Computational Statistics Homework 3

Liam Dillingham

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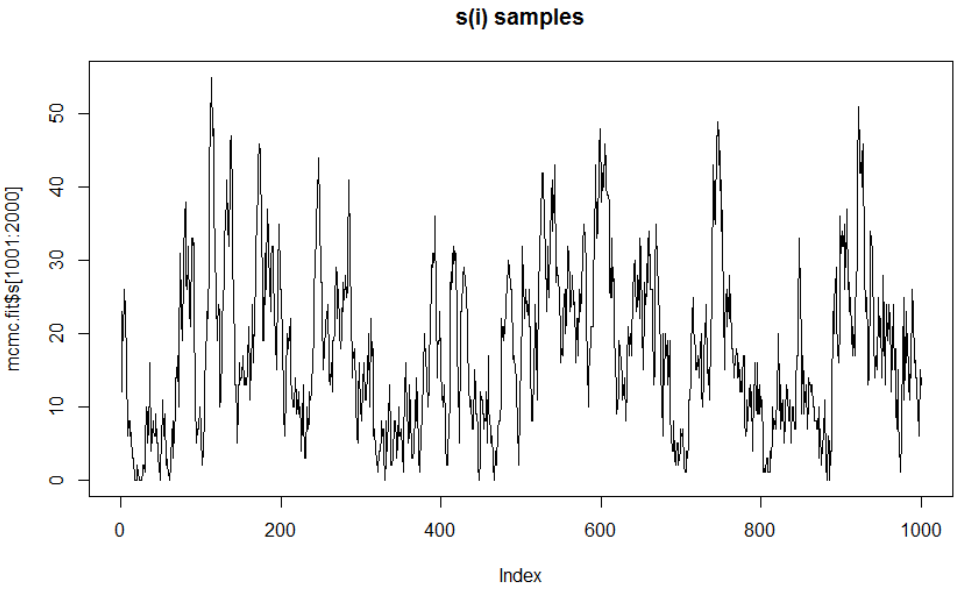
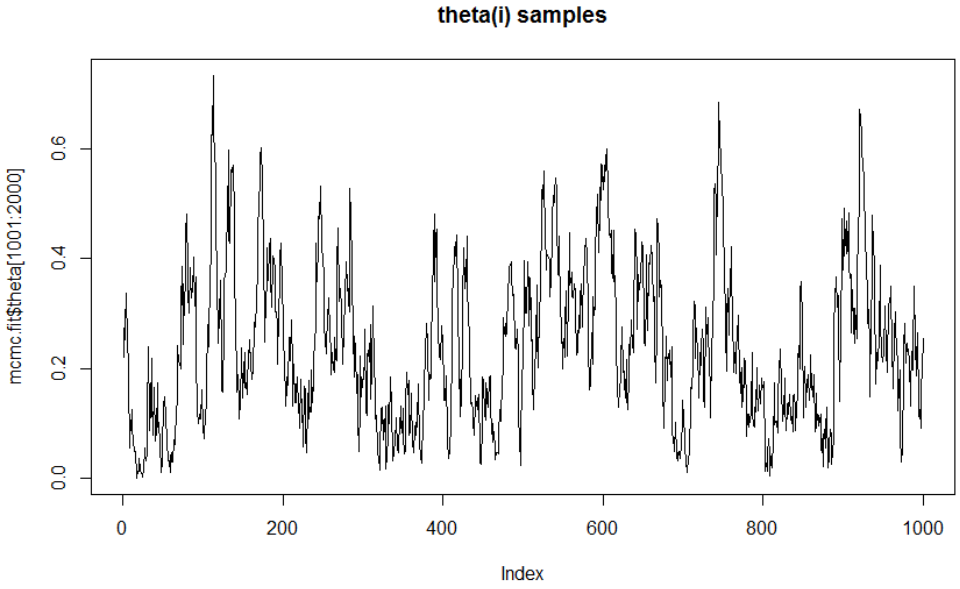
1 Question 1

Implement the Gibbs sampler from the assignment sheet for generating bivariate samples from the join density (s, θ).

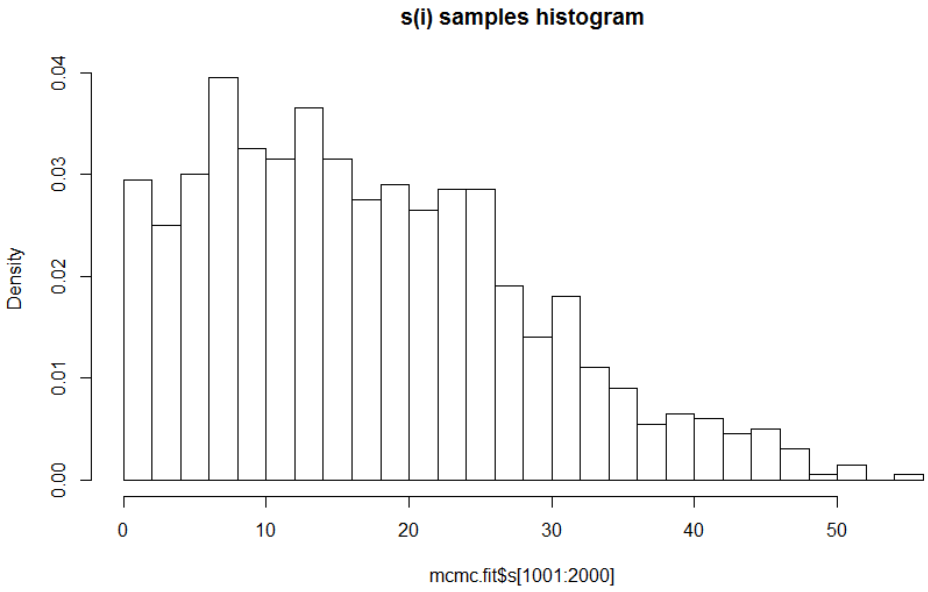
1.1 Draw the trace plot for the $s^{(i)}$ samples



1.2 Draw the traceplot for the $\theta^{(i)}$ samples



1.3 Draw the histogram for the $s^{(i)}$ samples



1.4 Estimate the posterior median of θ based on the samples drawn. Is it close to the maximum likelihood estimate of s/n?

From the problem description, it states that the maximum likelihood estimate of theta, $\hat{\theta}_{mle}$, is equal to $s/n = 74/16 = 0.2162162$. By calculating the post burn-in simulation of our Gibbs sampler, we achieve a median value of 0.2198654

1.5 How sensitive is the posterior median to the choice of initial values?

2 Question 2

Implement the Gibbs sampler from before but treat n as an unknown paramter as well with a Poisson prior on n, i.e. $\pi(n) = \text{Poisson}(\lambda)$. Assume $(\lambda = 64)$.
