

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].

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Sed porttitor urna ac ipsum rhoncus, vel dictum risus commodo. Integer ultrices dui sit amet pulvinar tempor. Phasellus nec tellus eu turpis sodales accumsan. Proin ultr

THEOREM 1.1. *This is a theorem*

We reference Theorem 1.1.

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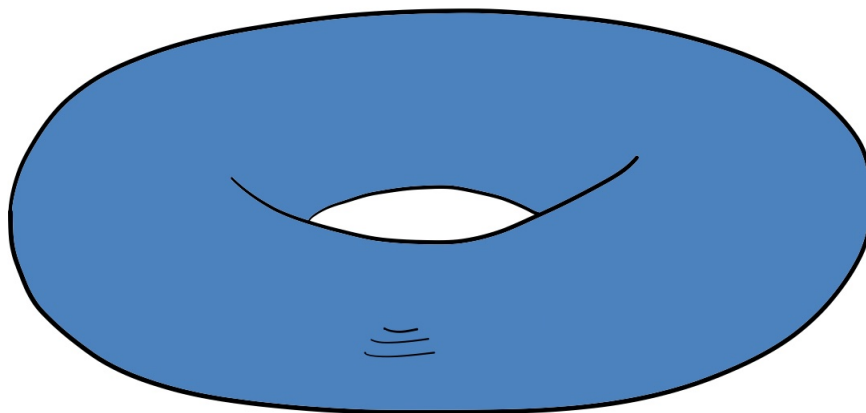


FIGURE 1. This is a torus

$$\begin{array}{ccccccc}
& 0 & & 0 & & 0 & \\
& \downarrow & & \downarrow & & \downarrow & \\
0 & \longrightarrow & A' & \xrightarrow{f'} & B' & \xrightarrow{g'} & C' \longrightarrow 0 \\
& & \downarrow a & & \downarrow b & & \downarrow c \\
0 & \longrightarrow & A & \xrightarrow{f} & B & \xrightarrow{g} & C \longrightarrow 0 \\
& & \downarrow a'' & & \downarrow b'' & & \downarrow c'' \\
0 & \longrightarrow & A'' & \xrightarrow{f''} & B'' & \xrightarrow{g''} & C'' \longrightarrow 0 \\
& & \downarrow & & \downarrow & & \downarrow \\
& & 0 & & 0 & & 0
\end{array}$$

FIGURE 2. The Snake Lemma

## 1. Motivation

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

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

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.

□

## 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>