# [PROJECT TITLE]

A Dissertation Submitted

in Partial Fulfilment of the Requirements

for the Degree of

## MASTER OF SCIENCE

in

**[Department Name]**

*by*

**[Full Name]**
**(Roll No. [Roll No.])**

*to*

**SCHOOL OF [DEPARTMENT NAME]**
**INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH**
**THIRUVANANTHAPURAM - 695 551, INDIA**

*December 2022*

# DECLARATION

I, [**Full Name**] **(Roll No:** [**Roll Number**]**)**, hereby declare that, this report entitled **"**[**Project Title**]**"** submitted to Indian Institute of Science Education and Research Thiruvananthapuram towards the partial requirement of **Master of Science** in [**Department Name**], is an original work carried out by me under the supervision of [**Project Guide(s)**] and has not formed the basis for the award of any degree or diploma, in this or any other institution or university. I have sincerely tried to uphold academic ethics and honesty. Whenever a piece of external information or statement or result is used then, that has been duly acknowledged and cited.

Thiruvananthapuram - 695 551 [**Full Name**]

December 2022

## CERTIFICATE

This is to certify that the work contained in this project report entitled **"[Project Title]"** submitted by [**Full Name**] (**Roll No:** [**Roll Number**]) to Indian Institute of Science Education and Research, Thiruvananthapuram towards the partial requirement of [**Master of Science/ Doctor of Philosophy**] in [**Department Name**] has been carried out by [him/her/them] under my supervision and that it has not been submitted elsewhere for the award of any degree.

| | |
|---|---|
| Thiruvananthapuram - 695 551 | [Project Supervisor] |
| December 2022 | Project Supervisor |

ACKNOWLEDGEMENT

[*Sample:*] I thank everyone who helped me see this project through to completion. I would like to first express my profound gratitude and deep regard to [Project Guide(s)], IISER Thiruvananthapuram and sincerely wish to acknowledge [his/her/their] vision, guidance, valuable feedback and constant support throughout the duration of this project.

I am indebted to [Insert Names] for their steadfast encouragement and time. I am lastly grateful to the Indian Institute of Science Education and Research Thiruvananthapuram for providing the necessary resources and facilities to complete this project to the best of my ability.

Thiruvananthapuram - 695 551 [**Full Name**]

December 2022

# ABSTRACT

Name of the student: [**Full Name**] Roll No: [**Roll No.**]

Degree for which submitted: [**M.Sc./Ph.D.**] Department: **School of** [**Dept.**]

Thesis title: [**Project Title**]

Thesis supervisor: [**Project Supervisor**]

Date of thesis submission: **December 2022**

The main aim of the project ........

**Keywords:**

[Insert Keywords]

# Contents

# List of Figures

# List of Tables

# Notations and Abbreviations

No notation is used in this document. No abbreviations have been used either.

# Chapter 1

# Introduction

Introductory lines...

## 1.1 Section-1 Name

Some text here ...

**Definition 1.1.1.** Some definition....

**Theorem 1.1.2.** *Some theorem.......*

*Proof.* Proof is as follows.... $\square$

**Corollary 1.1.3.** *A corollary to the theorem is....*

*Remark* 1.1.4. Some remark.......

Equations can be typed as follows:

$$f(x) = \frac{x^2 - 5x + 6}{e^x - 2} = \frac{(x-2)(x-3)}{e^x - 2} \tag{1.1}$$

All elements can be referred to after assigning them a label. Labels follow the format `\label`{labelname}, whereas standard referral commands include `\eqref`{labelname} for equations like the one above (1.1) and `\ref`{labelname} for objects apart from equations, such as the theorem previously mentioned (Theorem 1.1.2). Use the tilde sign (∼) to create non-breakable spaces.

In the case of aligning a stack of equations, you may proceed as given below.

$$\text{Array in Math Mode} \qquad \left\{ \begin{array}{rcll} -\Delta u + \lambda u & = & |u|^{p-2}, & \text{in } \Omega \\ u & \geq & 0, & u \in H_0^1(\Omega) \end{array} \right. \tag{1.2}$$

Using `array` in math mode or `eqnarray` is a quick and easy way to get the most customisable equation output but is outdated and prone to errors, especially for longer equations. Use of alternate multiline equation environments like `multiline`(*), `align`(*), `gather`(*) or `split` in any math-mode environment is recommended.

$$g(\theta) = i\theta \qquad = (i\theta) * \ln e \tag{1.3}$$

$$= \ln(e^{i\theta}) \qquad = \ln(\cos\theta + i \sin\theta) \tag{1.4}$$

## 1.2 Section-2 Name

This is how matrices in LaTeX look:

$$\begin{aligned}\begin{pmatrix}\sin\theta & \cos\theta \\ -\cos\theta & \sin\theta\end{pmatrix}\times\begin{pmatrix}\sin\theta & \cos\theta \\ -\cos\theta & \sin\theta\end{pmatrix} &= \begin{pmatrix}\sin^2\theta-\cos^2\theta & 2\cos\theta\sin\theta \\ -2\cos\theta\sin\theta & -\cos^2\theta+\sin^2\theta\end{pmatrix} \\ &= \begin{pmatrix}-\cos 2\theta & \sin 2\theta \\ -\sin 2\theta & -\cos 2\theta\end{pmatrix}\end{aligned}$$

The brackets of a given matrix depend on the type of matrix called.

