

[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**

February 2024

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]

February 2024

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]

February 2024

Project Supervisor

ACKNOWLEDGEMENT

[*Sample:*] I thank everyone who has assisted me in seeing this project through to its completion. I would like to first express my profound gratitude and deepest regards 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**]

February 2024

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: **February 2024**

The main aim of the project

Keywords:

[Insert Keywords]

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List of Figures

1.1 3D Cone designed by Gene R. using TikZ package, see `Images/Figures/3D_Cone.tex`
for code 4

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....

□

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

Remark 1.1.4. Some remark.....

Equations can be typed as follows:

$$f(x) = \frac{x^2 - 5x + 6}{(e^x - 2)/10} = 10 \frac{(x - 2)(x - 3)}{e^x - 2} \quad (1.1)$$

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

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

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

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.

$$g(\theta) = i\theta \quad = (i\theta) * \ln e \quad (1.3)$$

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

1.2 Section-2 Name

This is how matrices in L^AT_EX 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	$\neg P$	$\neg P \rightarrow (P \vee Q)$
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 so¹. 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 `[#]`).

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

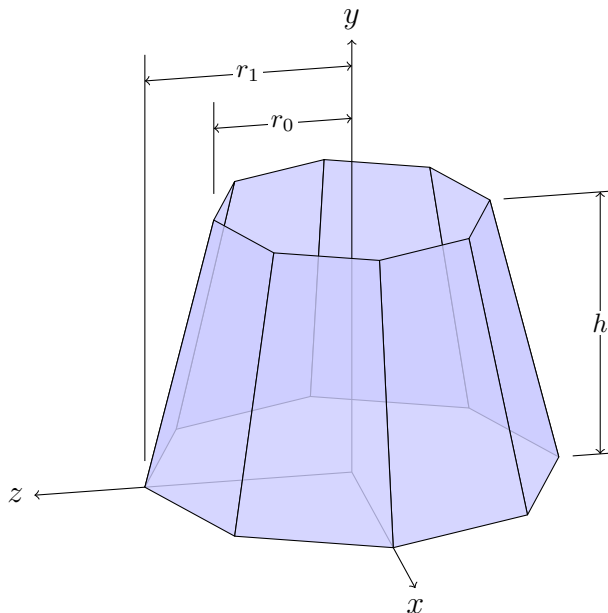


Figure 1.1: 3D Cone designed by Gene R. using TikZ package, see Images/Figures/3D_Cone.tex for code

1.2.1 This is a Subsection

This is a Subsubsection

Subsubsections do not appear in the ToC and lack numbering². Similar to skipping equation numbering, you can skip section numbering (as well as with subsections) and remove mentions from the ToC using `\section*{section_name}`.

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

Proof. The proof is as follows...

□

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

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.

1.3 Sample Question and Proof

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

Proof by Contradiction. Assume $A = \cup_{i=1}^n A_i$ is instead 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 $j, k \in 1, 2, \dots, n-1$. Without loss of generality, let $j \leq k$. Now see that

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

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

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

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.

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