Biostat 276 Project 1

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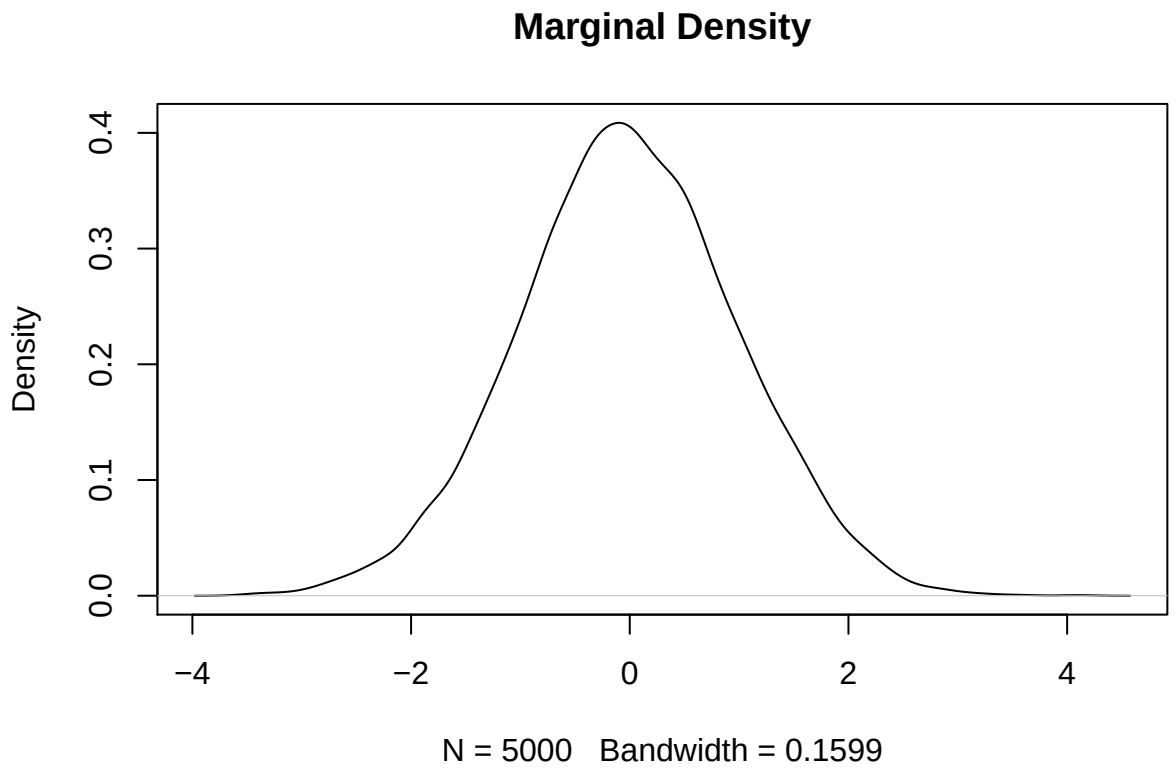
Sampling from the Banana Distribution

a)

