, 1:49–52.

[Augustine, 1995] Augustine, R. L. (1995). *Heterogeneous catalysis for the synthetic chemist*. Marcel Dekker.

[Averroes, 1982] Averroes (1982). *The Epistle on the Possibility of Conjunction with the Active Intellect by Ibn Rushd with the Commentary of Moses Narboni*. Number 7 in Moreshet: Studies in Jewish History, Literature and Thought. Jewish Theological Seminary of America.

[Baez and Lauda, 2004a] Baez, J. C. and Lauda, A. D. (2004a). Higher-dimensional algebra v: 2-groups. *Theory and Applications of Categories*, 12:423–491.

[Baez and Lauda, 2004b] Baez, J. C. and Lauda, A. D. (2004b). Higher-dimensional algebra v: 2-groups.

[Bertram and Wentworth, 1996] Bertram, A. and Wentworth, R. (1996). Gromov invariants for holomorphic maps on riemann surfaces. 9(2):529–571.

['Brunswick', 1985] 'Brunswick' (1985). The piper and the rats: A musical experiment. Technical Report 1984, Rodent Activities Termination Section (RATS), Pest Control Division, Brunswick Public Welfare Department, Hamelin.

[Bry and Afflerbach, 1968] Bry, I. and Afflerbach, L. (1968). In search of an organizing princi-

ple for behavioural science literature. *Community Mental Health*, 4(1):75–84.

[BSI, 1973a] BSI (1973a). *BS 2570: Natural Fibre Twines*, Table 5. British Standards Institution, London, 3rd edition.

[BSI, 1973b] BSI (1973b). Natural fibre twines. BS 2570, British Standards Institution, London. 3rd. edn.

[BSI, 1976] BSI (1976). Bibliographic references. BS 1629, British Standards Institution.

[BSI, 1978] BSI (1978). Citing publications by bibliographic references. BS 5606, British Standards Institution.

[BSI, 1983] BSI (1983). Citation of unpublished documents. BS 6371, British Standards Institution.

[Butcher, 1981] Butcher, J. (1981). *Copy-editing*. Cambridge University Press, 2nd edition.

[Chapman, 1975] Chapman, J. (1975). *The Icehouse Bottom Site—40MR23*. Number 23 in University of Tennessee Department of Anthropology Publication. Univ. of Tennessee Press, Knoxville.

[Chave, 1964] Chave, K. E. (1964). Skeletal durability and preservation. In Imbrie, J. and Newel, N., editors, *Approaches to paleoecology*, pages 377–87, New York. Wiley.

['Chicago', 1982] 'Chicago' (1982). *The Chicago Manual of Style*. University of Chicago Press, 13th edition.

[Chiu and Chow, 1978] Chiu, W. W. and Chow, W. M. (1978). A hybrid hierarchical model of a multiple virtual storage (mvs) operating system.

[Chomsky, 1973] Chomsky, N. (1973). Conditions on transformations. In Anderson, S. R. and Kiparsky, P., editors, *A festschrift for Morris Halle*, New York. Holt, Rinehart & Winston.

[Cicero, 1995] Cicero, M. T. (1995). *De natura deorum. Über das Wesen der Götter*. Reclam.

[Coleridge, 1983] Coleridge, S. T. (1983). *Biographia literaria, or Biographical sketches of my literary life and opinions*, volume 7 of *Bollingen Series*. Routledge and Kegan Paul.

[Cotton et al., 1999] Cotton, F. A., Wilkinson, G., Murillio, C. A., and Bochmann, M. (1999). *Advanced inorganic chemistry*. Wiley, 6 edition.

[Croft, 1978] Croft, W. B. (1978). *Organizing and searching large files of document descriptions*. PhD thesis, Cambridge University.

[Doody, 1974] Doody, T. (1974). Hemingway's style and jake's narration. *The Journal of Narrative Technique*, 4(3):212–225.

[Downes, 1974] Downes, W. J. (1974). Systemic grammar and structural sentence relatedness. London School of Economics. Mimeo.

[Eckstein and Zuckermann, 1960] Eckstein, P. and Zuckermann, S. (1960). Morphology of the reproductive tract. In Parkes, A. S., editor, *Marshall's Physiology of Reproduction*, volume 1, pages 43–154. Longman, London.

[Einstein, 1905] Einstein, A. (1905). Zur Elektrodynamik bewegter Körper. (German) [On the electrodynamics of moving bodies]. *Annalen der Physik*, 322(10):891–921.

[Ellis and Walton, 1971] Ellis, B. and Walton, A. K. (1971). A bibliography on optical modulators. Technical Report RAE-TR-71009, Royal Aircraft Establishment.

[Exchequer, 1639] Exchequer (1634–1639). Act books. Edinburgh, Scottish Record Office, E.4/5.

[Feigl, 1958] Feigl, F. (1958). *Spot Tests in Organic Analysis*, chapter 6. Publisher publisher, 5th edition.

[Fletcher and Hopkins, 1907] Fletcher, W. M. and Hopkins, F. G. (1907). Lactic acid in amphibian muscle. *J. Physiol.*, 35:247–309.

[GAJ, 1986] GAJ (1986). *G-Animal's Journal*, 41(7). The entire issue is devoted to gnats and gnus (this entry is a cross-referenced ARTICLE (journal)).

[Gerhardt, 2000] Gerhardt, M. J. (2000). *The Federal Appointments Process*. Duke University Press.

[Gillies, 1933] Gillies, A. (1933). Herder and the preparation of goethe's idea of world literature. *Publications of the English Goethe Society*, 9:46–67.

[Glashow, 1961] Glashow, S. (1961). Partial symmetries of weak interactions. *Nucl. Phys.*, 22:579–588.

[Godfrey, 1959] Godfrey, G. B. (1959). Joints in tubular structures. *Struct. Eng.*, 37(4):126–135.

[Gonzalez, 2001] Gonzalez, R. (2001). *The Ghost of John Wayne and Other Stories*. The University of Arizona Press.

[Goossens et al., 1994] Goossens, M., Mittelbach, F., and Samarin, A. (1994). *The LaTeX Companion*. Addison-Wesley, 1 edition.

[Gordon, 1975] Gordon, R. (1975). The tunes of Chicken Little. In Ballet, A. H., editor, *Playwrights for Tomorrow: A Collection of Plays*, volume 13. University of Minnesota Press, Minneapolis. One of four plays included in vol. 13.

[Hammond, 1997] Hammond, C. (1997). *The basics of crystallography and diffraction*. International Union of Crystallography and Oxford University Press.

[Hanlon, 1972] Hanlon, J. (1972). Designing buildings by computer. *New Scientist*, pages 429–432.

[Hanson, 1967] Hanson, C. W. (1967). Subject inquiries and literature searching. In Ashworth, W., editor, *Handbook of special librarianship and information work*, pages 414–452. 3rd edition.

[Heller and Lederis, 1958] Heller, H. and Lederis, K. (1958). Paper chromatography of small amounts of vasopressin and oxytocin. *Nature*, 182:1231–2.

[Herrmann et al., 2006] Herrmann, W. A., Öfele, K., Schneider, S. K., Herdtweck, E., and Hoffmann, S. D. (2006). A carbocyclic carbene as an efficient catalyst ligand for c–c coupling reactions. 45(23):3859–3862.

[Hershkovitz, 1962] Hershkovitz, P. (1962). *Evolution of Neotropical cricetine rodents (Muridae) with special reference to the phyllotine group*, volume 46 of *Fieldiana: Zoology*. Field Museum of Natural History, Chicago.

[Hoel, 1971a] Hoel, P. G. (1971a). *Elementary Statistics*. Wiley series in probability and mathematical statistics. Wiley, New York, Chichester, 3rd edition. ISBN 0 471 40300.

[Hoel, 1971b] Hoel, P. G. (1971b). *Elementary Statistics*, pages 19–33. Wiley series in probability and mathematical statistics. Wiley, New York, Chichester, 3rd edition. ISBN 0 471 40300.

[Homer, 2004] Homer (2004). *Die Ilias*. Artemis & Winkler, 3 edition.

[Hostetler et al., 1998] Hostetler, M. J., Wingate, J. E., Zhong, C.-J., Harris, J. E., Vachet, R. W., Clark, M. R., Londono, J. D., Green, S. J., Stokes, J. J., Wignall, G. D., Glish, G. L., Porter, M. D., Evans, N. D., and Murray, R. W. (1998). Alkanethiolate gold cluster molecules with core diameters from 1.5 to 5.2 nm. *Langmuir*, 14(1):17–30.

[Howells, 1951] Howells, W. W. (1951). Factors of human physique. *American Journal of Physical Anthropology*, 9:159–192.

[Howells, 1966a] Howells, W. W. (1966a). Population distances: Biological, linguistic, geographical and environmental. *Current Anthropology*, 7:531–540.

[Howells, 1966b] Howells, W. W. (1966b). Variability in family lines vs. population variability. *Annals of the New York Academy of Sciences*, 134:624–631.

[Hyman, 1981] Hyman, A. (1981). Aristotle's theory of the intellect and its interpretation by averroes. In O'Meara, D. J., editor, *Studies in Aristotle*, number 9 in Studies in Philosophy and the History of Philosophy, pages 161–191. The Catholic University of America Press.

[ISO, 2009] ISO (2009). 80000-2. *Quantities and units–Part 2: Mathematical signs and symbols to be used in the natural sciences and technology*.

[Itzhaki, 1996] Itzhaki, N. (1996). Some remarks on 't hooft's s-matrix for black holes.

[Jackson, 1979] Jackson, R. (1979). Running down the up-escalator: Regional inequality in Papua New Guinea. *Australian Geographer*, 14:175–84.

[Johnson, 1974] Johnson, G. B. (1974). Enzyme polymorphism. *Science*, 184:28–37.

[Kant, 1968a] Kant, I. (1968a). *Kritik der praktischen Vernunft*, volume 5, pages 1–163. Walter de Gruyter.

[Kant, 1968b] Kant, I. (1968b). *Kritik der Urtheilskraft*, volume 5, pages 165–485. Walter de Gruyter.

