

MTH6120 Further Topics in Mathematical Finance

Key objectives

To prepare for a successful exam you should go through the *lecture notes* and the solution sheets of *all exercises*. For an optimum result, you should know all of the following:

Brownian motion and geometric Brownian motion, characteristic function of Gaussian random variables, probability integral Φ , interest rates, present value analysis, varying interest rates, European and American options, call and put options, definition of arbitrage, return functions, arbitrage theorem, risk-neutral geometric Brownian motion, Black-Scholes option pricing formula, indicator function, partial derivatives of option cost, option cost if dividend is paid continuously or at a fixed time, estimating the volatility parameter from historical data, convexity properties of call option prices, definition of share price index, option portfolio property, put-call option parity formula, Poisson process as a model for share price jumps, modification of Black-Scholes theory for log-normally distributed jump factors, expectation of observables for Poisson and other distributions, possible non-uniqueness of arbitrage pricing (3-state model), utility functions and maximizing the expected utility, favorable gambles, portfolios and portfolio selection problem, definition of rate of return, definition of correlation coefficient and estimation from data, general properties of covariance, capital asset pricing model (CAPM), optimization models, Knapsack problem, exotic options.