homework1

Adam Li

September 19, 2016

R Markdown

Problem 5

setup and initialize variables

require("graphics") theta<-seq(0,1,length=11) yi_sum <- 57 N <- 100

ii) loop every value of theta and plot probabilities as a function of theta

prob<-theta^57 * (1-theta)^(N-57) plot(theta, prob, type='l') title('Bernoulli Distribution of Yi Sum')

iii) Posterior Distribution

prob <- 1/10 * theta^57 * (1-theta)^(N-57) plot(theta, prob, type='l') title('Posterior Distribution In Discrete Theta')

iv) Plot Posterior density

theta <- 1:1000/1000 prob<-theta^57 * (1-theta)^(N-57) plot(theta, prob, type='l') title('Posterior Distribution in Continuous Theta')

v) Posterior Distribution as function of theta

prob <- dbeta(theta, 1+57, 1+100-57) plot(theta, prob) title('Beta Distribution of Posterior')

Problem 6:

theta_0 <- seq(0.1, 0.9, 0.1) ptheta <- 0.5 n_0 <-c(1, 2, 8, 16, 32) probs <- matrix(0, length(theta_0), length(n_0))

theta_index <- 0 for (theta in theta_0) {

n_index <- 0 for (n in n_0) { a <- theta*n* b <- *(1-theta)*n

```
# Compute Pr(theta > 0.5 | Sum(Yi) = 57) and plot contours
probs[theta_index, n_index] <- 1-pbeta(ptheta, a+yi_sum, b+N-yi_sum)

n_index <- n_index + 1
```

} theta_index <- theta_index+1 } contour(theta_0, n_0, probs) title(main="Contour Plot of Different [a,b] Beta Priors", xlab = "theta_0", ylab = "n_0")