[Knuth, 1973a] Knuth, D. E. (1973a). *The Art of Computer Programming*. Four volumes. Addison-Wesley. Seven volumes planned (this is a cross-referenced set of BOOKs).

[Knuth, 1973b] Knuth, D. E. (1973b). *Fundamental Algorithms*, volume 1 of *The Art of Computer Programming*, section 1.2, pages 10–119. Addison-Wesley, Reading, Massachusetts, second edition. This is a full INBOOK entry.

[Knuth, 1973c] Knuth, D. E. (1973c). *Fundamental Algorithms*, chapter 1.2. Addison-Wesley.

[Knuth, 1981a] Knuth, D. E. (1981a). *Seminumerical Algorithms*, volume 2 of *The Art of Computer Programming*. Addison-Wesley, Reading, Massachusetts, second edition. This is a full BOOK entry.

[Knuth, 1981b] Knuth, D. E. (1981b). *Seminumerical Algorithms*. Addison-Wesley.

[Knvth, 1988] Knvth, J. C. (1988). The programming of computer art. Vernier Art Center, Stanford, California. This is a full BOOKLET entry.

[Kowalik and Isard, 1995] Kowalik, F. and Isard, M. (1995). Estimateur d'un défaut de fonctionnement d'un modulateur en quadrature et étage de modulation l'utilisant.

[Kullback, 1959] Kullback, S. (1959). *Information Theory and Statistics*. John Wiley & Sons.

[Kullback, 1997a] Kullback, S. (1997a). *Information Theory and Statistics*. Dover Publications.

[Kullback, 1997b] Kullback, S. (1997b). *Information Theory and Statistics*. Dover Publications.

[Laufenberg et al., 2006] Laufenberg, X., Eynius, D., Suelzle, H., Usbeck, S., Spaeth, M., Neuser-Hoffmann, M., Myrzik, C., Schmid, M., Nietfeld, F., Thiel, A., Braun, H., and Ebner, N. (2006). Elektrische einrichtung und betriebsverfahren.

[Lincoll, 1977a] Lincoll, D. D. (1977a). Semigroups of recurrences. In Lipcoll, D. J., Lawrie, D. H., and Sameh, A. H., editors, *High Speed Computer and Algorithm Organization*, number 23 in Fast Computers, part 3, pages 179–183. Academic Press, New York, third edition. This is a full INCOLLECTION entry.

[Lincoll, 1977b] Lincoll, D. D. (1977b). Semigroups of recurrences. In *High Speed Computer and Algorithm Organization*. Academic Press.

[Lincoll, 2004] Lincoll, D. D. (2004). Semigroups of recurrences. In [Lipcoll et al., 1977], pages 179–183. This is a cross-referencing INCOLLECTION entry.

[Lipcoll et al., 1977] Lipcoll, D. J., Lawrie, D. H., and Sameh, A. H., editors (1977). *High Speed Computer and Algorithm Organization*. Number 23 in Fast Computers. Academic Press, New York, third edition. This is a cross-referenced BOOK (collection) entry.

[Loh, 1992] Loh, N. C. (1992). High-resolution micromachined interferometric accelerometer.

[Maguire, 1976] Maguire, J. (1976). *A taxonomic and ecological study of the living and fossil Hystricidae with particular reference to southern Africa*. Ph.d. diss., Department of Geology, University of the Witwatersrand, Johannesburg.

[Malinowski, 1972] Malinowski, B. (1972). *Argonauts of the Western Pacific*. Routledge and Kegan Paul, 8 edition.

[Mann, 1968] Mann, A. E. (1968). *The palaeodemography of Australopithecus*. Ph.d. diss., University of California, Berkeley.

[Markey, 2005] Markey, N. (2005). Tame the beast.

[Maron, 2000] Maron, M. (2000). *Animal Triste*. University of Nebraska Press.

[Massa, 2004] Massa, W. (2004). *Crystal structure determination*. Spinger, 2 edition.

[Masterly, 1988a] Masterly, É. (1988a). Mastering thesis writing. Master's project, Stanford University, English Department. This is a full MASTERSTHESIS entry.

[Masterly, 1988b] Masterly, É. (1988b). Mastering thesis writing. Master's thesis, Stanford University.

[McColvin, 2004] McColvin, L. R. (2004). *Libraries in Britain*. Longmans Green, for the British Council, London.

[McNeill, 1963] McNeill, W. H. (1963). The era of Middle Eastern dominance to 500 B.C. In *The Rise of the West*, part 1. University of Chicago Press, Chicago.

[Milton, 1924] Milton, J. (1924). Paradise lost. In Moody, W. V., editor, *The Complete Poetical Works of John Milton*. Houghton Mifflin, Boston, Student's Cambridge edition.

[Missilany, 2004] Missilany (2004). This is a minimal MISC entry.

[Missilany, 1984] Missilany, J.-B. (1984). Handing out random pamphlets in airports. Handed out at O'Hare. This is a full MISC entry.

[Moore, 1965] Moore, G. E. (1965). Cramming more components onto integrated circuits.

Electronics, 38(8):114–117.

[Moore, 1998] Moore, G. E. (1998). Cramming more components onto integrated circuits. *Proceedings of the IEEE*, 86(1):82–85.

[Moraux, 1979] Moraux, P. (1979). Le *De Anima* dans la tradition grècque. In Lloyd, G. E. R. and Owen, G. E. L., editors, *Aristotle on Mind and the Senses*, pages 281–324.

[Nietzsche, 1988a] Nietzsche, F. (1988a). *Die Geburt der Tragödie. Unzeitgemäße Betrachtungen I–IV. Nachgelassene Schriften 1870–1973*, volume 1. and Walter de Gruyter, 2 edition.

[Nietzsche, 1988b] Nietzsche, F. (1988b). *Sämtliche Werke*. and Walter de Gruyter, 2 edition.

[Nietzsche, 1988c] Nietzsche, F. (1988c). *Unzeitgemässe Betrachtungen. Zweites Stück*, volume 1, pages 243–334. and Walter de Gruyter.

[Oaho et al., 1983a] Oaho, A. V., Ullman, J. D., and Yannakakis, M. (1983a). On notions of information transfer in VLSI circuits. In Oz, W. V. and Yannakakis, M., editors, *Proc. Fifteenth Annual ACM*, number 17 in All ACM Conferences, pages 133–139, Boston. Academic Press. This is a full INPROCEDINGS entry.

[Oaho et al., 1983b] Oaho, A. V., Ullman, J. D., and Yannakakis, M. (1983b). On notions of information transfer in VLSI circuits. In *Proc. Fifteenth Annual ACM*.

[Oaho et al., 2004] Oaho, A. V., Ullman, J. D., and Yannakakis, M. (2004). On notions of information transfer in VLSI circuits. pages 133–139. This is a cross-referencing INPROCEEDINGS entry.

[Oetiker et al., 2014] Oetiker, T., Partl, H., Hyna, I., and Schlegl, E. (2014). *The Not So Short Introduction to LaTeX 2ε Or LaTeX 2ε in 157 minutes*. n.a.

[Ogilvy, 1965] Ogilvy, D. (1965). The creative chef. In Steiner, G. A., editor, *The Creative Organization*, pages 199–213. University of Chicago Press, Chicago.

[Oz and Yannakakis, 1983] Oz, W. V. and Yannakakis, M., editors (1983). *Proc. Fifteenth Annual*, number 17 in All ACM Conferences, Boston. Academic Press. This is a full PROCEEDINGS entry.

[Padhye et al., 1999] Padhye, J., Firoiu, V., and Towsley, D. (1999). A stochastic model of tcp reno congestion avoidance and control.

[Phony-Baloney, 1988a] Phony-Baloney, F. P. (1988a). *Fighting Fire with Fire: Festooning French Phrases*. PhD dissertation, Fanstord University, Department of French. This is a full PHDTHESIS entry.

[Phony-Baloney, 1988b] Phony-Baloney, F. P. (1988b). *Fighting Fire with Fire: Festooning French Phrases*. PhD thesis, Fanstord University.

[Piccato, 2001] Piccato, P. (2001). *City of Suspects*. Duke University Press.

[Pines, 1979] Pines, S. (1979). The limitations of human knowledge according to al-farabi, ibn bajja, and maimonides. In Twersky, I., editor, *Studies in Medieval Jewish History and Literature*, pages 82–109.

[Prufer, 1964] Prufer, O. (1964). The Hopewell cult. *Scientific American*, pages 90–102.

[Pym, 1624] Pym, J. (1624). Diary. Northampton, Northamptonshire Record Office, Finch-Hatton 50.

[Ramsbottom, 1931] Ramsbottom, J. (1931). Fungi pathogenic to man. In *A System of Bacteri-*

ology in relation to Medicine, volume 8, pages 11–70. HMSO, for Medical Research Council, London.

[Ranganthan, 1951] Ranganthan, S. R. (1951). Colon classification and its approach to documentation. In Shera, J. H. and Egan, M. E., editors, *Bibliographic Organization*, pages 94–105.

[Reese, 1958] Reese, T. R. (1958). Georgia in anglo-spanish diplomacy, 1736-1739. *William and Mary Quarterly*, 15:168–190.

[Salam, 1968] Salam, A. (1968). Weak and electromagnetic interactions. In Svartholm, N., editor, *Elementary particle theory*, pages 367–377. Almquist & Wiksell.

[Sarfraz and Razzak, 2002] Sarfraz, M. and Razzak, M. F. A. (2002). Technical section: An algorithm for automatic capturing of the font outlines. *Computers and Graphics*, 26(5):795–804.

[Shore, 1991] Shore, B. (1991). Twice-born, once conceived. *American Anthropologist*, 93(1):9–27.

[Sigfridsson and Ryde, 1998] Sigfridsson, E. and Ryde, U. (1998). Comparison of methods for deriving atomic charges from the electrostatic potential and moments. *Journal of Computational Chemistry*, 19(4):377–395.

[Smart, 1976] Smart, N. (1976). *The religious experience of mankind.* Schribner, New York, 2nd edition.

[Sorace et al., 1997] Sorace, R. E., Reinhardt, V. S., and Vaughn, S. A. (1997). High-speed digital-to-rf converter.

