Lecture 9 Homework:

(due by Lecture 10 in Chalk FINM331 Assignments submenu)

• You must show your work, code and/or worksheet for full credit.
• Justifying each non-trivial step with a reason is part of showing your work.
• There are 10 or more points per question if correct and best answer.
• Report numerical values in at least 4 significant digits (e.g., for errors use format like \( \%8.3e \)).

1. (30 points) Bayesian Estimation with MCMC for the Merton Jump-Diffusion Model Generalized to Multivariate Assets with a Common Jump Counting Process:

Use the Bayesian MCMC Method of Subsect. 9.10.2, L9-pp. 34-46 to estimate the jump-diffusion parameters for two (2) related assets, one an index and the other a stock on the index over three (3) trading years such as 2007-2009. Produce a table like the Table 1 of Johannes and Polson (2003) of prior and posterior parameter means and standard deviations. Use a 95% credible interval as mean ± 1.96*std. Use about 500 iterations for the Gibbs sampler, discarding the first 150 as burn-in, but this is only for keeping the problem effort reasonable. Use reasonable guestimates for the prior parameter and start out with a \( \Lambda \approx 0.05 \) to ensure a 0-1 jump law. (Note that Johannes and Polson (2003) use \( \lambda \) for the common Poisson average jump count in place of the \( \Lambda \) properly used in class, so they do not mean the jump rate.)