University of Illinois Chicago

A Sample Thesis in Mathematics

by

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for the degree of Doctor of Philosophy

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CHAPTER 1

Introduction

This is the introduction chapter. We cite some classic works [**1, 2**].

THEOREM 1.1. *This is a theorem*

We reference Theorem 1.1.
University of Illinois Chicago.

1. Motivation

1.1. Historical context. A brief overview of how the problem developed.

$$\int_0^1 f(x)dx = 2 \tag{1}$$

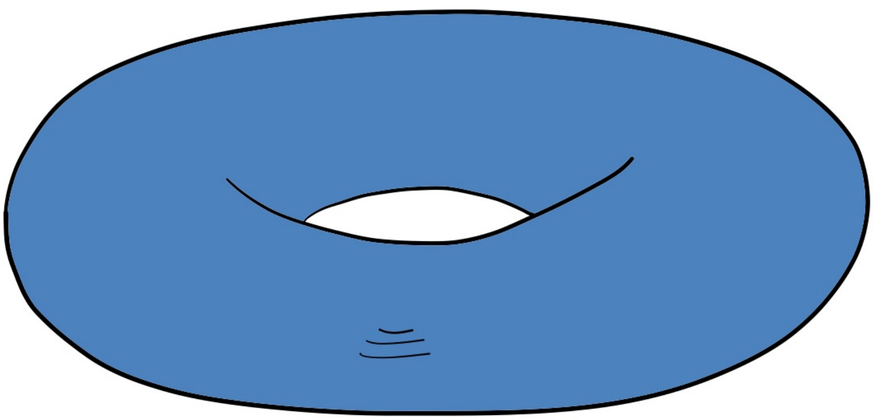

FIGURE 1. This is a torus

$$\begin{tikzcd}
 & 0 \arrow[d] & 0 \arrow[d] & 0 \arrow[d] & \\
0 \arrow[r] & A' \arrow[r, "f'"] \arrow[d, "a"] & B' \arrow[r, "g'"] \arrow[d, "b"] & C' \arrow[r] \arrow[d, "c"] & 0 \\
0 \arrow[r] & A \arrow[r, "f"] \arrow[d, "a''"] & B \arrow[r, "g"] \arrow[d, "b''"] & C \arrow[r] \arrow[d, "c''"] & 0 \\
0 \arrow[r] & A'' \arrow[r, "f''"] \arrow[d] & B'' \arrow[r, "g''"] \arrow[d] & C'' \arrow[r] \arrow[d] & 0 \\
 & 0 & 0 & 0 &
\end{tikzcd}$$

FIGURE 2. The Snake Lemma

How to solve (1)

1.2. Open questions. Some questions remain open for future work.

2. Outline of the thesis

We summarize the structure of the thesis.

CHAPTER 2

Background

This chapter gives necessary background.

1. Group theory

DEFINITION 2.1. A group is a set G with a binary operation satisfying closure, associativity, identity, and inverses.

THEOREM 2.2. *Every finite subgroup of the multiplicative group of a field is cyclic.*

PROOF. This is a standard result from algebra. $\square$

CHAPTER 3

Main Results

Here we present the main contributions of the thesis.

1. A computer simulation

```
def factorial(n):
    """Compute the factorial of n recursively."""
    if n == 0:
        return 1
    else:
        return n * factorial(n - 1)

print(f"5! = {factorial(5)}")
```

2. Second main result

Another significant theorem.

APPENDIX A

Technical Lemmas

Here we collect some supporting lemmas.

Bibliography

[1] R. Hartshorne, *Algebraic Geometry*, Springer-Verlag, New York, 1977.
[2] D. Mumford, *Abelian Varieties*, Oxford University Press, 1970.
[3] J. Draisma, E. Horobet, G. Ottaviani, B. Sturmfels, and R. R. Thomas, "The Euclidean distance degree of an algebraic variety," *arXiv:1309.0049* (2013). Available at: https://arxiv.org/abs/1309.0049