

Stat 462/862 Assignment 4

(Due on Dec 7, 2015)

1. (a) Provide a Metropolis-Hastings algorithm to generate samples from a binomial distribution $Bino(n, p)$ with

$$P(X = k) = \binom{n}{k} p^k (1 - p)^{n-k}, k = 0, \dots, n.$$

Use uniform distribution in $\{0, \dots, n\}$ as proposal distribution and use independent chains. Compare estimated means and variances with the known theoretical means and variances of the binomial distribution.

- (b) Provide a Metropolis-Hastings algorithm to generate samples from a standard normal distribution. The proposal distribution is the normal distribution with the mean being the current value in the chain and the variance being 0.25, 0.01, 100, respectively. Compare the estimated means and variance with the known theoretical means and variance of a standard normal distribution.

2. Consider Example 2 on page 7 of the notes unit6, provide the gibbs sampler for generating samples of X and θ . Compare the histogram of samples of θ with the true marginal distribution of θ .