STATS 237/237P Project

Due Date: Thursday, Aug 17, 2017

- If you are interested in another question, you can work on your own project but please send me an email to describe your problem.
- You may team up with the others to form a group of no more than 3 members to work on the project.

Price an Asian call option with payoff $(\bar{S} - K)_+$, with the mean $\bar{S} = \sum_{i=1}^{n} S_{i\Delta t}/n$ computed over n dates spaced $\Delta t = T/n$ time units apart. Assume

$$dS_t = rS_t dt + \sqrt{V_t} S_t dW_t^{(1)}$$
$$dV_t = \xi V_t dW_t^{(2)},$$

where $W_t^{(1)}$ and $W_t^{(2)}$ are standard Brownian motions with $E[dW_t^{(1)} dW_t^{(2)}] = \rho$. Take $r = 0.05$, $S_0 = 50$, $T = 1$, $K = 50$, $\sqrt{V_0} = 0.3$, $\rho = 0.5$ and $n = 32$.

(a) Apply Euler Scheme to estimate $e^{-rT} E[(\bar{S} - K)_+]$ for $\xi = 0$ and $\xi = 2$. Give a 95% confidence interval for your estimates.

(b) Explain, by results, how you can improve your estimates in part (a).

(c) Try the method in "Asymptotically optimal importance sampling and stratification for pricing path-dependent options" by Glasserman, Heidelberger, Shahabuddin, Mathematical Finance, 9 (2), 117-152, 1999 (See Section 5.2). Compare with your estimates in part (b).