[Térrific, 1988] Térrific, T. (1988). An $O(n \log n/\log \log n)$ sorting algorithm. Wishful Research Result 7, Fanstord University, Computer Science Department, Fanstord, California. This is a full TECHREPORT entry.

[Terrific, 1988] Terrific, T. (1988). An $O(n \log n/\log \log n)$ sorting algorithm. Technical report, Fanstord University.

[Thomson, 1971] Thomson, V. (1971). Cage and the collage of noises. In *American Music since 1910*, chapter 8. Holt, Rinehart and Winston, New York.

[Traquair, 1638] Traquair, E. (1638). Letter to Marquess of Hamilton, 28 Aug. Lennoxlove (E. Lothian), Muniments of Duke of Hamilton and Brandon, C.1, no. 963.

[Ünderwood et al., 1988] Ünderwood, U., Ñet, N., and P̄ot, P. (1988). Lower bounds for wishful research results. Talk at Fanstord University (this is a full UNPUBLISHED entry).

[Ünderwood et al., 2004] Ünderwood, U., Ñet, N., and P̄ot, P. (2004). Lower bounds for wishful research results. Talk at Fanstord University (this is a minimal UNPUBLISHED entry).

[van Gennep, 1909a] van Gennep, A. (1909a). *Les rites de passage*. Nourry.

[van Gennep, 1909b] van Gennep, A. (1909b). *Les rites de passage*. Nourry.

[van Gennep, 1960] van Gennep, A. (1960). *The Rites of Passage*. University of Chicago Press.

[Vázques de Parga et al., 1993] Vázques de Parga, L., Lacarra, J. M., and Uría Ríu, J. (1993). *Las Peregrinaciones a Santiago de Compostela*. Iberdrola. Ed. facs. de la realizada en 1948–49.

[von Brandt and Hoffmann, 1987] von Brandt, A. and Hoffmann, E. (1987). Die nordischen

länder von der mitte des 11. jahrhunderts bis 1448. In Seibt, F., editor, *Europa im Hoch- und Spätmittelalter*, number 2 in Handbuch der europäischen Geschichte, pages 884–917. Klett-Cotta.

[Wassenberg and Sanders, 2010] Wassenberg, J. and Sanders, P. (2010). Faster radix sort via virtual memory and write-combining.

[Weinberg, 1967] Weinberg, S. (1967). A model of leptons. *Phys. Rev. Lett.*, 19:1264–1266.

[Westfahl, 2004] Westfahl, G. (2004). The true frontier. pages 55–65.

[Wilde, 1899] Wilde, O. (1899). *The Importance of Being Earnest: A Trivial Comedy for Serious People*. English and American drama of the Nineteenth Century. Leonard Smithers and Company.

[Winget Ltd., 1967] Winget Ltd. (1967). Detachable bulldozer attachment for dumper vehicles. GB Patent Specification 1060631.

[Wood, 1961] Wood, R. H. (1961). *Plastic and Elastic Design of Slabs and Plates*. Thames & Hudson, London.

[Worman, 2002] Worman, N. (2002). *The Cast of Character*. University of Texas Press.

[Wright, 1963] Wright, R. C. (1963). *Report Literature*, pages 46–59.

[Wright, 1978a] Wright, S. (1978a). *Evolution and the genetics of populations*, volume 4. Univ. of Chicago Press, Chicago.

[Wright, 1978b] Wright, S. (1978b). Variability within and among natural populations. In *Evolution and the genetics of populations*, vol. 4. Univ. of Chicago Press, Chicago.

[Yoon et al., 2006] Yoon, M. S., Ryu, D., Kim, J., and Ahn, K. H. (2006). Palladium pincer complexes with reduced bond angle strain: efficient catalysts for the heck reaction. *Organometallics*, 25(10):2409–2411.

Appendix A
ANSWERS TO QUESTIONS TO THIS THESIS

Contents

A1 How important is the problem to practice?

A possible answer to this question is the summary of your Significance of the Study, and that portion of the Problem Statement where you describe the ideal scenario for your intended audience.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

A2 How will you know if the solution/s that you will achieve would be better than existing ones?

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

A2.1 How will you measure the improvement/s?

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

A2.1.1 What is/are your basis/bases for the improvement/s?

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut

porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

A2.1.2 Why did you choose that/those basis/bases?

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

A2.1.3 How significant are your measure/s of the improvement/s?

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

A3 What is the difference of the solution/s from existing ones?

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

A3.1 How is it different from previous and existing ones?

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec

ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

A4   What are the assumptions made (that are behind for your proposed solution to work)?

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

A4.1   Will your proposed solution/s be sensitive to these assumptions?

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

A4.2   Can your proposed solution/s be applied to more general cases when some of the assumptions are eliminated? If so, how?

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

A5 What is the necessity of your approach / proposed solution/s?

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

A5.1 What will be the limits of applicability of your proposed solution/s?

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

A5.2 What will be the message of the proposed solution to technical people? How about to non-technical managers and business men?

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

A6 How will you know if your proposed solution/s is/are correct?

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit

blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

A6.1 Will your results warrant the level of mathematics used (i.e., will the end justify the means)?

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

A7 Is/are there an/ alternative way/s to get to the same solution/s?

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

A7.1 Can you come up with illustrating examples, or even better, counter examples to your proposed solution/s?

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

A7.2 Is there an approximation that can arrive at the essentially the same proposed solution/s more easily?

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec

ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

A8   If you were the examiner of your Thesis, how would you present the Thesis in another way? Give your remarks, especially for your methodology and the results and discussions.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

A8.1   What are the weaknesses of your Thesis, specifically your methodology and the results and discussions?

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Appendix B
USAGE EXAMPLES

Contents

The user is expected to have a working knowledge of LaTeX. A good introduction is in [Oetiker et al., 2014]. Its latest version can be accessed at http://www.ctan.org/tex-archive/info/lshort.

B1 Equations

The following examples show how to typeset equations in LaTeX. This section also shows examples of the use of `\gls{ }` commands in conjunction with the items that are in the `notation.tex` file. **Please make sure that the entries in** `notation.tex` **are those that are referenced in the LaTeX document files used by this Thesis. Please comment out unused notations and be careful with the commas and brackets in** `notation.tex` .

In (B.1), the output signal $y(t)$ is the result of the convolution of the input signal $x(t)$ and the impulse response $h(t)$.

$$y(t) = h(t) * x(t) = \int_{-\infty}^{+\infty} h(t - \tau) x(\tau) \, \mathrm{d}\tau \tag{B.1}$$

Other example equations are as follows.

$$\begin{bmatrix} V_1 \\ I_1 \end{bmatrix} = \begin{bmatrix} A & B \\ C & D \end{bmatrix} \begin{bmatrix} V_2 \\ I_2 \end{bmatrix} \tag{B.2}$$

$$\frac{1}{2} < \left\lfloor \mathrm{mod}\left(\left\lfloor \frac{y}{17} \right\rfloor 2^{-17\lfloor x \rfloor - \mathrm{mod}(\lfloor y \rfloor, 17)}, 2 \right) \right\rfloor, \tag{B.3}$$

$$|\zeta(x)^3 \zeta(x + iy)^4 \zeta(x + 2iy)| = \exp \sum_{n,p} \frac{3 + 4\cos(ny \log p) + \cos(2ny \log p)}{np^{nx}} \geq 1 \tag{B.4}$$

The verbatim LaTeX code of Sec. B1 is in List. B.1.

Listing B.1: Sample LaTeX code for equations and notations usage

```
1  The following examples show how to typeset equations in \LaTeX.  This
       section also shows examples of the use of \verb| \gls{ } | commands
       in conjunction with the items that are in the \verb| notation.tex |
       file. \textbf{Please make sure that the entries in} \verb| notation.
       tex |\textbf{  are those that are referenced in the \LaTeX \ document
        files used by this \documentType.  Please comment out unused
       notations and be careful with the commas and brackets  in} \verb|
       notation.tex |.
2
3  In~\eqref{eq:conv}, the output signal \gls{not:output_sigt} is the result
        of the convolution of the input signal \gls{not:input_sigt} and the
       impulse response \gls{not:ir}.
4
5  \begin{eqnarray}
6      y\left( t \right) = h\left( t \right) * x\left( t \right)=\int_{-\
           infty}^{+\infty}h\left( t-\tau \right)x\left( \tau \right) \
           mathrm{d}\tau
7      \label{eq:conv}
8  \end{eqnarray}
9
10 Other example equations are as follows.
11
12 \begin{eqnarray}
13    \left[ \dfrac{ V_{1} }{ I_{1} } \right] =
14    \begin{bmatrix}
15       A & B \\
16       C & D
17    \end{bmatrix}
18    \left[ \dfrac{ V_{2} }{ I_{2} } \right]
19    \label{eq:ABCD}
20 \end{eqnarray}
21
22 \begin{eqnarray}
23 \dfrac{1}{2} < \left\lfloor \mathrm{mod}\left(\left\lfloor \dfrac{y}{17}
       \right\rfloor 2^{-17 \lfloor x \rfloor - \mathrm{mod}(\lfloor y\
       rfloor, 17)},2\right)\right\rfloor,
24 \end{eqnarray}
25
26 \begin{eqnarray}
27 | \zeta(x)^3 \zeta(x + iy)^4 \zeta(x + 2iy) | =
28 \exp\sum_{n,p} \frac{3 + 4 \cos( ny \log p) + \cos (2ny \log p)}{np^{nx}}
       \ge 1
29 \end{eqnarray}
```

B2 Notations

In order to use the standardized notation, the user is highly suggested to see the ISO 80000-2 standard [ISO, 2009].

See https://en.wikipedia.org/wiki/Help:Displaying_a_formula and https://en.wikipedia.org/wiki/List_of_mathematical_symbols for LaTeX maths and other notations, respectively.

The following were taken from `isomath-test.tex` .