Bayesian Adaptive Lasso

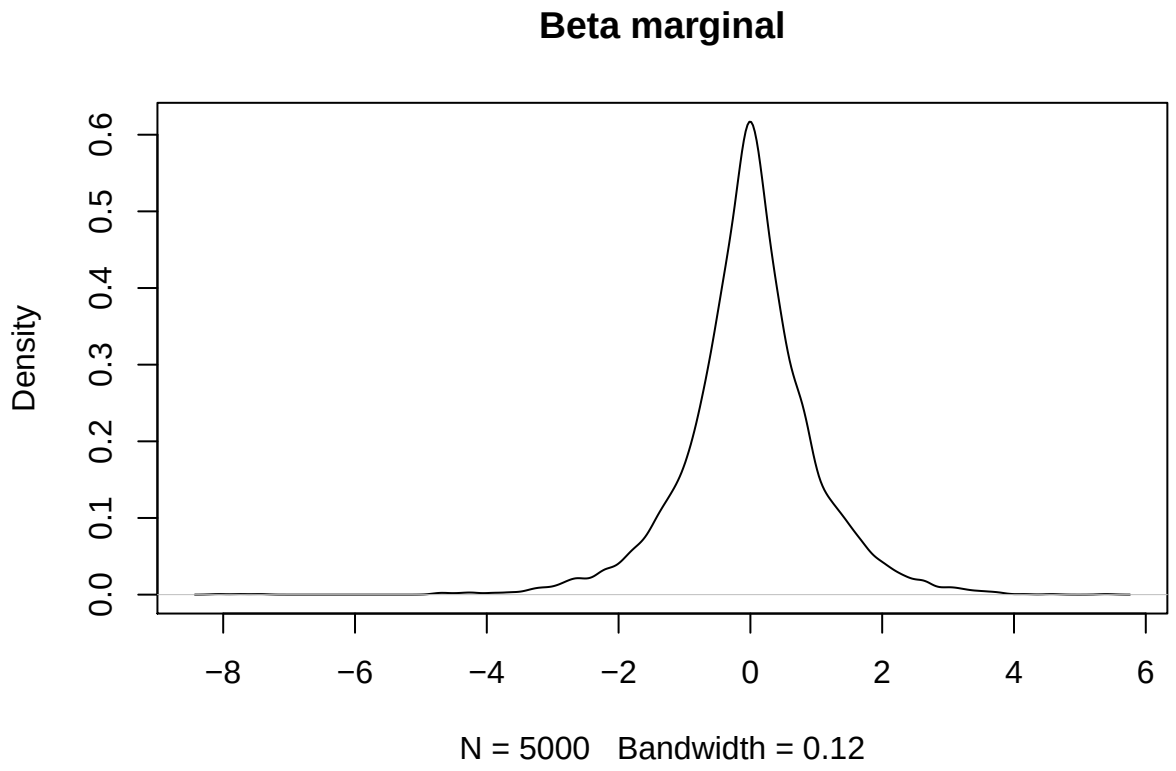
#a)

```
sima <- rnorm(5000, 0, 1)
plot(density(sima), main = "Marginal Density")
```



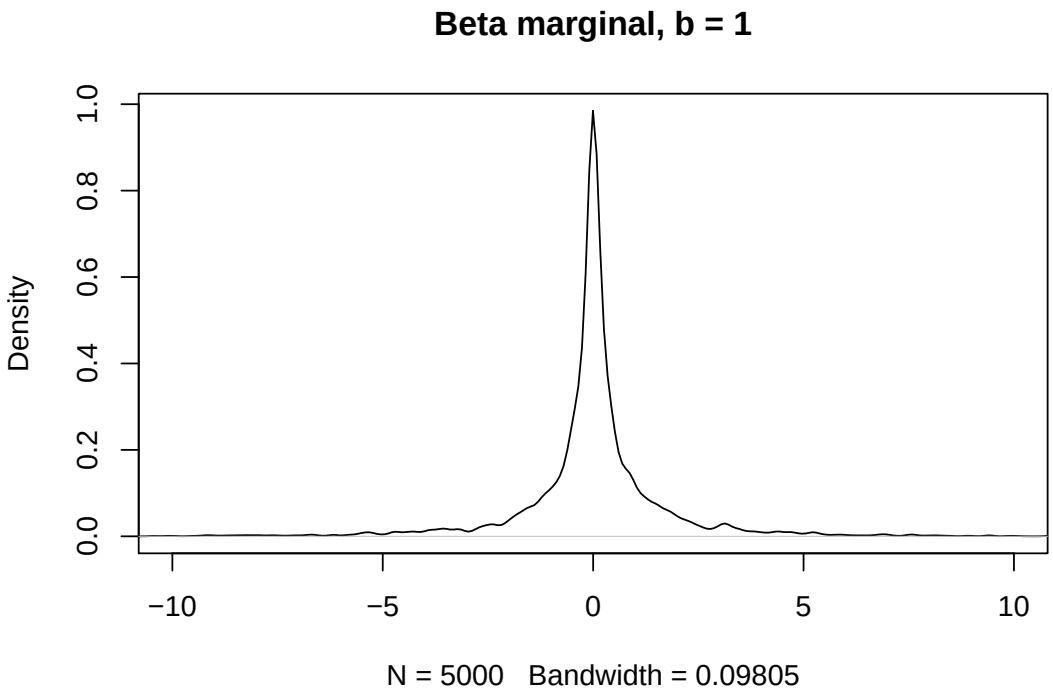
b)

