

534HW6.3

Michael Pena

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```
# get samples
data <- read.table("coal.dat",head=T)
N <- 100000
set.seed(534)
theta <- sample(1:111,N,replace = T)
attach(data)

# get the lambdas
lamb1 <- rgamma(N,3,rgamma(N,10,10))
lamb2 <- rgamma(N,3,rgamma(N,10,10))

# generate from poisson
ell <- rep(0,N)
for (i in 1:N){
  first <- prod(dpois(disasters[1:theta[i]],lamb1[i]))
  secnd <- prod(dpois(disasters[(theta[i]+1):112],lamb2[i]))

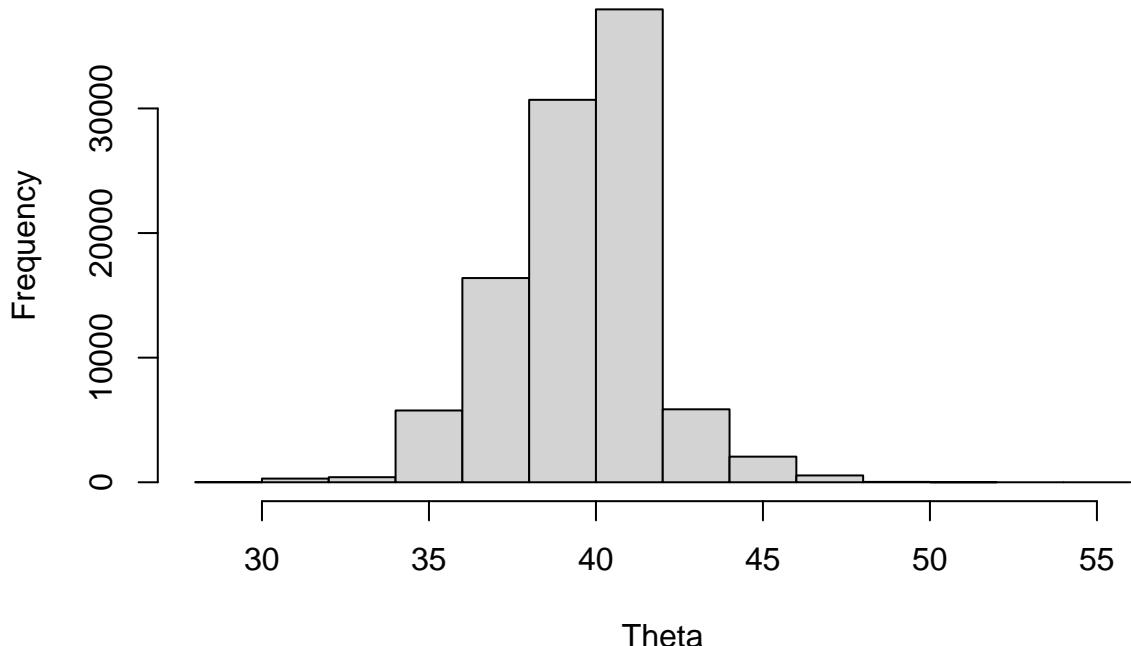
  ell[i] = first * secnd
}

# render weights
W <- ell/sum(ell)

# get parameter vector
params <- cbind(theta,lamb1,lamb2)
# select theta but weighted
weight.index <- sample(1:N,N,prob = W,replace = T)
theta.w <- params [weight.index,1]