B2.1 Math alphabets

If there are other symbols in place of Greek letters in a math alphabet, it uses T1 or OT1 font encoding instead of OML.

mathnormal	$A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, \alpha, \beta, \pi, \nu, \omega, v, w, 0, 1, 9$
mathit	$A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, \mathit{ff}, \mathit{fi}, \ss, °, !, v, w, 0, 1, 9$
mathrm	$\mathrm{A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, ff, fi, ß, °, !, v, w, 0, 1, 9}$
mathbf	$\mathbf{A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, ff, fi, ß, °, !, v, w, 0, 1, 9}$
mathsf	$\mathsf{A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, ff, fi, ß, °, !, v, w, 0, 1, 9}$
mathtt	$\mathtt{A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, \uparrow, \downarrow, ß, °, !, v, w, 0, 1, 9}$

New alphabets bold-italic, sans-serif-italic, and sans-serif-bold-italic.

mathbfit	$A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, \alpha, \beta, \pi, \nu, \omega, v, w, 0, 1, 9$
mathsfit	$A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, \alpha, \beta, \pi, \nu, \omega, v, w, 0, 1, 9$
mathsfbfit	$A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, \alpha, \beta, \pi, \nu, \omega, v, w, 0, 1, 9$

Do the math alphabets match?

$ax\alpha\omega ax\alpha\omega \mathbf{ax\alpha\omega} \quad \mathtt{TC\Theta\Gamma} TC\Theta\Gamma TC\Theta\Gamma$

B2.2 Vector symbols

Alphabetic symbols for vectors are boldface italic, $\lambda = e_1 \cdot a$, while numeric ones (e.g. the zero vector) are bold upright, $a + \mathbf{0} = a$.

B2.3 Matrix symbols

Symbols for matrices are boldface italic, too:[1] $\Lambda = E \cdot A$.

---

[1]However, matrix symbols are usually capital letters whereas vectors are small ones. Exceptions are physical quantities like the force vector F or the electrical field E.

B2.4 Tensor symbols

Symbols for tensors are sans-serif bold italic,

$$\boldsymbol{\alpha} = \boldsymbol{e} \cdot \boldsymbol{a} \quad \Longleftrightarrow \quad \alpha_{ijl} = e_{ijk} \cdot a_{kl}.$$

The permittivity tensor describes the coupling of electric field and displacement:

$$D = \epsilon_0 \boldsymbol{\epsilon}_\mathrm{r} E$$

B2.5 Bold math version

The "bold" math version is selected with the commands `\boldmath` or `\mathversion{bold}`

mathnormal	$A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, \alpha, \beta, \pi, \nu, \omega, v, w, 0, 1, 9$
mathit	$A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, \text{ff}, \text{fi}, \text{ß}, °, !, v, w, 0, 1, 9$
mathrm	$\mathrm{A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, ff, fi, ß, °, !, v, w, 0, 1, 9}$
mathbf	$\mathbf{A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, ff, fi, ß, °, !, v, w, 0, 1, 9}$
mathsf	$\mathsf{A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, ff, fi, ß, °, !, v, w, 0, 1, 9}$
mathtt	$\mathtt{A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, ↑, ↓, ß, °, !, v, w, 0, 1, 9}$

New alphabets bold-italic, sans-serif-italic, and sans-serif-bold-italic.

mathbfit	$A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, \alpha, \beta, \pi, \nu, \omega, v, w, 0, 1, 9$
mathsfit	$\boldsymbol{\mathsf{A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, \alpha, \beta, \pi, \nu, \omega, v, w, 0, 1, 9}}$
mathsfbfit	$\boldsymbol{\mathsf{A, B, \Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, \alpha, \beta, \pi, \nu, \omega, v, w, 0, 1, 9}}$

Do the math alphabets match?

$\boldsymbol{axa\omega}ax\alpha\omega\boldsymbol{\mathsf{ax\alpha\omega}} \quad \boldsymbol{\mathsf{TC\Theta\Gamma}}TC\Theta\Gamma\boldsymbol{TC\Theta\Gamma}$

B2.5.1 Vector symbols

Alphabetic symbols for vectors are boldface italic, $\lambda = \boldsymbol{e}_1 \cdot \boldsymbol{a}$, while numeric ones (e.g. the zero vector) are bold upright, $\boldsymbol{a} + \mathbf{0} = \boldsymbol{a}$.

B2.5.2 Matrix symbols

Symbols for matrices are boldface italic, too:[2] $\boldsymbol{\Lambda} = \boldsymbol{E} \cdot \boldsymbol{A}$.

B2.5.3 Tensor symbols

Symbols for tensors are sans-serif bold italic,

$$\boldsymbol{\mathsf{\alpha}} = \boldsymbol{\mathsf{e}} \cdot \boldsymbol{\mathsf{a}} \quad \Longleftrightarrow \quad \boldsymbol{\mathsf{\alpha}}_{ijl} = \boldsymbol{\mathsf{e}}_{ijk} \cdot \boldsymbol{\mathsf{a}}_{kl}.$$

The permittivity tensor describes the coupling of electric field and displacement:

$$D = \epsilon_0 \boldsymbol{\mathsf{\epsilon}}_\mathrm{r} E$$

---

[2]However, matrix symbols are usually capital letters whereas vectors are small ones. Exceptions are physical quantities like the force vector F or the electrical field E.

The verbatim LaTeX code of Sec. B2 is in List. B.2.

Listing B.2: Sample LaTeX code for notations usage

```latex
% A teststring with Latin and Greek letters::
\newcommand{\teststring}{%
% capital Latin letters
% A,B,C,
A,B,
% capital Greek letters
%\Gamma,\Delta,\Theta,\Lambda,\Xi,\Pi,\Sigma,\Upsilon,\Phi,\Psi,
\Gamma,\Delta,\Theta,\Lambda,\Xi,\Pi,\Sigma,\Phi,\Psi,\Omega,
% small Greek letters
\alpha,\beta,\pi,\nu,\omega,
% small Latin letters:
% compare \nu, \omega, v, and w
v,w,
% digits
0,1,9
}


\subsection{Math alphabets}

If there are other symbols in place of Greek letters in a math
alphabet, it uses T1 or OT1 font encoding instead of OML.

\begin{eqnarray*}
\mbox{mathnormal} &  & \teststring \\
\mbox{mathit} &  & \mathit{\teststring}\\
\mbox{mathrm} &  & \mathrm{\teststring}\\
\mbox{mathbf} &  & \mathbf{\teststring}\\
\mbox{mathsf} &  & \mathsf{\teststring}\\
\mbox{mathtt} &  & \mathtt{\teststring}
\end{eqnarray*}
 New alphabets bold-italic, sans-serif-italic, and sans-serif-bold-italic
    .
\begin{eqnarray*}
\mbox{mathbfit}    &  & \mathbfit{\teststring}\\
\mbox{mathsfit}    &  & \mathsfit{\teststring}\\
\mbox{mathsfbfit} &  & \mathsfbfit{\teststring}
\end{eqnarray*}
%
Do the math alphabets match?


$
\mathnormal  {a x \alpha \omega}
\mathbfit    {a x \alpha \omega}
\mathsfbfit{a x \alpha \omega}
\quad
\mathsfbfit{T C \Theta \Gamma}
\mathbfit    {T C \Theta \Gamma}
\mathnormal  {T C \Theta \Gamma}
$


\subsection{Vector symbols}

Alphabetic symbols for vectors are boldface italic,
$\vec{\lambda}=\vec{e}_{1}\cdot\vec{a}$,
while numeric ones (e.g. the zero vector) are bold upright,
$\vec{a} + \vec{0} = \vec{a}$.

\subsection{Matrix symbols}
```

50

```
59
60  Symbols for matrices are boldface italic, too:%
61  \footnote{However, matrix symbols are usually capital letters whereas
        vectors
62  are small ones. Exceptions are physical quantities like the force
63  vector $\vec{F}$ or the electrical field $\vec{E}$.%
64  }
65  $\matrixsym{\Lambda}=\matrixsym{E}\cdot\matrixsym{A}.$
66
67
68  \subsection{Tensor symbols}
69
70  Symbols for tensors are sans-serif bold italic,
71
72  \[
73      \tensorsym{\alpha}  =  \tensorsym{e}\cdot\tensorsym{a}
74      \quad \Longleftrightarrow \quad
75      \alpha_{ijl}  =  e_{ijk}\cdot a_{kl}.
76  \]
77
78
79  The permittivity tensor describes the coupling of electric field and
80  displacement: \[
81  \vec{D}=\epsilon_{0}\tensorsym{\epsilon}_{\mathrm{r}}\vec{E}\]
82
83
84
85  \newpage
86  \subsection{Bold math version}
87
88  The ``bold'' math version is selected with the commands
89  \verb+\boldmath+ or \verb+\mathversion{bold}+
90
91  {\boldmath
92      \begin{eqnarray*}
93      \mbox{mathnormal} &  & \teststring \\
94      \mbox{mathit} &  & \mathit{\teststring}\\
95      \mbox{mathrm} &  & \mathrm{\teststring}\\
96      \mbox{mathbf} &  & \mathbf{\teststring}\\
97      \mbox{mathsf} &  & \mathsf{\teststring}\\
98      \mbox{mathtt} &  & \mathtt{\teststring}
99      \end{eqnarray*}
100      New alphabets bold-italic, sans-serif-italic, and sans-serif-bold-
            italic.
101      \begin{eqnarray*}
102      \mbox{mathbfit}    &  & \mathbfit{\teststring}\\
103      \mbox{mathsfit}    &  & \mathsfit{\teststring}\\
104      \mbox{mathsfbfit} &  & \mathsfbfit{\teststring}
105      \end{eqnarray*}
106      %
107      Do the math alphabets match?
108
109      $
110      \mathnormal  {a x \alpha \omega}
111      \mathbfit    {a x \alpha \omega}
112      \mathsfbfit{a x \alpha \omega}
113      \quad
114      \mathsfbfit{T C \Theta \Gamma}
115      \mathbfit    {T C \Theta \Gamma}
116      \mathnormal  {T C \Theta \Gamma}
117      $
118
119      \subsection{Vector symbols}
120
```

