STAT 206 Lab 9 – Due Monday, November 28, 2016, 11:59 PM

General instructions for labs: You are encouraged to work in pairs to complete the lab. Labs must be completed as an R Markdown file. Be sure to include your lab partner (if you have one) and your own name in the file. Give the commands to answer each question in its own code block, which will also produce plots that will be automatically embedded in the output file. Each answer must be supported by written statements as well as any code used.

Agenda: Determine the full conditional distributions and simulate a Gibbs sampler

Gibbs Sampler

Suppose (Y_1, Y_2) are normally distributed with mean $\mu = (0, 0)$ and covariance matrix

$$\Sigma = \begin{pmatrix} 1 & \rho \\ \rho & 1 \end{pmatrix}.$$

1. Find the full conditional distributions of $Y_1|Y_2$ and $Y_2|Y_1$.
2. Write a Gibbs sampler using the full conditional distributions.
3. Generate 10000 draws from the bivariate normal distribution with $\rho = .7$.
4. Plot estimates of the marginal distributions of Y_1 and Y_2 using the 10000 MCMC draws along with the true distribution. Comment on your findings.
5. Estimate the Effective Sample Size for estimating $E(Y_1)$ and $E(Y_2)$. Comment on your findings.
6. Comment on the mixing properties for your Gibbs sampler. Include at least one plot in support of your comments.