# graph theta with weights
hist(x = theta.w,
      main = "Theta Frequency",
      xlab = "Theta")
```

Theta Frequency



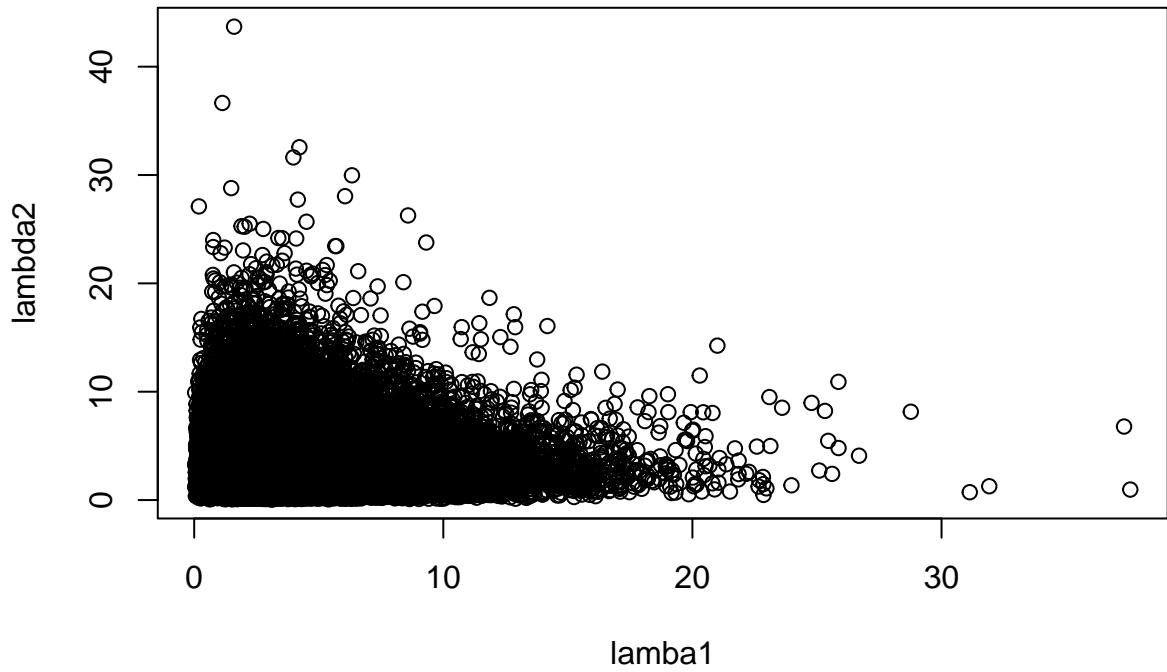
```
# find expected values
E.theta <- mean(theta.w); E.theta

## [1] 39.91891

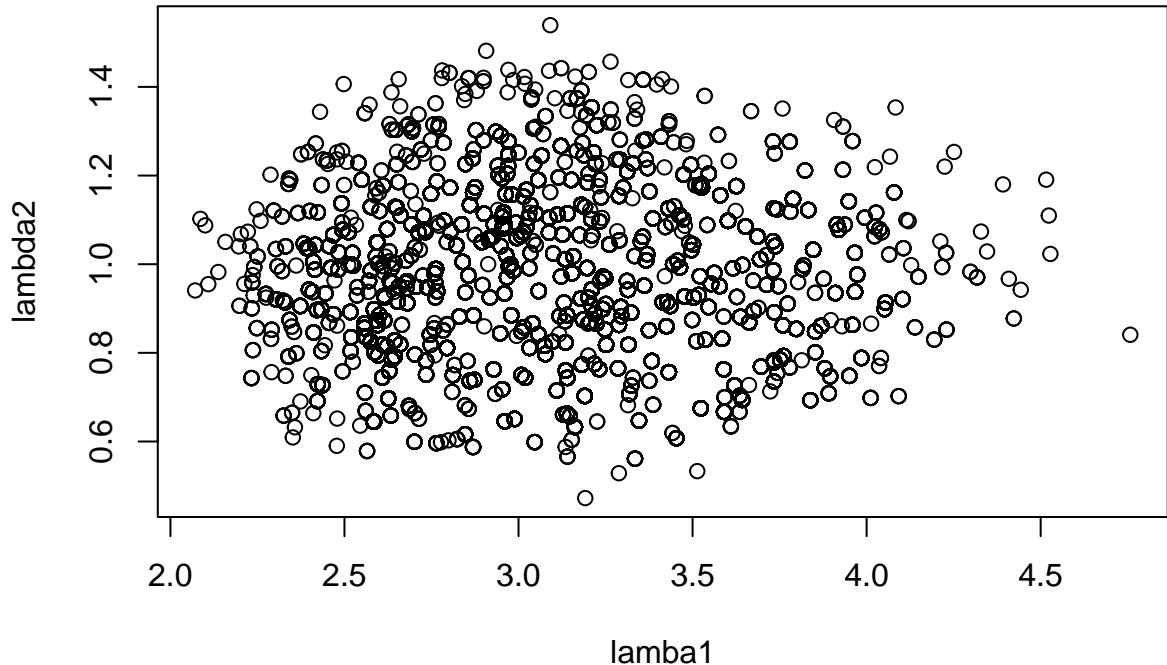
# confidence interval
quantile(theta.w, probs = c(0.01,0.99))