51

```
121     Alphabetic symbols for vectors are boldface italic,
122     $\vec{\lambda}=\vec{e}_{1}\cdot\vec{a}$,
123     while numeric ones (e.g. the zero vector) are bold upright,
124     $\vec{a} + \vec{0} = \vec{a}$.
125
126
127
128
129     \subsection{Matrix symbols}
130
131     Symbols for matrices are boldface italic, too:%
132     \footnote{However, matrix symbols are usually capital letters whereas
            vectors
133     are small ones. Exceptions are physical quantities like the force
134     vector $\vec{F}$ or the electrical field $\vec{E}$.%
135     }
136     $\matrixsym{\Lambda}=\matrixsym{E}\cdot\matrixsym{A}.$
137
138
139     \subsection{Tensor symbols}
140
141     Symbols for tensors are sans-serif bold italic,
142
143     \[
144         \tensorsym{\alpha}  =  \tensorsym{e}\cdot\tensorsym{a}
145         \quad \Longleftrightarrow \quad
146         \alpha_{ijl}  =  e_{ijk}\cdot a_{kl}.
147     \]
148
149     The permittivity tensor describes the coupling of electric field and
150     displacement: \[
151     \vec{D}=\epsilon_{0}\tensorsym{\epsilon}_{\mathrm{r}}\vec{E}\]
152 }
```

B3 Abbreviation

This section shows examples of the use of LaTeXcommands in conjunction with the items that are in the `abbreviation.tex` and in the `glossary.tex` files. Please see List. B.3. **To lessen the LaTeX parsing time, it is suggested that you use** `\acr{ }` **only for the first occurrence of the word to be abbreviated.**

Again please see List. B.3. Here is an example of first use: alternating current (ac). Next use: ac. Full: alternating current (ac). Here's an acronym referenced using `\acr` : hyper-text markup language (html). And here it is again: html. If you are used to the `glossaries` package, note the difference in using `\gls` : hyper-text markup language (html). And again (no difference): hyper-text markup language (html). Here are some more entries:

- extensible markup language (xml) and cascading style sheet (css).

- Next use: xml and css.

- Full form: extensible markup language (xml) and cascading style sheet (css).

- Reset again.

- Start with a capital. Hyper-text markup language (html).

- Next: Html. Full: Hyper-text markup language (html).

- Prefer capitals? Extensible markup language (XML). Next: XML. Full: extensible markup language (XML).

- Prefer small-caps? Cascading style sheet (CSS). Next: CSS. Full: cascading style sheet (CSS).

- Resetting all acronyms.

- Here are the acronyms again:

- Hyper-text markup language (HTML), extensible markup language (XML) and cascading style sheet (CSS).

- Next use: HTML, XML and CSS.

- Full form: Hyper-text markup language (HTML), extensible markup language (XML) and cascading style sheet (CSS).

- Provide your own link text: style sheet.

The verbatim LaTeX code of Sec. B3 is in List. B.3.

Listing B.3: Sample LaTeX code for abbreviations usage

```
1  Again please see List.~\ref{lst:abbrv}. Here is an example of first use:
       \acr{ac}. Next use: \acr{ac}. Full: \gls{ac}.  Here's an acronym
       referenced using \verb| \acr |: \acr{html}.  And here it is again: \
       acr{html}. If you are used to the \texttt{glossaries} package, note
       the difference in using \verb| \gls |: \gls{html}. And again (no
       difference): \gls{html}. Here are some more entries:
2
3  \begin{itemize}
4
5      \item \acr{xml} and \acr{css}.
6
7      \item Next use: \acr{xml} and \acr{css}.
8
9      \item Full form: \gls{xml} and \gls{css}.
10
11     \item Reset again. \glsresetall{abbreviation}
12
13     \item Start with a capital. \Acr{html}.
14
15     \item Next: \Acr{html}. Full: \Gls{html}.
16
17     \item Prefer capitals? \renewcommand{\acronymfont}[1]{\
           MakeTextUppercase{#1}} \Acr{xml}. Next: \acr{xml}. Full: \gls{xml
           }.
18
19     \item Prefer small-caps? \renewcommand{\acronymfont}[1]{\textsc{#1}} \
           Acr{css}. Next: \acr{css}. Full: \gls{css}.
20
21     \item Resetting all acronyms.\glsresetall{abbreviation}
22
23     \item Here are the acronyms again:
24
25     \item \Acr{html}, \acr{xml} and \acr{css}.
26
27     \item Next use: \Acr{html}, \acr{xml} and \acr{css}.
28
29     \item Full form: \Gls{html}, \gls{xml} and \gls{css}.
30
31     \item Provide your own link text: \glslink{[textbf]css}{style}
32
33 \end{itemize}
```

B4 Glossary

This section shows examples of the use of `\gls{ }` commands in conjunction with the items that are in the `glossary.tex` and `notation.tex` files. Note that entries in `notation.tex` are prefixed with " `not:` " label (see List. B.4).

Please make sure that the entries in `notation.tex` **are those that are referenced in the LaTeX document files used by this Thesis. Please comment out unused notations and be careful with the commas and brackets in** `notation.tex` .

- Matrices are usually denoted by a bold capital letter, such as A. The matrix's (i,j)th element is usually denoted a_{ij}. Matrix $\mathbf{I}$ is the identity matrix.

- A set, denoted as $\mathcal{S}$, is a collection of objects.

- The universal set, denoted as $\mathcal{U}$, is the set of everything.

- The empty set, denoted as $\emptyset$, contains no elements.

- Functional Analysis is seen as the study of complete normed vector spaces, i.e., Banach spaces.

- The cardinality of a set, denoted as $|\mathcal{S}|$, is the number of elements in the set.

The verbatim LaTeX code for the part of Sec. B4 is in List. B.4.

Listing B.4: Sample LaTeX code for glossary and notations usage

```
1  \begin{itemize}
2
3     \item \Glspl{matrix} are usually denoted by a bold capital letter,
          such as $\mathbfit{A}$. The \gls{matrix}'s $(i,j)$th element is
          usually denoted $a_{ij}$. \Gls{matrix} $\mathbf{I}$ is the
          identity \gls{matrix}.
4
5     \item A set, denoted as \gls{not:set}, is a collection of objects.
6
7     \item The universal set,  denoted as \gls{not:universalSet}, is the
          set of everything.
8
9     \item The empty set, denoted as \gls{not:emptySet}, contains no
          elements.
10
11    \item \Gls{Functional Analysis} is seen as the study of complete
          normed vector spaces, i.e., Banach spaces.
12
13    \item The cardinality of a set, denoted as \gls{not:cardinality}, is
          the number of elements in the set.
14
15 \end{enumerate}
```

B5 Figure

This section shows several ways of placing figures. PDFLATEX compatible files are PDF, PNG, and JPG. Please see the `figure` subdirectory.

Fig. B.1   A quadrilateral image example.

Fig. B.1 is a gray box enclosed by a dark border. List. B.5 shows the corresponding LaTeX code.

Listing B.5: Sample LaTeX code for a single figure

```
1  \begin{figure}[!htbp]
2      \centering
3          \includegraphics[width=0.5\textwidth]{example}
4      \caption{A quadrilateral image example.}
5      \label{fig:example}
6  \end{figure}
7  \cleardoublepage
8
9  Fig.~\ref{fig:example} is a gray box enclosed by a dark border. List.~\
       ref{lst:onefig} shows the corresponding \LaTeX \ code.
10 \end{figure}
```

(a) A sub-figure in the top row.

(b) A sub-figure in the middle row.

(c) A sub-figure in the bottom row.

Fig. B.2   Figures on top of each other. See List. B.6 for the corresponding LaTeX code.

Listing B.6: Sample LaTeX code for three figures on top of each other

```latex
\begin{figure}[!htbp]
\centering
\subbottom[A sub-figure in the top row.]{
\includegraphics[width=0.35\textwidth]{example_gray_box}
\label{fig:top}
}
\vfill
\subbottom[A sub-figure in the middle row.]{
\includegraphics[width=0.35\textwidth]{example_gray_box}
\label{fig:mid}
}
\vfill
\subbottom[A sub-figure in the bottom row.]{
\includegraphics[width=0.35\textwidth]{example_gray_box}
\label{fig:botm}
}
\caption{Figures on top of each other}
\label{fig:tmb}
\end{figure}
```
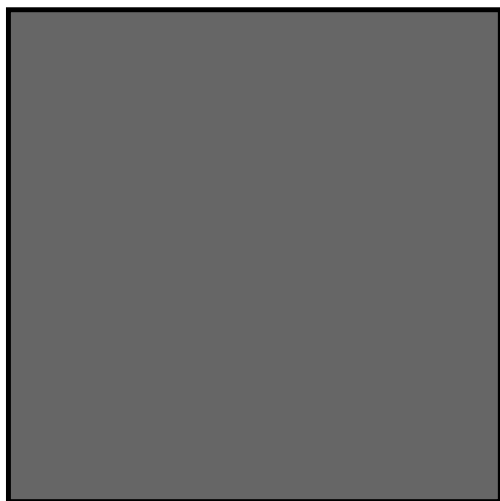
(a) A sub-figure in the upper-left corner.
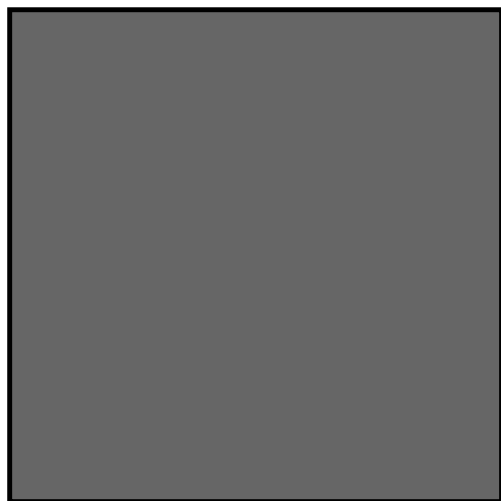
(b) A sub-figure in the upper-right corner.
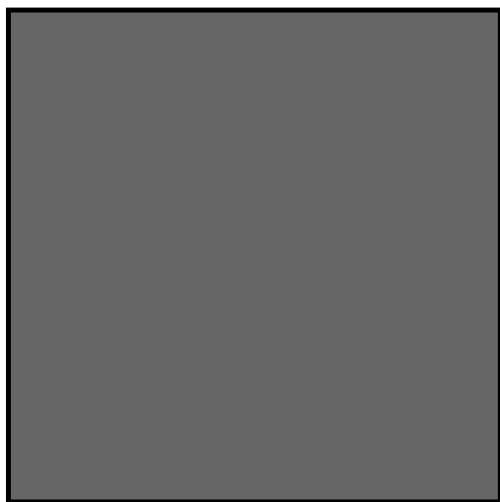
(c) A sub-figure in the lower-left corner.
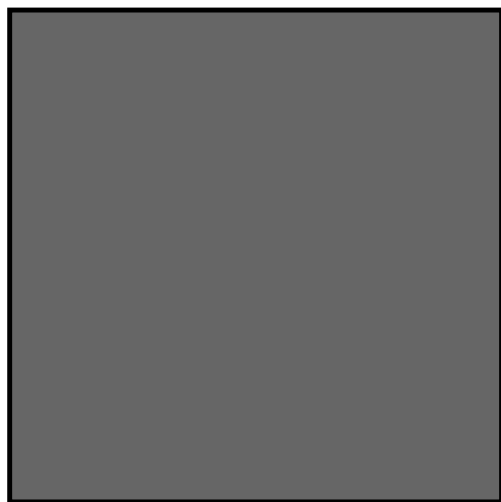
(d) A sub-figure in the lower-right corner

Fig. B.3   Four figures in each corner. See List. B.7 for the corresponding LATEX code.