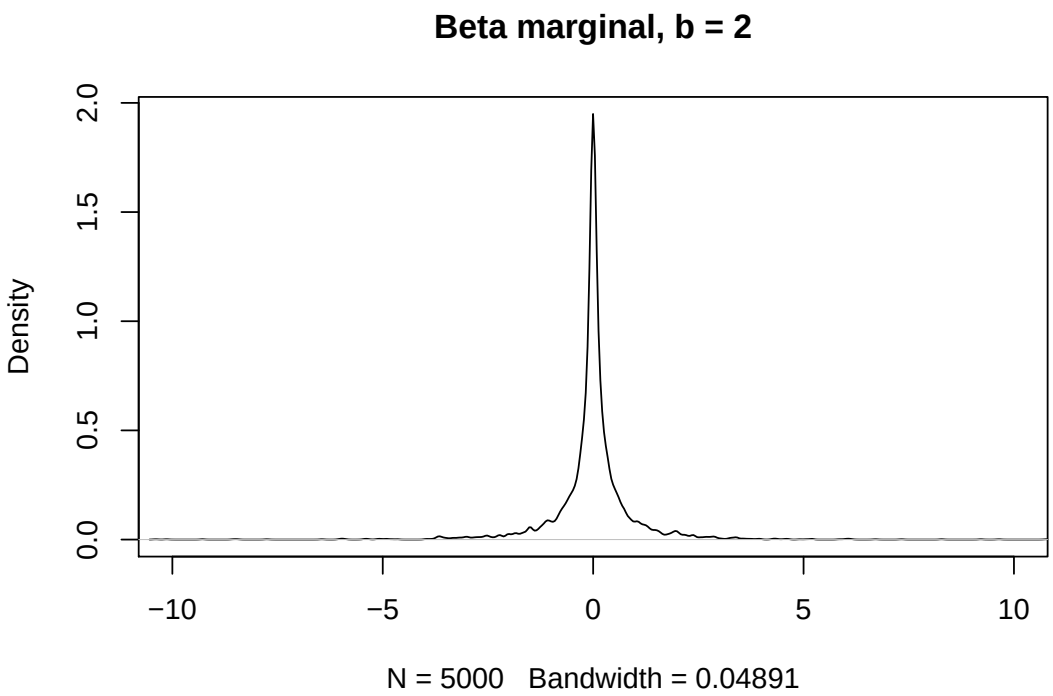
```
lambda2 <- 2
tau2 <- rgamma(5000, shape = 1, rate = lambda2/2)
simb <- rnorm(5000, 0, sqrt(tau2))
plot(density(simb), main = "Beta marginal")
```