Similarly, here is a quick truth table:

| $P$ | $Q$ | $\neg P$ | $\neg P \to (P \vee Q)$ |
|---|---|---|---|
| T | T | F | T |
| T | F | F | T |
| F | T | T | T |
| F | F | T | F |

*Remark* 1.2.1. Defining a table as such does not count in the LoT; use the `tabular` environment within a `table` or other variants instead.

*Remark* 1.2.2. You can cite sources in the footer as so[1]. Citations are read from the `ref.bib` file and are displayed at the end. As utilizing the **verbose** style for the biblatex package makes calling regular cites via `\cite`{*source_name*} impractical, it must be disabled before switching to using regular in-line citations (displayed as [#]).

[1] G.H. Golub and C.F. Van Loan. *Matrix Computations*. Second Edition. The John Hopkins University Press, 1989, pp. xiii+283.

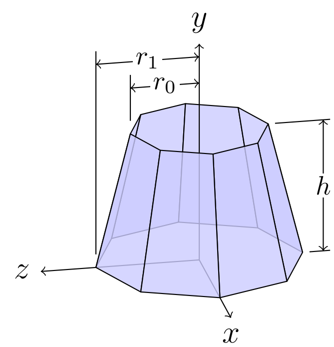


Figure 1.1: 3D Cone designed by Gene R. using TikZ package,
see `Images/Figures/3D_Cone.tex` for code

## 1.2.1 This is a Subsection

### This is a Subsubsection

Subsubsections do not appear in the ToC and lack numbering[2].

**Theorem 1.2.3.** *Some theorem.......*

*Proof.* The proof is as follows... □

*Remark* 1.2.4. Though the figure is called for after Theorem 1.2.3 in the TeX script, the figure appears above it. This is because `\begin{figure}[`*parameter*`]` takes a float specifier/position parameter with default values `tbp`, meaning the position priority order is top, bottom, then next page.

[2]Regular footnotes work as well. Quickly reference a simple fact in minimal lines.

## 1.3 Sample Question and Proof

Suppose $A_i$ is a connected subset of a topological space $X$ for $i = 1, \ldots, n$, and $A_i \cap A_{i+1} \neq \phi \quad \forall i \in \{1, 2, \ldots, n-1\}$. Prove that $A = \cup_{i=1}^{n} A_i$ is connected.

*Proof.* Assume $A = \cup_{i=1}^{n} A_i$ is actually disconnected,
$\implies \therefore A$ can be represented as the union of (at least) two disjoint, non-empty, relatively open subsets of $A$, of which let us consider any two **connected** subsets $X$ and $Y$. Now, upon taking any element $x \in X$, as well as $y \in Y$, we can say that $x \in A_j$ and $y \in A_k$ for some $j, k \in 1, 2, \ldots, n-1$. Without loss of generality, let $j \leq k$. Now see that

$$\because A_l \cap A_{l+1} \neq \phi \quad \forall l \in \{1, 2, \ldots, n-1\}$$

$$\Rightarrow \cup_{i=j}^{l} A_i \cap A_{l+1} \neq \phi \quad \forall l \in \{j, j+1, \ldots, k-1\} \tag{1.5}$$

$$\Rightarrow \cup_{i=j}^{l} A_i \text{ is a connected subset of } X \quad \forall l \in \{j, j+1, \ldots, k\} \tag{1.6}$$

Hence, consider the union $\cup_{i=j}^{k} A_i$ which now contains both $x$ and $y$ and is connected throughout (as each $A_i$ is a connected subset and (1.3)) which is hence a **contradiction** as $X$ and $Y$ are supposed to be disjoint. **Therefore,** $A = \cup_{i=1}^{n} A_i$ is in fact **connected.** □

*Remark* 1.3.1. You may have slight spacing issues within your equations (particularly with the $\exists$ sign), in which case you can use blank characters such as `\.`, `\,` and `\!` for a quick fix. Larger spaces can be called with `\quad` or `\qquad`.

# Appendices

# Appendix A

# Long Appendix Title Here

Write your Appendix content here. Sections and subsections can be used as well.

## A.1 First Appendix Section

### A.1.1 First Appendix Subsection

#### First Appendix Subsubsection

Appendices will show up in the ToC numbered as letters. This is of course totally customizable, please refer to the CTAN documentation (https://ctan.org/pkg/appendix?lang=en) for further clarity on the same.

# Bibliography


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