Stochastic Methods + Lab

Session 8

September 27, 2016

1. Implement a function

   ```
   binomial_tree (payoff, n, u, d, rp, S0)
   ```

   where `payoff` is the function returning the payoff of the option given the current stock price at maturity, `n` is the number of periods to simulate, `u` the relative upward change in stock price in one period, `d` the relative downward change in stock price in one period, `rp` the risk-free period interest rate, and `S0` the initial stock price.

2. Test your code by pricing a European call option with strike price $K = 0.9$, risk-free interest rate $r = 0.05$, and maturity time $T = 1$ on a stock with initial stock price $S_0 = 1$ and annualized volatility $\sigma = 0.3$.

   Use the calibration of the model explained in class, where

   $$u = \frac{1}{d} = \exp\left(\sigma\sqrt{\frac{T}{n}}\right).$$