

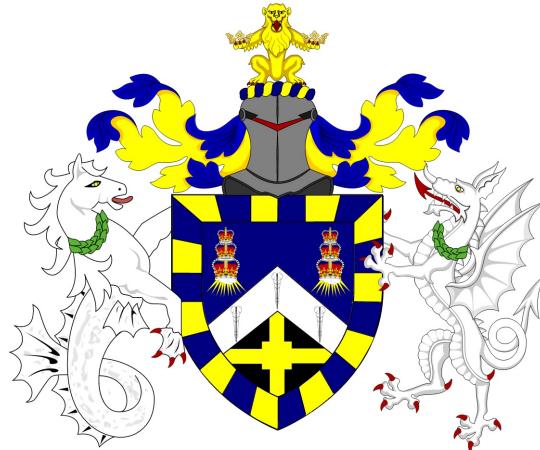
Financial Mathematics MSc Dissertation MTHM038, 2025/27

# **Title of the Thesis**

With special emphasis on examples

**Matthew Walmsley, ID 251012939**

Supervisor: Prof. ABC XYZ



A thesis presented for the degree of  
Master of Science in Financial Mathematics

School of Mathematical Sciences  
and School of Economics and Finance  
Queen Mary University of London

# Declaration of original work

This declaration is made on January 30, 2026.

**Student's Declaration:** I Matthew Walmsley hereby declare that the work in this thesis is my original work. I have not copied from any other students' work, work of mine submitted elsewhere, or from any other sources except where due reference or acknowledgement is made explicitly in the text. Furthermore, no part of this dissertation has been written for me by another person, by generative artificial intelligence (AI), or by AI-assisted technologies.

Referenced text has been flagged by:

1. Using italic fonts, **and**
2. using quotation marks “...”, **and**
3. explicitly mentioning the source in the text.

This work is dedicated to ABC XYZ

# Acknowledgements

Example text

# Abstract

Example text

# Contents

<b>1</b>	<b>Introduction</b>	<b>6</b>
1.1	Motivation for this work . . . . .	6
1.1.1	The problem of exponential extensions . . . . .	7
1.1.2	The approach of Junderstein . . . . .	7
<b>2</b>	<b>Eulerian topological string motives</b>	<b>8</b>
2.1	Definitions . . . . .	8
2.1.1	Tate's theorem . . . . .	8
2.1.2	Grothendieck topologies . . . . .	8
2.2	Calculation of the invariant cycles . . . . .	9
2.2.1	Fontaine's theorem . . . . .	9
<b>3</b>	<b>Conclusions</b>	<b>10</b>
<b>A</b>	<b>Implementation of the BarrierOptionCVA class</b>	<b>11</b>
<b>B</b>	<b>Shorter running title</b>	<b>12</b>

# Chapter 1

## Introduction

This note presents a conjecture stemming from our investigations in the generation of sigmoid tensor categories of Picard numbers of tori in Banach algebras. Example text

### 1.1 Motivation for this work

In the works of Petri ([P99, Theorem 2.3]) we find the following statement

**Theorem 1.1.1** ([P99, Theorem 2.3], see also [BS, pg. 45]). *The Gramm matrix for  $E_8$  is:*

$$\begin{pmatrix} 2 & -1 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 2 & -1 & 0 & 0 & 0 & 0 & 0 \\ 0 & -1 & 2 & -1 & 0 & 0 & 0 & -1 \\ 0 & 0 & -1 & 2 & -1 & 0 & 0 & 0 \\ 0 & 0 & 0 & -1 & 2 & -1 & 0 & 0 \\ 0 & 0 & 0 & 0 & -1 & 2 & -1 & 0 \\ 0 & 0 & 0 & 0 & 0 & -1 & 2 & 0 \\ 0 & 0 & -1 & 0 & 0 & 0 & 0 & 2 \end{pmatrix}.$$

### **1.1.1 The problem of exponential extensions**

Example text

### **1.1.2 The approach of Junderstein**

Example text

# Chapter 2

## Eulerian topological string motives

Example text

### 2.1 Definitions

Example text

#### 2.1.1 Tate's theorem

Preliminary considerations Example text

Motivic financial algebroids Example text

#### 2.1.2 Grothendieck topologies

Example text

## 2.2 Calculation of the invariant cycles

Example text

### 2.2.1 Fontaine's theorem

Example text

# Chapter 3

## Conclusions

Example text

# **Appendix A**

## **Implementation of the BarrierOptionCVA class**

Example text

## **Appendix B**

### **Additional details on the Gundermanian determinant**

Example text

# Bibliography

- [P99] William Petri, *Analysis of infinitely generated frog complexes*, Rendicoti Ranæ Analysorum, 234 (4), 34–21, 2015
- [Ross] Sheldon Ross, *An Elementary Introduction to Mathematical Finance*, 3rd Edition, Cambridge University Press, 2011
- [Hull] John C. Hull, *Options, Futures, and Other Derivatives*, 8th Edition, Pearson Education, 2011
- [BS] Fischer Black and Myron Scholes, *The Pricing of Options and Corporate Liabilities*, Journal of Political Economy 81 3, 637–654, (1973)