

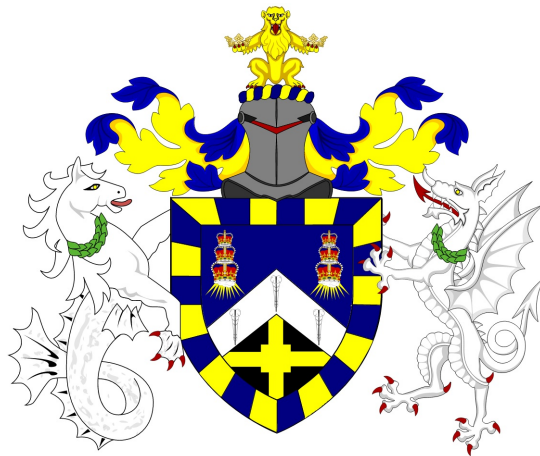
Financial Mathematics MSc Dissertation MTHM038, 2025/27

Tittle of the Thesis

With special emphasis on examples

Matthew Walmsley, ID 251012939

Supervisor: Dr Linqi Wang



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 February 9, 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

1	Introduction	6
1.1	Motivation for this work	6
1.1.1	The problem of exponential extensions	7
1.1.2	The approach of Junderstein	7
2	Eulerian topological string motives	8
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
3	Conclusions	10
A	Implementation of the BarrierOptionCVA class	11
B	Shorter running title	12

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 ([2, Theorem 2.3]) we find the following statement

Theorem 1.1.1 ([2, Theorem 2.3], see also [1, 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

- [1] Fischer Black and Myron Scholes. The pricing of options and corporate liabilities. *Journal of Political Economy*, 81(3):637–654, 1973.
- [2] William Petri. Analysis of infinitely generated frog complexes. *Rendicoti Ranæ Analysorum*, 234(4):34–21, 2015.