## 1% 99%
## 35 46

# plotting lambdas
plot(params[,2],params[,3],xlab = "lamba1" ,ylab = "lamba2")
```



```
# plotting lambdas sampled with weight
plot(params[weight.index,2],params[weight.index,3],xlab = "lambda1" ,ylab = "lambda2")
```



```
# mean of lambda1
mean(params[,2])

## [1] 3.33915

# confidence interval
quantile(params[,2], probs = c(0.01,0.99))

##          1%         99%
## 0.4078367 11.6482585
```

```

# mean of lambda 2
mean(params[,3])

## [1] 3.338481

# confidence interval
quantile(params[,3], probs = c(.01,.99))

##          1%      99%
## 0.401207 11.609884

# mean of lambda 1 resampled
mean(params[weight.index,2])

## [1] 3.136527

# confidence interval
quantile(params[weight.index,2], probs = c(.01,.99))

##          1%      99%
## 2.512281 3.852170

# mean of lambda 2 resampled
mean(params[weight.index,3])

## [1] 0.9453634

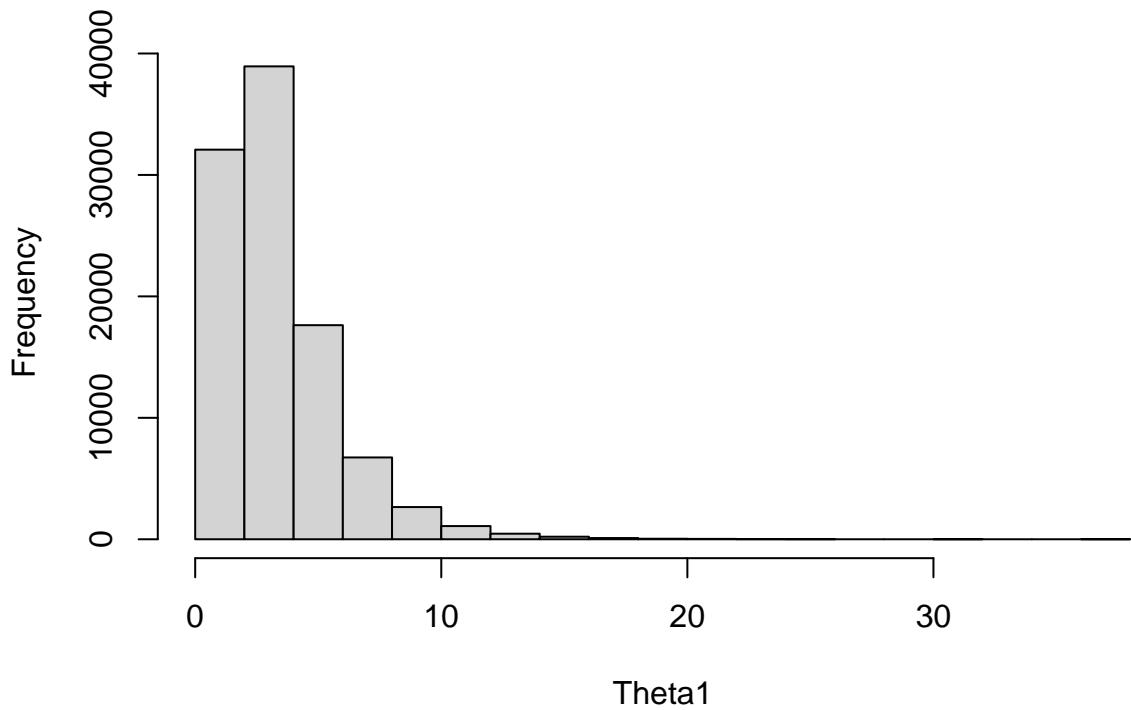
# confidence interval
quantile(params[weight.index,3], probs = c(.01,.99))

