

Statistics 220 – Assignment 3

Due: Thursday, April 21, 2005

Chapter 6: 2, 3, 16

Chapter 11: 3

5) Devise an acceptance-rejection method for generating beta deviates based on the inequality $x^{a-1}(1-x)^{b-1} \leq x^{a-1} + (1-x)^{b-1}$. What is the acceptance probability for your method?

6) Implement a Gibbs sampler for the following normal random effects model

$$\begin{aligned}y_{ij} &\stackrel{iid}{\sim} N(\theta_j, \sigma^2) \\ \theta_j &\stackrel{iid}{\sim} N(\mu, \tau^2) \\ \mu &\sim N(0, \omega^2) \\ \sigma^2 &\sim \text{Inv-}\chi^2(\nu, s^2) \\ \tau^2 &\sim \text{Inv-}\chi^2(\eta, t^2)\end{aligned}$$

Use it to analyze the detergent data set discussed in class with $\omega^2 = 10000$, $\nu = \eta = 5$, $s^2 = t^2 = 1$. When running the sampler, use a burn in of 100 imputations and a sample of 1000 imputation (a total of 1100 imputations). In discussing your analysis of the data, focus on the posterior distribution of θ . Which of the filling machines appear to be different.