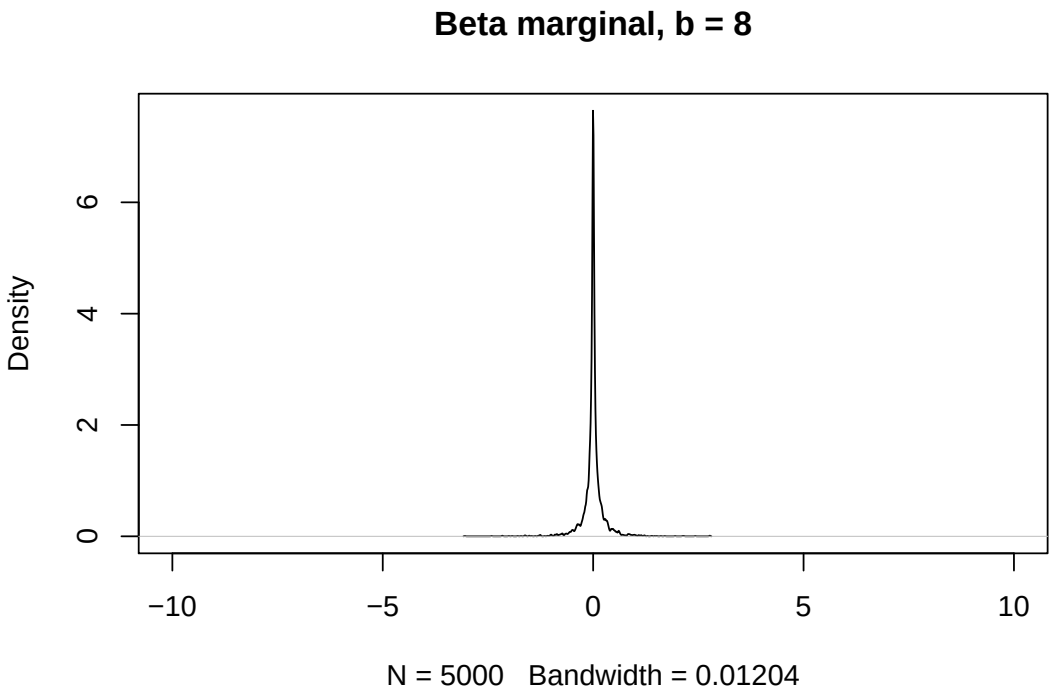


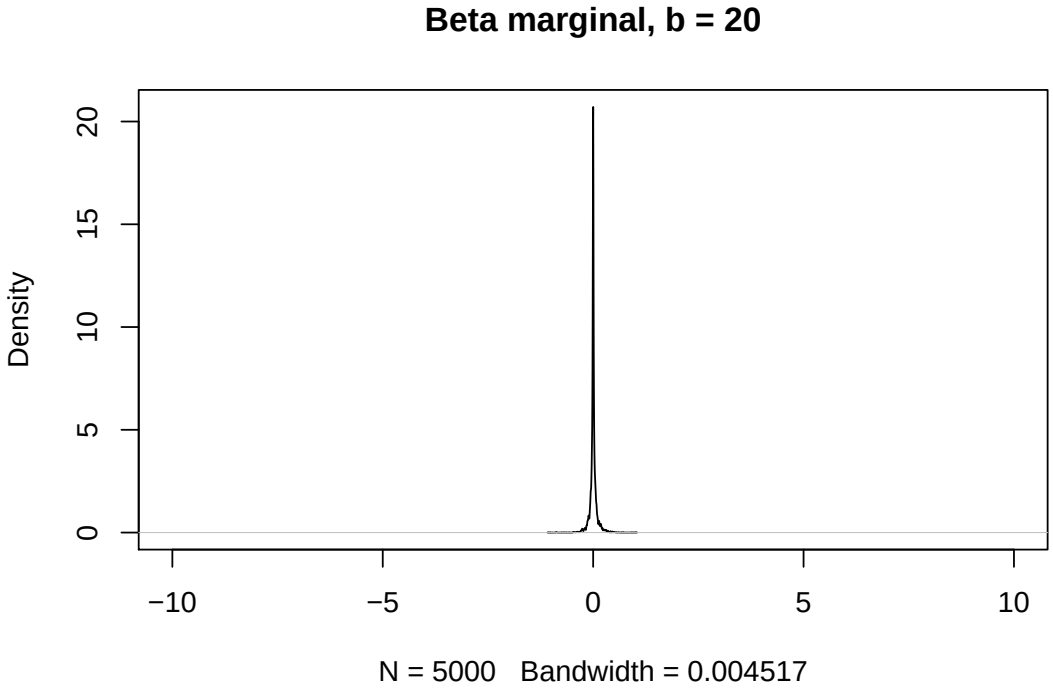
c)

