Mentor: Professor Leslie Cheng

Before conducting my research in financial mathematics, I will first obtain the necessary background. I will read J. Robert Buchanan's textbook *An Undergraduate Introduction to Financial Mathematics*. The book is a guide to understanding the basics of option pricing and hedging. I am also learning to use LaTex, the document mark-up language that I will use to write up my research findings.

To begin, I am studying primary aspects of financial math, which the textbook encompasses in topics such as the theory of interest, discrete probability, and normal random variables. After gaining sufficient background knowledge on these topics, I will further study the fundamental theorem of finance, or the Arbitrage Theorem. Following the introduction of this theorem, the textbook is based on the premise that financial transactions are carried out in an arbitrage-free setting. This is to say that in the financial market, one cannot make risk-free profits.

Throughout the course of my research, I hope to familiarize myself with the study of stock markets, derivative pricing, and hedging. To that end, the textbook provides material on Random Walks and Brownian Motion, the Black-Scholes Equation, General Principles of Hedging, and some sample Stock Market Data on which the these principles and analytic techniques can be applied.

Further on in my research, I will be able to choose a specific topic in financial mathematics to focus on. To prepare for more in-depth study of the material in the textbook, I am working on the exercises provided by the author. The exercises are helpful in understanding how the principles and techniques explained in the text are applied, and practicing them. I am working with techniques in calculus, linear programming, probability and statistics and their applications in the financial market. With these techniques and applications, I will learn how mathematical models associated with financial economics are developed and treated.