Lab Assignment - 10

Instructor: Dr. Arabin Kumar Dey

1 Due date:

- 3/3/2013.

2 Notes:

- Make a proper documentation preferably in latex or using some other software and submit the printout of the report in .pdf form.

- Each student needs to write his/ her own solutions, even though discussions of the assignments between students are encouraged.

3 Assignments:

a financial asset. The process $\{S(t)\}$ is a GBM with drift parameter μ, volatility parameter σ, and initial value $S(0)$ if

$$S(t) = S(0) \exp([\mu - \frac{\sigma^2}{2}]t + \sigma W(t)).$$

where $\{W(t)\}$ is a standard BM. As with the case of a BM, we have a simple recursive procedure to simulate a GBM at $0 = t_0 < t_1 < \cdots t_n$ as

$$S(t_{i+1}) = S(t_i) \exp([\mu - \frac{\sigma^2}{2}](t_{i+1} - t_i) + \sigma\sqrt{t_{i+1} - t_i}Z_{i+1})$$

where $Z_1, Z_2, \cdots, Z_n$ are independent $N(0,1)$ variates. In the interval $[0,5]$, taking both positive and negative values for μ and for at least two different values of σ^2, simulate and plot at least 10 sample paths of the GBM (taking sufficiently large number of sample points for each path). Also, by generating a large number of sample paths, compare the actual and simulated distributions of $S(5)$. Calculate expectation and variance of $S(5)$ and match it with the theoretical values.