

hw2

Michael Pena

2024-10-10

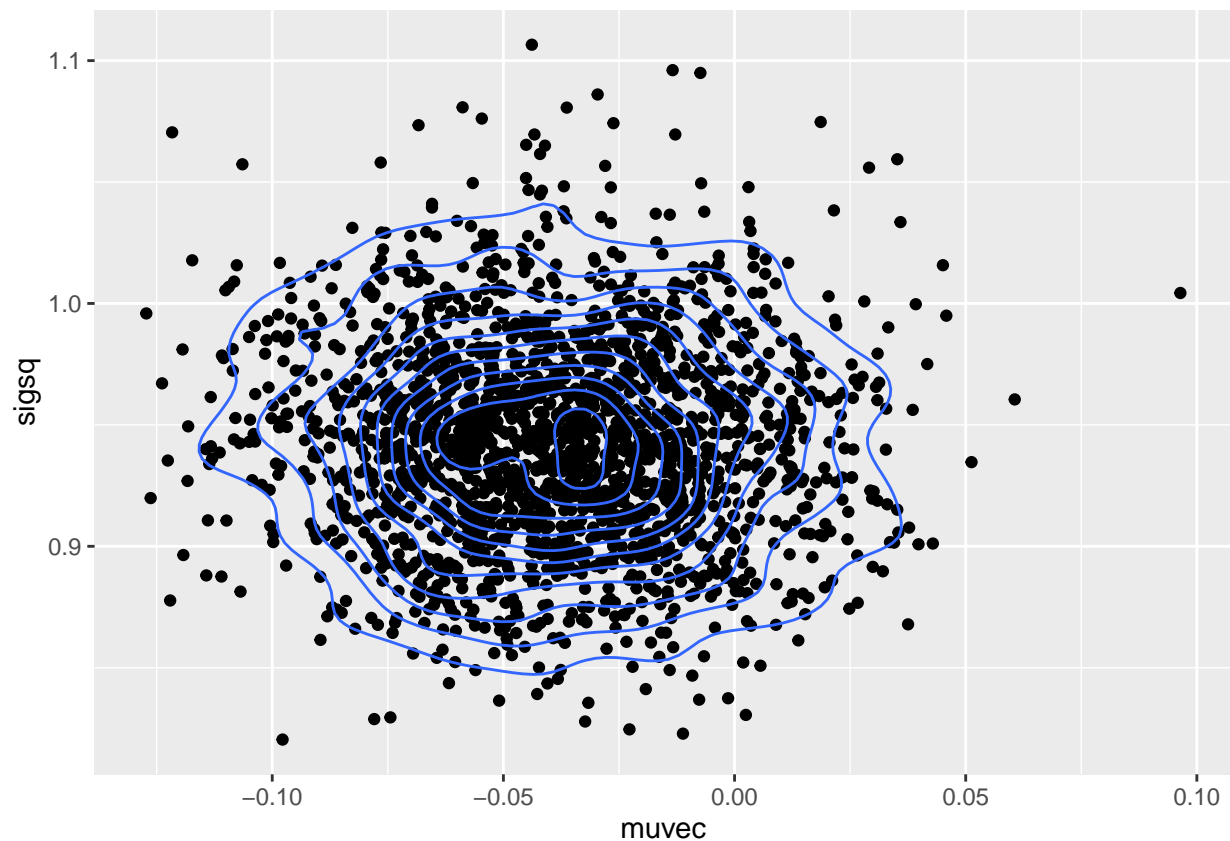
(b)

```
# simulation
n = 1000
y = rnorm(n,0,1)
s = sd(y)
```

