

Assignment #6

1. For the situation in Exercise 5, pp. 96-97 of GCSR, do the following:
 - (a) Generate 10,000 observations from the *correct* posterior distribution of (μ, σ) using MCMC. As a proposal distribution, use the *incorrect* posterior. (Note that in so doing you will be using an independence sampler.) Check the output to determine if convergence and adequate mixing seem to have occurred.
 - (b) Compute estimates of the posterior mean and variance for each of μ and σ .
 - (c) Compute a kernel density estimate of the marginal distribution for each of μ and σ .
 - (d) Produce a scatterplot of σ versus μ using the output from (a).
 - (e) Repeat (a)-(d) using the following proposal distribution:

$$q(\mu, \sigma | \mu^*, \sigma^*) = \sqrt{2} \phi \left(\sqrt{2}(\mu - \mu^*) \right) q_1(\sigma | \sigma^*),$$

where ϕ is the standard normal density and $q_1(\cdot | s)$ is $\text{gamma}(s^2/0.0625, s/0.0625)$. Which proposal (the one in (a) or (e)) seems to work better? Justify your answer.

2. Do Exercise 3, p. 310 of GCSR.