Abstract

We develop the essential tools needed to handle Markov processes and study Markov processes closely with some applications. We then study the basic properties of Brownian motion and we look into the detail at the construction of Stochastic integral with respect to Brownian motion. We use this construction to prove the Ito formula and then we develop the theory of stochastic differential equations. Finally we develop the necessary tools to rigorously prove the Black-Scholes option pricing formula and we solve this formula for the European call option.