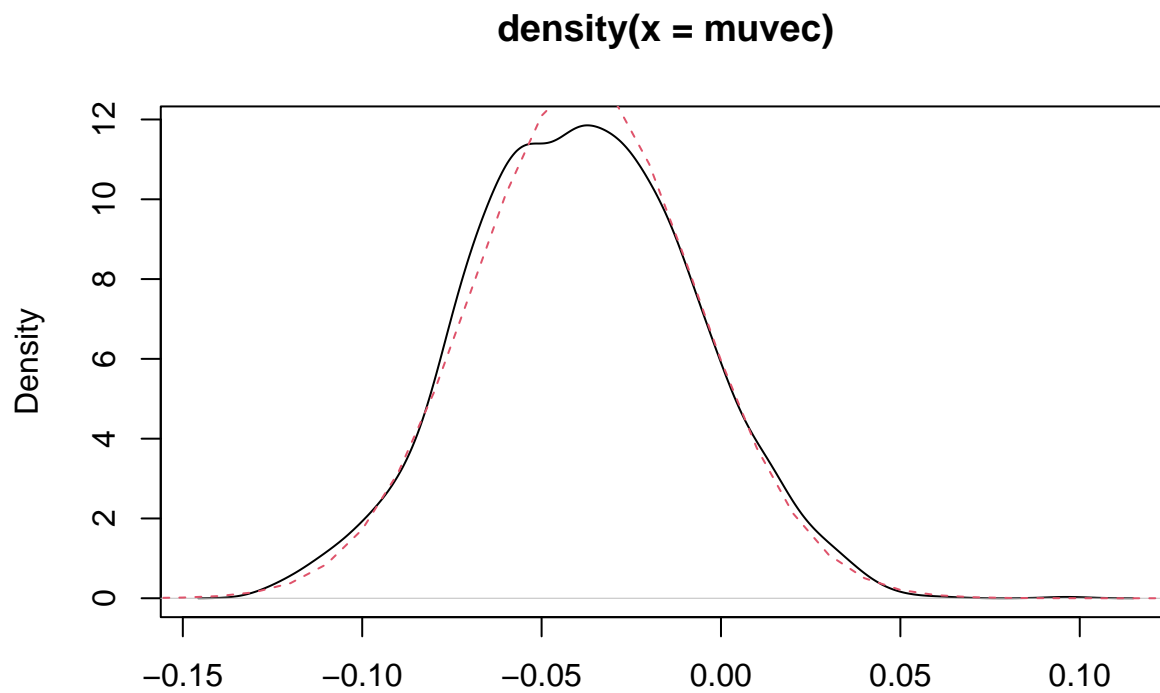
(c)

```
# posterior sample
sigsq <- rinvchisq(2000, n - 1, s^2)
muvec <- rnorm(2000, mean(y), sqrt(sigsq/n))

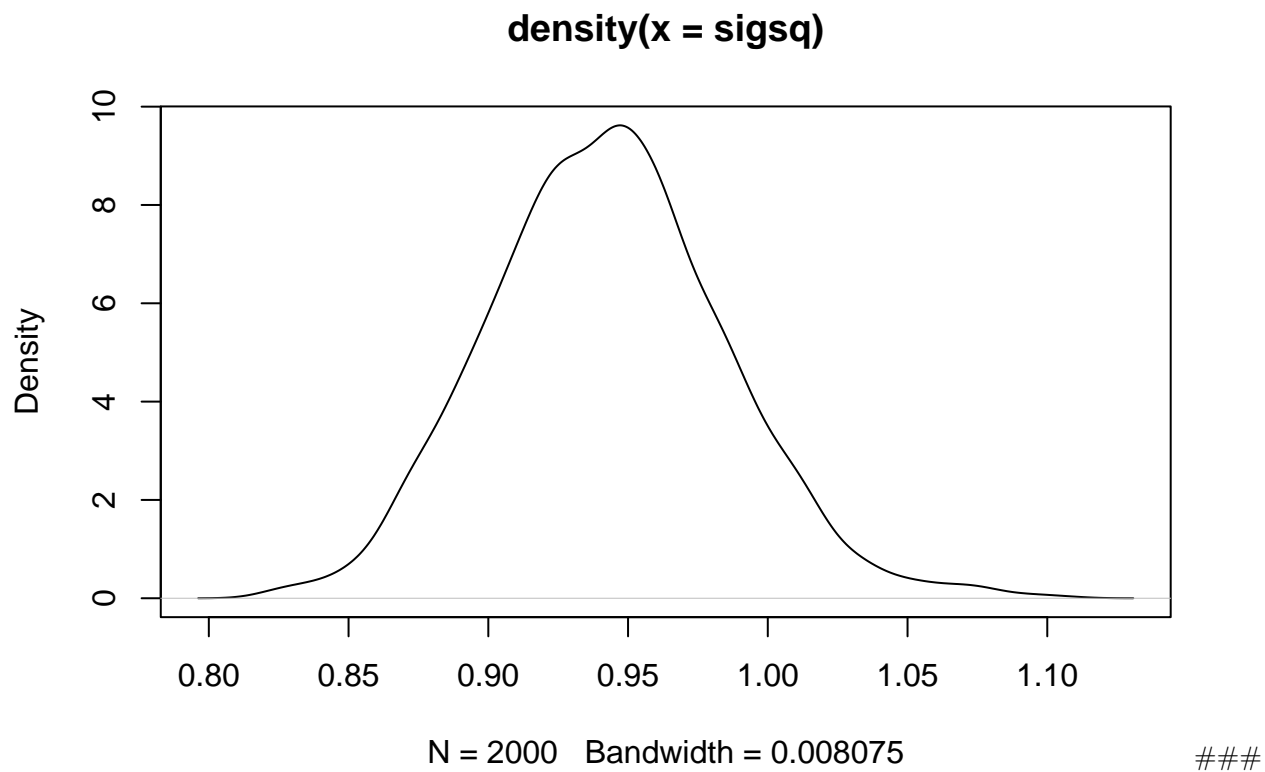
post <- data.frame(cbind(muvec, sigsq))
ggplot(post, aes(x = muvec, y = sigsq)) +
  geom_point() + geom_density2d()
```



```
# plotting the marginal posterior distribution for mu
plot(density(muvec))
x <- seq(-3,3,.01)
lines(x,
      dt.scaled(x,
                df = n-1,
                mean(y),
                s/sqrt(n)),
      lty = 2,
      col = 2)
```



```
# plotting the marginal posterior distribution for sigsq  
plot(density(sigsq))  
x <- seq(0,2,0.01)  
lines(x,dinvchisq(x,df = n-1, scale = s^2),  
      lty =2,  
      col = 2)
```



(d)

```
# estimate posterior predictive distribution
ysim <- c()
for(i in 1:2000){
  ysim[i] = rnorm(1, post$muvec[i], sqrt(post$sigsq[i]))
}
plot(density(ysim))
```