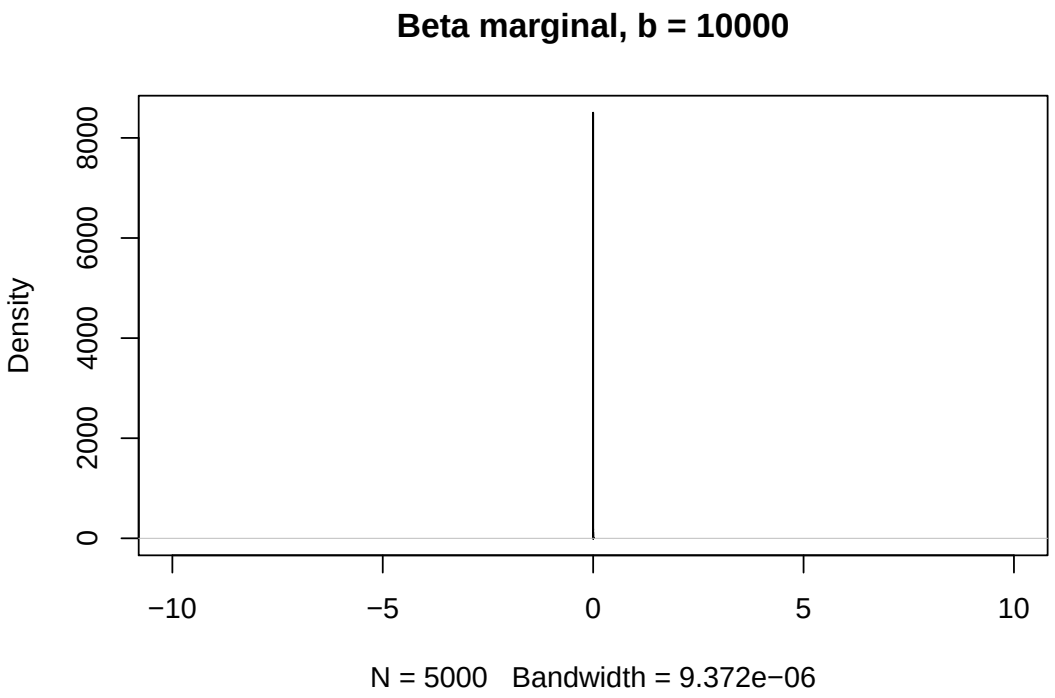
```
bvec <- c(1, 2, 8, 20, 10000)
marginalplot <- function(n, b){
  lambda <- 1/rgamma(n, 1, b)
  tau2 <- rgamma(n, shape = 1, rate = lambda^2/2)
  sim <- rnorm(n, 0, sqrt(tau2))
  plot <- plot(density(sim),
               main = paste0("Beta marginal, b = ", b),
               xlim = c(-10, 10))
  save_plot <- recordPlot()
  return(save_plot)
}

plots <- lapply(bvec, marginalplot, n = 5000)
```


Beta marginal, b = 1
Density
0.0
0.2
0.4
0.6
0.8
1.0
−10
−5
0
5
10
N = 5000 Bandwidth = 0.09805


Beta marginal, b = 2
Density
0.0
0.5
1.0
1.5
2.0
−10
−5
0
5
10
N = 5000 Bandwidth = 0.04891


Beta marginal, b = 8
Density
0
2
4
6
−10
−5
0
5
10
N = 5000 Bandwidth = 0.01204


Beta marginal, b = 20
Density
0
5
10
15
20
−10
−5
0
5
10
N = 5000 Bandwidth = 0.004517


Beta marginal, b = 10000
Density
0
2000
4000
6000
8000
−10
−5
0
5
10
N = 5000 Bandwidth = 9.372e−06