Lab 7

STA-360/602, Spring 2018

March 8, 2018

1 Agenda

In this lab, we will deriving conditional distributions, code a Gibbs sampler, and analyze the output of the Gibbs sampler.

Consider the following Exponential model for observation(s) $\mathbf{x} = (\mathbf{x_1}, \ldots, \mathbf{x_n})$.[1]:

$$p(x|a, b) = ab \exp(-abx) I(x > 0),$$

where the x_i are assumed to be iid for $i = 1, \ldots n$. and suppose the prior is

$$p(a, b) = \exp(-a - b) I(a, b > 0).$$

You want to sample from the posterior $p(a, b|x_{1:n})$. You may assume that $a = 0.25, b = 0.25$.

1. Find the conditional distributions needed for implementing a Gibbs sampler.

2. Code up your own Gibbs sampler using part (a).

3. (5 pts) Plot a histogram or a density estimate of the estimated posterior using (b).

4. (10 pts) How do you know that your estimated posterior in (c) is reliable? Provide convergence diagnostic plots and commentary.

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[1]Please note that in the attached data there are 40 observations, which can be found in data-exponential.csv.