Listing B.7: Sample LATEX code for the four figures

```latex
\begin{figure}[!htbp]
\centering
\subbottom[A sub-figure in the upper-left corner.]{
\includegraphics[width=0.45\textwidth]{example_gray_box}
\label{fig:upprleft}
}
\hfill
\subbottom[A sub-figure in the upper-right corner.]{
\includegraphics[width=0.45\textwidth]{example_gray_box}
\label{fig:uppright}
}
\vfill
\subbottom[A sub-figure in the lower-left corner.]{
\includegraphics[width=0.45\textwidth]{example_gray_box}
\label{fig:lowerleft}
}
\hfill
\subbottom[A sub-figure in the lower-right corner]{
\includegraphics[width=0.45\textwidth]{example_gray_box}
\label{fig:lowright}
}
\caption{Four figures in each corner. See List.~\ref{lst:fourfigs} for
    the corresponding \LaTeX \ code.}
\label{fig:fourfig}
\end{figure}
```

B6   Table

This section shows an example of placing a table (a long one). Table B.1 are the triples.

TABLE B.1   FEASIBLE TRIPLES FOR HIGHLY VARIABLE GRID

Time (s)	Triple chosen	Other feasible triples
0	(1, 11, 13725)	(1, 12, 10980), (1, 13, 8235), (2, 2, 0), (3, 1, 0)
2745	(1, 12, 10980)	(1, 13, 8235), (2, 2, 0), (2, 3, 0), (3, 1, 0)
5490	(1, 12, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
8235	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
10980	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
13725	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
16470	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
19215	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
21960	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
24705	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
27450	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
30195	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
32940	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
35685	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
38430	(1, 13, 10980)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
41175	(1, 12, 13725)	(1, 13, 10980), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
43920	(1, 13, 10980)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
46665	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
49410	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
52155	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
54900	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
57645	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
60390	(1, 12, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
63135	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
65880	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
68625	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
71370	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
74115	(1, 12, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
76860	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
79605	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
82350	(1, 12, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
85095	(1, 12, 13725)	(1, 13, 10980), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
87840	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
90585	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
93330	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
96075	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
98820	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
101565	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
104310	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
107055	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
109800	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
112545	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
115290	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
118035	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
120780	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
123525	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
126270	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
129015	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
131760	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
134505	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
137250	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
139995	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
142740	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
145485	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)

Time (s)	Triple chosen	Other feasible triples
148230	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
150975	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
153720	(1, 12, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
156465	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
159210	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
161955	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
164700	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)

List. B.8 shows the corresponding LaTeX code.

Listing B.8: Sample LaTeX code for making typical table environment

```
 1  \begin{center}
 2  {\scriptsize
 3  \begin{tabularx}{\textwidth}{p{0.1\textwidth}|p{0.2\textwidth}|p{0.5\
       textwidth}}
 4  \caption{Feasible triples for highly variable grid} \label{tab:triple_
       grid} \\
 5  \hline
 6  \hline
 7  \textbf{Time (s)} &
 8  \textbf{Triple chosen} &
 9  \textbf{Other feasible triples} \\
10  \hline
11  \endfirsthead
12  \multicolumn{3}{c}%
13  {\textit{Continued from previous page}} \\
14  \hline
15  \hline
16  \textbf{Time (s)} &
17  \textbf{Triple chosen} &
18  \textbf{Other feasible triples} \\
19  \hline
20  \endhead
21  \hline
22  \multicolumn{3}{r}{\textit{Continued on next page}} \\
23  \endfoot
24  \hline
25  \endlastfoot
26  \hline
27
28  0 & (1, 11, 13725) & (1, 12, 10980), (1, 13, 8235), (2, 2, 0), (3, 1, 0)
        \\
29  2745 & (1, 12, 10980) & (1, 13, 8235), (2, 2, 0), (2, 3, 0), (3, 1, 0) \\
30  5490 & (1, 12, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
31  8235 & (1, 12, 16470) & (1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1,
       0) \\
32  10980 & (1, 12, 16470) & (1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1,
       0) \\
33  13725 & (1, 12, 16470) & (1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1,
       0) \\
34  16470 & (1, 13, 16470) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
35  19215 & (1, 12, 16470) & (1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1,
       0) \\
36  21960 & (1, 12, 16470) & (1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1,
       0) \\
37  24705 & (1, 12, 16470) & (1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1,
       0) \\
38  27450 & (1, 12, 16470) & (1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1,
       0) \\
39  30195 & (2, 2, 2745) & (2, 3, 0), (3, 1, 0) \\
40  32940 & (1, 13, 16470) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
41  35685 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
42  38430 & (1, 13, 10980) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
43  41175 & (1, 12, 13725) & (1, 13, 10980), (2, 2, 2745), (2, 3, 0), (3, 1,
       0) \\
44  43920 & (1, 13, 10980) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
45  46665 & (2, 2, 2745) & (2, 3, 0), (3, 1, 0) \\
46  49410 & (2, 2, 2745) & (2, 3, 0), (3, 1, 0) \\
47  52155 & (1, 12, 16470) & (1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1,
       0) \\
```

```
48  54900 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
49  57645 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
50  60390 & (1, 12, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
51  63135 & (1, 13, 16470) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
52  65880 & (1, 13, 16470) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
53  68625 & (2, 2, 2745) & (2, 3, 0), (3, 1, 0) \\
54  71370 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
55  74115 & (1, 12, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
56  76860 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
57  79605 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
58  82350 & (1, 12, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
59  85095 & (1, 12, 13725) & (1, 13, 10980), (2, 2, 2745), (2, 3, 0), (3, 1,
        0) \\
60  87840 & (1, 13, 16470) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
61  90585 & (1, 13, 16470) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
62  93330 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
63  96075 & (1, 13, 16470) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
64  98820 & (1, 13, 16470) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
65  101565 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
66  104310 & (1, 13, 16470) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
67  107055 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
68  109800 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
69  112545 & (1, 12, 16470) & (1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1,
        0) \\
70  115290 & (1, 13, 16470) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
71  118035 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
72  120780 & (1, 13, 16470) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
73  123525 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
74  126270 & (1, 12, 16470) & (1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1,
        0) \\
75  129015 & (2, 2, 2745) & (2, 3, 0), (3, 1, 0) \\
76  131760 & (2, 2, 2745) & (2, 3, 0), (3, 1, 0) \\
77  134505 & (1, 13, 16470) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
78  137250 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
79  139995 & (2, 2, 2745) & (2, 3, 0), (3, 1, 0) \\
80  142740 & (2, 2, 2745) & (2, 3, 0), (3, 1, 0) \\
81  145485 & (1, 12, 16470) & (1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1,
        0) \\
82  148230 & (2, 2, 2745) & (2, 3, 0), (3, 1, 0) \\
83  150975 & (1, 13, 16470) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
84  153720 & (1, 12, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
85  156465 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
86  159210 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
87  161955 & (1, 13, 16470) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
88  164700 & (1, 13, 13725) & (2, 2, 2745), (2, 3, 0), (3, 1, 0) \\
89  \end{tabularx}
90  }
91  \end{center}
```

B7 Algorithm or Pseudocode Listing

Table B.2 shows an example pseudocode. Note that if the pseudocode exceeds one page, it can mean that its implementation is not modular. List. B.9 shows the corresponding LaTeX code.

TABLE B.2   CALCULATION OF $y = x^n$

Input(s):		
n	:	nth power; $n \in \mathbb{Z}^+$
x	:	base value; $x \in \mathbb{R}^+$
Output(s):		
y	:	result; $y \in \mathbb{R}^+$

Require: $n \geq 0 \vee x \neq 0$
Ensure: $y = x^n$
 1: $y \Leftarrow 1$
 2: **if** $n < 0$ **then**
 3:     $X \Leftarrow 1/x$
 4:     $N \Leftarrow -n$
 5: **else**
 6:     $X \Leftarrow x$
 7:     $N \Leftarrow n$
 8: **end if**
 9: **while** $N \neq 0$ **do**
10:     **if** N is even **then**
11:         $X \Leftarrow X \times X$
12:         $N \Leftarrow N/2$
13:     **else** $\{N$ is odd$\}$
14:         $y \Leftarrow y \times X$
15:         $N \Leftarrow N - 1$
16:     **end if**
17: **end while**

Listing B.9: Sample LATEX code for algorithm or pseudocode listing usage

```latex
\begin{table}[!htbp]
    \caption{Calculation of $y = x^n$}
    \label{tab:calcxn}
    {\footnotesize
    \begin{tabular}{lll}
    \hline
    \hline
    {\bfseries Input(s):} & & \\
    $n$ & : & $n$th power; $n \in \mathbb{Z}^{+}$ \\
    $x$ & : & base value; $x \in \mathbb{R}^{+}$ \\
    \hline
    {\bfseries Output(s):} & & \\
    $y$ & : & result; $y \in \mathbb{R}^{+}$  \\
    \hline
    \hline
    \\
    \end{tabular}
    }
    \begin{algorithmic}[1]
    {\footnotesize
        \REQUIRE $n \geq 0 \vee x \neq 0$
        \ENSURE $y = x^n$
        \STATE $y \Leftarrow 1$
        \IF{$n < 0$}
            \STATE $X \Leftarrow 1 / x$
            \STATE $N \Leftarrow -n$
        \ELSE
            \STATE $X \Leftarrow x$
            \STATE $N \Leftarrow n$
        \ENDIF
        \WHILE{$N \neq 0$}
            \IF{$N$ is even}
                \STATE $X \Leftarrow X \times X$
                \STATE $N \Leftarrow N / 2$
            \ELSE[$N$ is odd]
                \STATE $y \Leftarrow y \times X$
                \STATE $N \Leftarrow N - 1$
            \ENDIF
        \ENDWHILE
    }
    \end{algorithmic}
\end{table}
```

B8 Program/Code Listing

List. B.10 is a program listing of a C code for computing Fibonacci numbers by calling the actual code. Please see the `code` subdirectory.

