

STATS 551 - HW1__2

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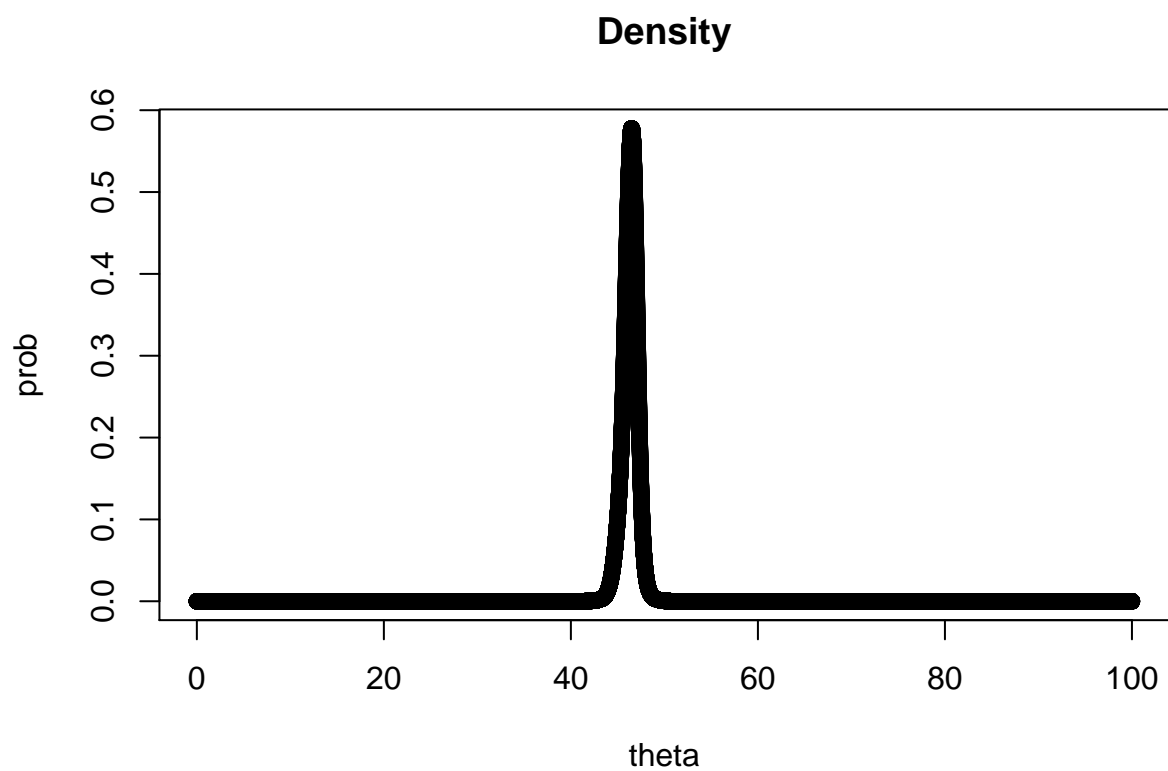
3.

(a)

Here I set $m=1000$.

```
m=1000
theta=(0:(m*100))/m
y=c(42,44.5,46,46.8,47.2,50)
post=function(t){
  prod(1/(1+(y-t)^2)/pi/100)
}
prob=c()
for(i in 0:(m*100)){
  prob[i+1]=post(i/m)
}
prob=prob/sum(prob)*m

# the posterior density function as a function of theta
postdf=function(x){
  if(x<0|x>100)
    return(0)
  else
    return(prob[floor(x*1000)])
}
plot(theta,prob,main = 'Density')
```

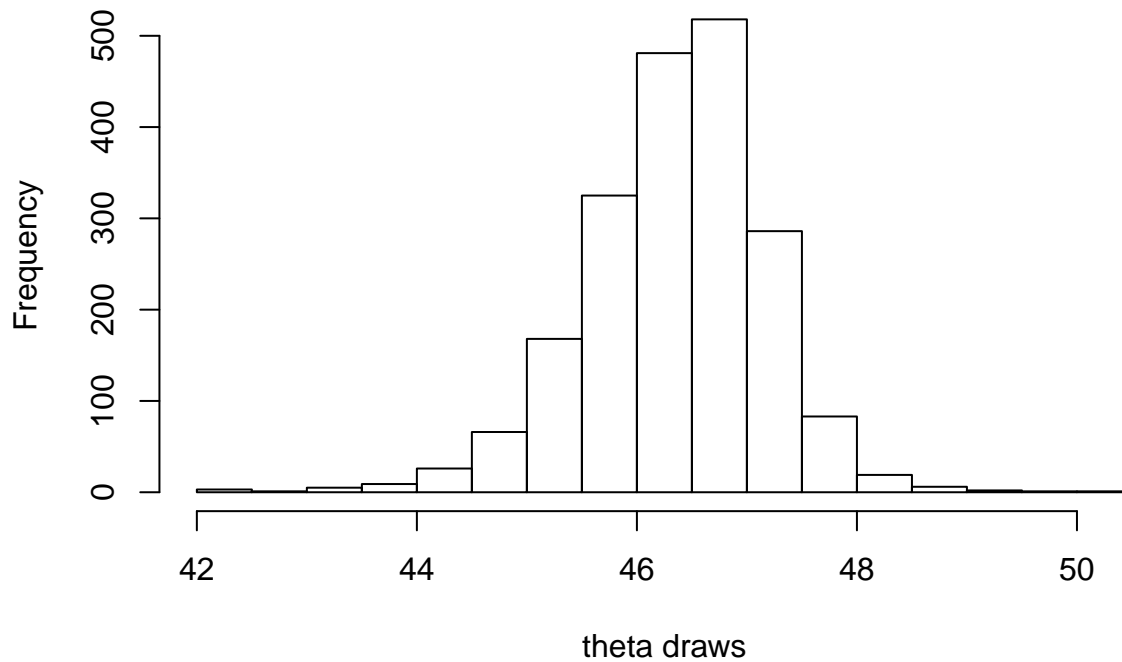


(b)

```
set.seed(1)

# 2000 draws of theta from the posterior density
Stheta=sample(theta,2000,replace = T,prob = prob)
hist(Stheta,breaks = 20,main="histogram of the theta draws",xlab = "theta draws")
```

histogram of the theta draws



(c)

```
Sy=c()
set.seed(5)

# 2000 samples from the predictive distribution
for(i in 1:length(Stheta)){
  Sy[i]=rcauchy(1,location = Stheta[i],scale = 1)
}
hist(Sy,breaks = 100,main="histogram of the predictive draws",xlab = "predictive draws")
```

histogram of the predictive draws

