

Mathematical Methods in Financial Engineering

Midterm

10 January 2013

Your boss has asked you to evaluate by simulation a 2-year at-the-money arithmetic Asian option on the Nifty expiring on 3 January 2015. The option has monthly averaging. Assume a dividend yield of 1% and an implied volatility of 25%.

1. Value the option with a 95% confidence level of ± 1 rupee.
2. Estimate delta with 95% confidence interval, using
 - a. finite differences (resimulation)
 - b. finite differences (common random variables)
 - c. pathwise derivative
 - d. likelihood ratio.
3. Estimate gamma by finite differences.

In each case, you should use an appropriate control variable. For questions 2 and 3, use 250,000 repetitions.

In the first 30 minutes, you will need to answer (in writing) a question on your methodology. During the remainder of the class, you will present your results and answer questions.