##          1%      99%
## 0.702739 1.235455

# rendering histograms
hist(params[,2],main = "Theta1 frequency", xlab = "Theta1")

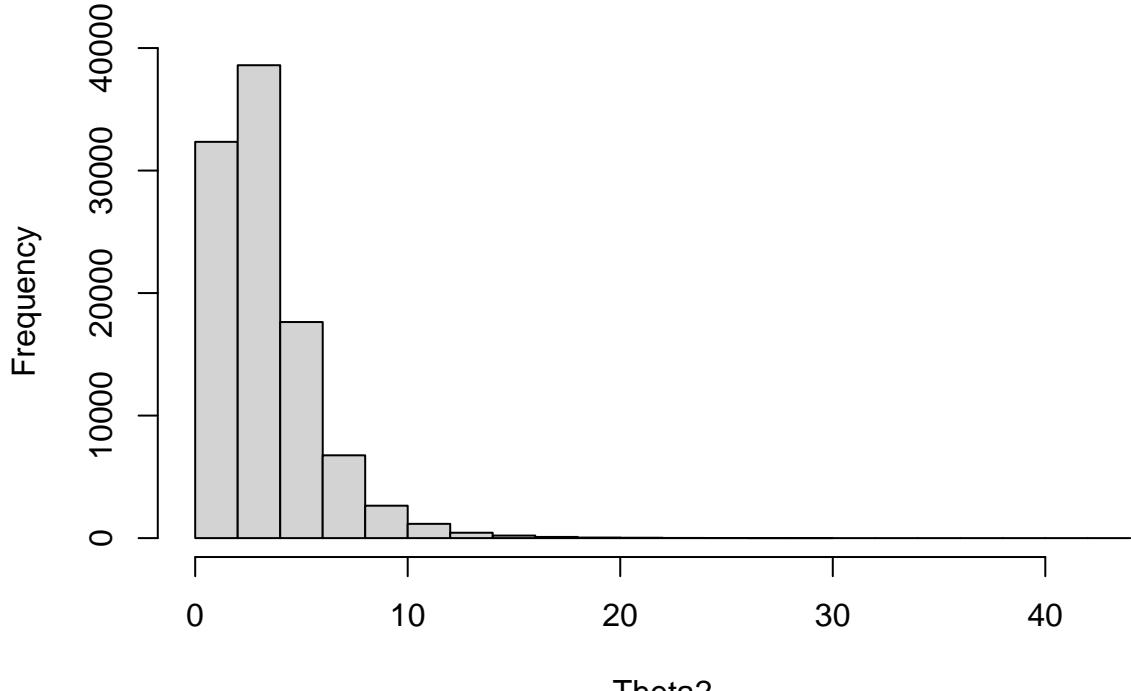
```

Theta1 frequency



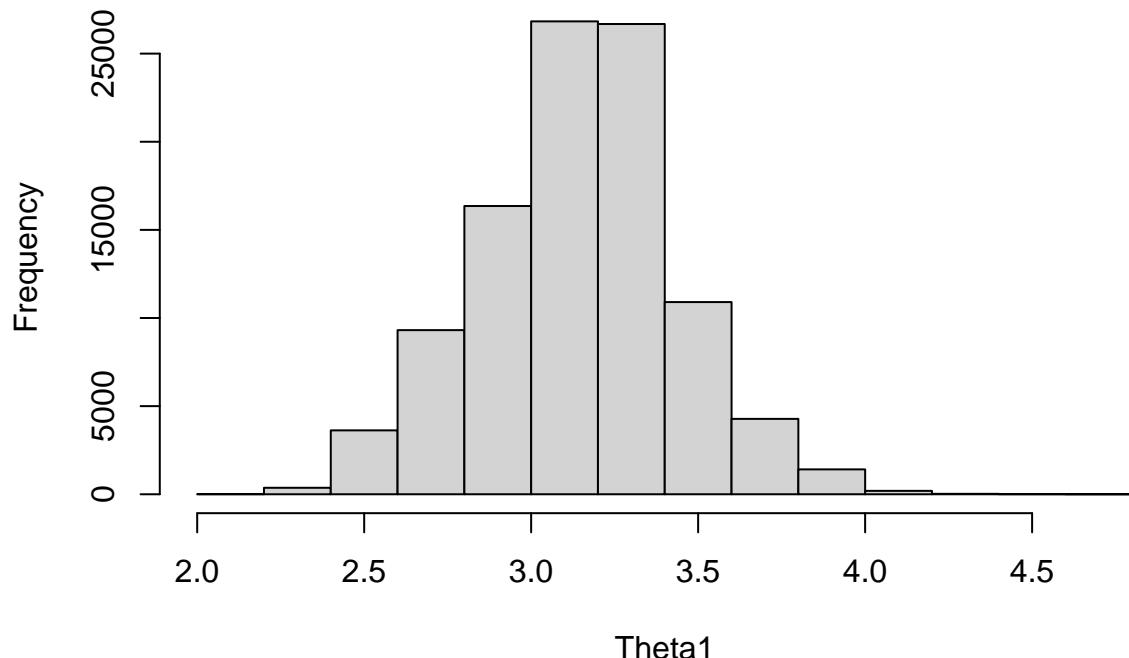
```
hist(params[,3],main = "Theta2 frequency", xlab = "Theta2")
```

Theta2 frequency