Listing B.10: Computing Fibonacci numbers in C (./code/fibo.c)

```c
 1  /* fibo.c -- It prints out the first N Fibonacci
 2   *           numbers.
 3   */
 4
 5  #include <stdio.h>
 6
 7  int main(void) {
 8      int n;        /* Number of fibonacci numbers we will print */
 9      int i;        /* Index of fibonacci number to be printed next */
10      int current;  /* Value of the (i)th fibonacci number */
11      int next;     /* Value of the (i+1)th fibonacci number */
12      int twoaway;  /* Value of the (i+2)th fibonacci number */
13
14      printf("How many Fibonacci numbers do you want to compute? ");
15      scanf("%d", &n);
16      if (n<=0)
17          printf("The number should be positive.\n");
18      else {
19          printf("\n\n\tI \t Fibonacci(I) \n\t=====================\n");
20          next = current = 1;
21          for (i=1; i<=n; i++) {
22  printf("\t%d \t   %d\n", i, current);
23  twoaway = current+next;
24  current = next;
25  next    = twoaway;
26          }
27      }
28  }
29
30  /* The output from a run of this program was:
31
32  How many Fibonacci numbers do you want to compute? 9
33
34      I    Fibonacci(I)
35      =====================
36      1      1
37      2      1
38      3      2
39      4      3
40      5      5
41      6      8
42      7      13
43      8      21
44      9      34
45
46  */
```

List. B.11 shows the corresponding LaTeX code.

Listing B.11: Sample LaTeX code for program listing

```
1  List.~\ref{lst:fib_c} is a program listing of a C code for computing
       Fibonacci numbers by calling the actual code. Please see the \verb|
       code | subdirectory.
```

B9 Referencing

Referencing chapters: This appendix is in Appendix B, which is about examples in using various LaTeX commands.

Referencing sections: This section is Sec. B9, which shows how to refer to the locations of various labels that have been placed in the LaTeX files. List. B.12 shows the corresponding LaTeX code.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem.

Listing B.12: Sample LaTeX code for referencing sections

```
1  Referencing sections: This section is Sec.~\ref{sec:ref}, which shows how
       to refer to the locations of various labels that have been placed in
       the \LaTeX \ files. List.~\ref{lst:refsec} shows the corresponding \
       LaTeX \ code.
```

Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

B9.1 A subsection

Referencing subsections: This section is Sec. B9.1, which shows how to refer to a subsection. List. B.13 shows the corresponding LaTeX code.

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem.

Listing B.13: Sample LaTeX code for referencing subsections

```
1  Referencing subsections: This section is Sec.~\ref{sec:subsec}, which
       shows how to refer to a subsection. List.~\ref{lst:refsub} shows the
       corresponding \LaTeX \ code.
```

Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

B9.1.1 A sub-subsection

Referencing sub-subsections: This section is Sec. B9.1.1, which shows how to refer to a sub-subsection. List. B.14 shows the corresponding LaTeX code.

Listing B.14: Sample LaTeX code for referencing sub-subsections

```
1  Referencing sub-subsections: This section is Sec.~\ref{sec:subsubsec},
      which shows how to refer to a sub-subsection. List.~\ref{lst:
      refsubsub} shows the corresponding \LaTeX \ code.
```

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

B10 Citing

Citing bibliography content is done using BibTeX. It requires the creation of a BibTeX file (.bib extension name), and then added in the argument of `\bibliography{ }`. For each .bib file, separate them by a comma in the argument of `\bibliography{ }` without the extension name. Building your BibTeX file (references.bib) can be done easily with a tool called JabRef (www.jabref.org).

The following subsections are examples of citations.

B10.1 Books

- ['Chicago', 1982]

- [Aristotle, 1877]

- [Aristotle, 1907]

- [Aristotle, 1968]

- [Aristotle, 1929]

- [ABCM, 1959]

- [Augustine, 1995]

- [Averroes, 1982]

- [Butcher, 1981]

- [Chapman, 1975]

- [Cicero, 1995]

- [Coleridge, 1983]

- [Cotton et al., 1999]

- [van Gennep, 1909a]

- [van Gennep, 1909b]

- [van Gennep, 1960]

- [Gerhardt, 2000]

- [Gonzalez, 2001]

- [Goossens et al., 1994]

- [Hammond, 1997]

- [Hershkovitz, 1962]

- [Hoel, 1971a]

- [Homer, 2004]

- [Knuth, 1981a]

- [Knuth, 1981b]

- [Knuth, 1973a]

- [Kullback, 1997a]

- [Kullback, 1997b]

- [Kullback, 1959]

- [Malinowski, 1972]

- [Maron, 2000]

- [Massa, 2004]

- [McColvin, 2004]

- [Nietzsche, 1988b]

- [Nietzsche, 1988a]

- [Oetiker et al., 2014]

- [Piccato, 2001]

- [Smart, 1976]

- [Vázques de Parga et al., 1993]

- [Wilde, 1899]

- [Wood, 1961]

- [Worman, 2002]

- [Wright, 1978a]

- [Lipcoll et al., 1977]

B10.2   Booklets

- [Knvth, 1988]

B10.3   Proceedings

- [Oz and Yannakakis, 1983]

B10.4   In books

- [von Brandt and Hoffmann, 1987]

- [BSI, 1973a]

- [Eckstein and Zuckermann, 1960]

- [Feigl, 1958]

- [Gordon, 1975]

- [Hanson, 1967]

- [Hoel, 1971b]

- [Hyman, 1981]

- [Kant, 1968a]

- [Kant, 1968b]

- [Knuth, 1973b]

- [Knuth, 1973c]

- [Lincoll, 1977a]

- [Lincoll, 2004]

- [Lincoll, 1977b]

- [McNeill, 1963]

- [Milton, 1924]

- [Nietzsche, 1988c]

- [Ogilvy, 1965]

- [Pines, 1979]

- [Ramsbottom, 1931]

- [Ranganthan, 1951]

- [Thomson, 1971]

- [Westfahl, 2004]

- [Wright, 1963]

- [Wright, 1978b]

B10.5 In proceedings

- [Chave, 1964]

- [Chomsky, 1973]

- [Moraux, 1979]

- [Oaho et al., 1983a]

- [Oaho et al., 2004]

- [Oaho et al., 1983b]

- [Salam, 1968]

B10.6 Journals

- [Aamport, 2004]

- [Aamport, 1986a]

- [Aamport, 1986b]

- [Aksın et al., 2006]

- [Angenendt, 2002]

- [Aslin, 1949]

- [Baez and Lauda, 2004a]

- [Bertram and Wentworth, 1996]

- [Bry and Afflerbach, 1968]

- [Doody, 1974]

- [Einstein, 1905]

- [Fletcher and Hopkins, 1907]

- [Gillies, 1933]

- [Glashow, 1961]

- [Godfrey, 1959]

- [Hanlon, 1972]

- [Heller and Lederis, 1958]

- [Herrmann et al., 2006]

- [Hostetler et al., 1998]

- [Howells, 1966a]

- [Howells, 1966b]

- [Howells, 1951]

- [ISO, 2009]

- [Jackson, 1979]

- [Johnson, 1974]

- [Moore, 1998]

- [Moore, 1965]

- [Prufer, 1964]

- [Reese, 1958]

- [Sarfraz and Razzak, 2002]

- [Shore, 1991]

- [Sigfridsson and Ryde, 1998]

- [Weinberg, 1967]

- [Yoon et al., 2006]

- [GAJ, 1986]

B10.7   Theses/dissertations

- [Croft, 1978]

- [Maguire, 1976]

- [Mann, 1968]

- [Masterly, 1988a]

- [Masterly, 1988b]

- [Phony-Baloney, 1988a]

- [Phony-Baloney, 1988b]

B10.8 Technical Reports and Others

- ['Brunswick', 1985]

- [BSI, 1983]

- [BSI, 1978]

- [BSI, 1976]

- [BSI, 1973b]

- [Ellis and Walton, 1971]

- [Térrific, 1988]

- [Terrific, 1988]

- [Winget Ltd., 1967]

- [Ünderwood et al., 2004]

- [Ünderwood et al., 1988]

- [Downes, 1974]

- [Exchequer, 1639]

- [Pym, 1624]

- [Traquair, 1638]

B10.9 Miscellaneous

- [Almendro et al., 1998]

- [Baez and Lauda, 2004b]

- [Chiu and Chow, 1978]

- [Itzhaki, 1996]

- [Kowalik and Isard, 1995]

- [Laufenberg et al., 2006]

- [Loh, 1992]

- [Markey, 2005]

- [Missilany, 1984]

- [Padhye et al., 1999]

- [Sorace et al., 1997]

- [Wassenberg and Sanders, 2010]

- [Missilany, 2004]

B11 Index

For key words or topics that are expected (or the user would like) to appear in the Index, use `index{key}`, where `key` is an example keyword to appear in the Index. For example, Fredholm integral and Fourier operator of the following paragraph are in the Index.

