

MTH 9831 Assignment 3 (09/16 - 09/23).

Read Lecture 3. Some additional references for this material are:

1. S. Shreve, Stochastic Calculus for Finance II, Sections 4.2, 4.3.
 2. A. Etheridge, A Course in Financial Calculus, Section 4.2.
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- (1) (Imitation of the technique which precedes the exercise) Exercise 1 from Lecture 3.
 - (2) (The difference between Ito and Stratonovich integrals) Exercise 3 from Lecture 3.
 - (3) (Stochastic integral of an elementary process is a martingale) Exercise 4 from Lecture 3.
 - (4) (General education problem) Let $(B(t))_{t \geq 0}$ be a standard Brownian motion. Show that $E((B(t))^{2n}) = t^n(2n-1)!!$. Steps: (a) **use scaling** to reduce the problem to computing $E(Z^{2n})$, where Z is a standard normal; (b) use integration by parts and induction (or any other elementary method you like) to get the answer.
 - (5) Exercise 4.2 from the textbook.
 - (6) Exercise 4.3 from the textbook.
 - (7) (Review of Brownian motion and basic calculus) Use properties of Brownian motion to find the expectation and variance of $\int_0^t B^2(s) ds$. Hint: write the square of the integral as a double integral and only then take the expectation.