```
hist(params[weight.index,2],main = "Theta1 resamp frequency", xlab = "Theta1")
```

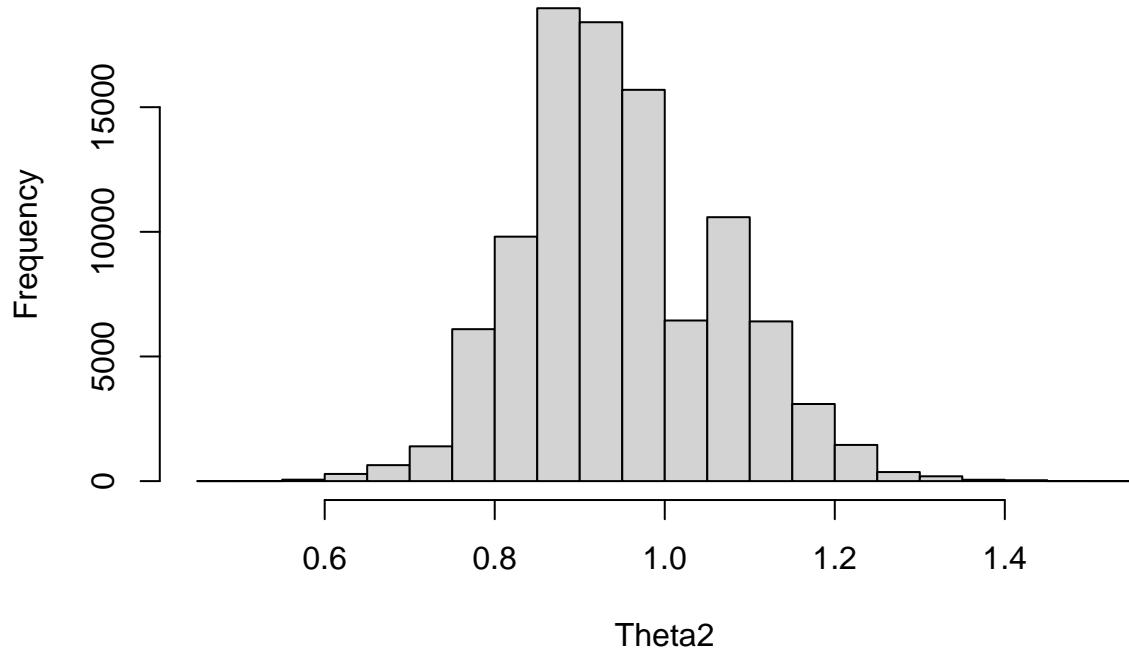
Theta1 resamp frequency



Theta1

```
hist(params[weight.index,3],main = "Theta2 resamp frequency", xlab = "Theta2")
```

Theta2 resamp frequency



Theta2

```
# count distinct parameters
sprintf("Unique number of points is %d",n_distinct(params[weight.index,]))
```

```
## [1] "Unique number of points is 713"
```

```

# get the highest frequency by taking the mode of weighted frequencies
table(weight.index) -> freq
mode <- freq[freq == max(freq)]
# get the parameters with corresponding index
params[as.numeric(names(mode)),]

##      theta      lamb1      lamb2
## 41.0000000 3.0579077 0.9394689
sprintf("The above are the paramter values with the heighest frequency at %d",as.numeric(mode))

## [1] "The above are the paramter values with the heighest frequency at 3677"

```