If we make a very large matrix with complex exponentials in the rows (i.e., cosine real parts and sine imaginary parts), and increase the resolution without bound, we approach the kernel of the Fredholm integral equation of the 2nd kind, namely the Fourier operator that defines the continuous Fourier transform.

List. B.15 is a program listing of the above-mentioned paragraph.

Listing B.15: Sample LaTeX code for Index usage

```
1  If we make a very large matrix with complex exponentials in the rows (i.e
      ., cosine real parts and sine imaginary parts), and increase the
      resolution without bound, we approach the kernel of the \index{
      Fredholm integral} Fredholm integral equation of the 2nd kind, namely
       the \index{Fourier} Fourier operator that defines the continuous
      Fourier transform.
```

B12 Adding Relevant PDF Pages

Examples of such PDF pages are Standards, Datasheets, Specification Sheets, Application Notes, etc. Selected PDF pages can be added (see List. B.16), but note that the options must be tweaked. See the manual of `pdfpages` for other options.

Listing B.16: Sample LaTeX code for including PDF pages

```
1  \includepdf[pages={8-10},%
2  offset=3.5mm -10mm,%
3  scale=0.73,%
4  frame,%
5  pagecommand={},]
6  {./reference/Xilinx2015-UltraScale-Architecture-Overview.pdf}
```

£ XILINX.

Virtex UltraScale FPGA Feature Summary

Table 6: **Virtex UltraScale FPGA Feature Summary**

	VU065	**VU080**	**VU095**	**VU125**	**VU160**	**VU190**	**VU440**
Logic Cells	626,640	780,000	940,800	1,253,280	1,621,200	1,879,920	4,432,680
CLB Flip-Flops	716,160	891,424	1,075,200	1,432,320	1,852,800	2,148,480	5,065,920
CLB LUTs	358,080	445,712	537,600	716,160	926,400	1,074,240	2,532,960
Maximum Distributed RAM (Mb)	4.8	3.9	4.8	9.7	12.7	14.5	28.7
Block RAM/FIFO w/ECC (36Kb each)	1,260	1,421	1,728	2,520	3,276	3,780	2,520
Total Block RAM (Mb)	44.3	50.0	60.8	88.6	115.2	132.9	88.6
CMT (1 MMCM, 2 PLLs)	10	16	16	20	30	30	30
I/O DLLs	40	64	64	80	120	120	120
Fractional PLLs	5	8	8	10	15	15	0
Maximum HP I/Os[1]	468	780	780	780	650	650	1,404
Maximum HR I/Os[2]	52	52	52	104	52	52	52
DSP Slices	600	672	768	1,200	1,560	1,800	2,880
System Monitor	1	1	1	2	3	3	3
PCIe Gen3 x8	2	4	4	4	5	6	6
150G Interlaken	3	6	6	6	8	9	0
100G Ethernet	3	4	4	6	9	9	3
GTH 16.3Gb/s Transceivers	20	32	32	40	52	60	48
GTY 30.5Gb/s Transceivers	20	32	32	40	52	60	0

Notes:
1. HP = High-performance I/O with support for I/O voltage from 1.0V to 1.8V.
2. HR = High-range I/O with support for I/O voltage from 1.2V to 3.3V.

82

Virtex UltraScale Device-Package Combinations and Maximum I/Os

Table 7: **Virtex UltraScale Device-Package Combinations and Maximum I/Os**

Package[1][2][3]	Package Dimensions (mm)	VU065 HR, HP GTH, GTY	VU080 HR, HP GTH, GTY	VU095 HR, HP GTH, GTY	VU125 HR, HP GTH, GTY	VU160 HR, HP GTH, GTY	VU190 HR, HP GTH, GTY	VU440 HR, HP GTH, GTY
FFVC1517	40x40	52, 468 20, 20	52, 468 20, 20	52, 468 20, 20				
FFVD1517	40x40		52, 286 32, 32	52, 286 32, 32				
FLVD1517	40x40				52, 286 40, 32			
FFVB1760	42.5x42.5		52, 650 32, 16	52, 650 32, 16				
FLVB1760	42.5x42.5				52, 650 36, 16			
FFVA2104	47.5x47.5		52, 780 28, 24	52, 780 28, 24				
FLVA2104	47.5x47.5				52, 780 28, 24			
FFVB2104	47.5x47.5		52, 650 32, 32	52, 650 32, 32				
FLVB2104	47.5x47.5				52, 650 40, 36			
FLGB2104	47.5x47.5					52, 650 40, 36	52, 650 40, 36	
FFVC2104	47.5x47.5			52, 364 32, 32				
FLVC2104	47.5x47.5				52, 364 40, 40			
FLGC2104	47.5x47.5					52, 364 52, 52	52, 364 52, 52	
FLGB2377	50x50							52, 1248 36, 0
FLGA2577	52.5x52.5						0, 448 60, 60	
FLGA2892	55x55							52, 1404 48, 0

Notes:

1. Go to Ordering Information for package designation details.
2. All packages have 1.0mm ball pitch.
3. Packages with the same last letter and number sequence, e.g., A2104, are footprint compatible with all other UltraScale architecture-based devices with the same sequence. The footprint compatible devices within this family are outlined. See the UltraScale Architecture Product Selection Guide for details on inter-family migration.

XILINX

Virtex UltraScale+ FPGA Feature Summary

Table 8: **Virtex UltraScale+ FPGA Feature Summary**

	VU3P	VU5P	VU7P	VU9P	VU11P	VU13P
Logic Cells	689,640	1,051,010	1,379,280	2,068,920	2,147,040	2,862,720
CLB Flip-Flops	788,160	1,201,154	1,576,320	2,364,480	2,453,760	3,271,680
CLB LUTs	394,080	600,577	788,160	1,182,240	1,226,880	1,635,840
Max. Distributed RAM (Mb)	12.0	18.3	24.1	36.1	34.8	46.4
Block RAM/FIFO w/ECC (36Kb each)	720	1,024	1,440	2,160	2,016	2,688
Block RAM (Mb)	25.3	36.0	50.6	75.9	70.9	94.5
UltraRAM Blocks	320	470	640	960	1,152	1,536
UltraRAM (Mb)	90.0	132.2	180.0	270.0	324.0	432.0
CMTs (1 MMCM and 2 PLLs)	10	20	20	30	12	16
Max. HP I/O[1]	520	832	832	832	624	832
DSP Slices	2,280	3,474	4,560	6,840	8,928	11,904
System Monitor	1	2	2	3	3	4
GTY Transceivers 32.75Gb/s	40	80	80	120	96	128
PCIe Gen3 x16 and Gen4 x8	2	4	4	6	3	4
150G Interlaken	3	4	6	9	9	12
100G Ethernet w/RS-FEC	3	4	6	9	6	8

Notes:
1.   HP = High-performance I/O with support for I/O voltage from 1.0V to 1.8V.

Virtex UltraScale+ Device-Package Combinations and Maximum I/Os

*Table 9:* **Virtex UltraScale+ Device-Package Combinations and Maximum I/Os**

| Package [1][2][3]	Package Dimensions (mm)	VU3P HP, GTY	VU5P HP, GTY	VU7P HP, GTY	VU9P HP, GTY	VU11P HP, GTY	VU13P HP, GTY
FFVC1517	40x40	520, 40					
FLVF1924	45x45					624, 64	
FLVA2104	47.5x47.5		832, 52	832, 52	832, 52		
FHVA2104	52.5x52.5[4]						832, 52
FLVB2104	47.5x47.5		702, 76	702, 76	702, 76	624, 76	
FHVB2104	52.5x52.5[4]						702, 76
FLVC2104	47.5x47.5		416, 80	416, 80	416, 104	416, 96	
FHVC2104	52.5x52.5[4]						416, 104
FLVA2577	52.5x52.5				448, 120	448, 96	448, 128

Notes:
1.   Go to Ordering Information for package designation details.
2.   All packages have 1.0mm ball pitch.
3.   Packages with the same last letter and number sequence, e.g., A2104, are footprint compatible with all other UltraScale devices with the same sequence. The footprint compatible devices within this family are outlined.
4.   These 52.5x52.5mm overhang packages have the same PCB ball footprint as the corresponding 47.5x47.5mm packages (i.e., the same last letter and number sequence) and are footprint compatible.
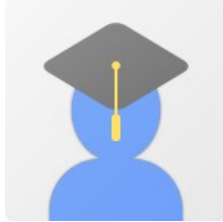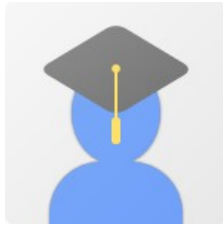
Appendix C
VITA
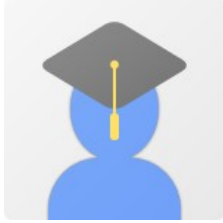
Benjamin R. Sanglitan wants to be the very best, that no one ever was. To catch them is my real test, to train them is my cause. I will travel across the land, searching far and wide. Teach Pokemon to understand the power inside.
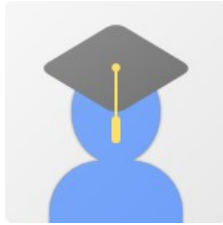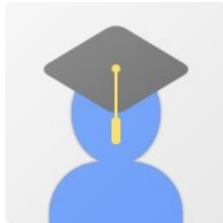
Blaze Perater wants to be the very best, that no one ever was. To catch them is my real test, to train them is my cause. I will travel across the land, searching far and wide. Teach Pokemon to understand the power inside.

Hashim Monir Ambia wants to be the very best, that no one ever was. To catch them is my real test, to train them is my cause. I will travel across the land, searching far and wide. Teach Pokemon to understand the power inside.

Abdul Ghaffar Tagolanao wants to be the very best, that no one ever was. To catch them is my real test, to train them is my cause. I will travel across the land, searching far and wide. Teach Pokemon to understand the power inside.

Glerry Paul Borja wants to be the very best, that no one ever was. To catch them is my real test, to train them is my cause. I will travel across the land, searching far and wide. Teach Pokemon to understand the power inside.