BIS 557 Final Project Problem 2

```
xa=0
x3=3.807184
x4=2.688513
x5=2.628231
u=1.074132
v=1.373923
w=1.501105
require("pscl")
```

```
## Loading required package: pscl
## Loading required package: MASS
## Loading required package: lattice
## Classes and Methods for R developed in the
##
## Political Science Computational Laboratory
##
## Department of Political Science
##
## Stanford University
##
## Simon Jackman
##
## hurdle and zeroinfl functions by Achim Zeileis
```

```
###Gibbs Sampling
gibbs=function(n){
  mat=matrix(ncol=3,nrow=n)
  x=1
  y=2
  z=1
  mat[1,]=c(x,y,z)
  for (i in 2:n){
    x=rnorm(1,(0.5047*y+1.3492),sqrt(z/6.6087))
    y=rnorm(1,(0.1750*x+2.1932),sqrt(z/19.0612))
    z=rigamma(1,7/2,(3.3044*x*x+9.5306*y*y-3.3357*x*y-8.9167*x-41.8042*y+73.5465))
    mat[i,]=c(x,y,z)
  }
  mat
}
###Estimate posterior
gibbs(10000)->A
data.frame(X1=A[,1],
           X2=A[,2],
           Sigma2=A[,3])->A

###Display joint distribution by a few samples
A[1:30,]
```

```
##           X1       X2    Sigma2
```

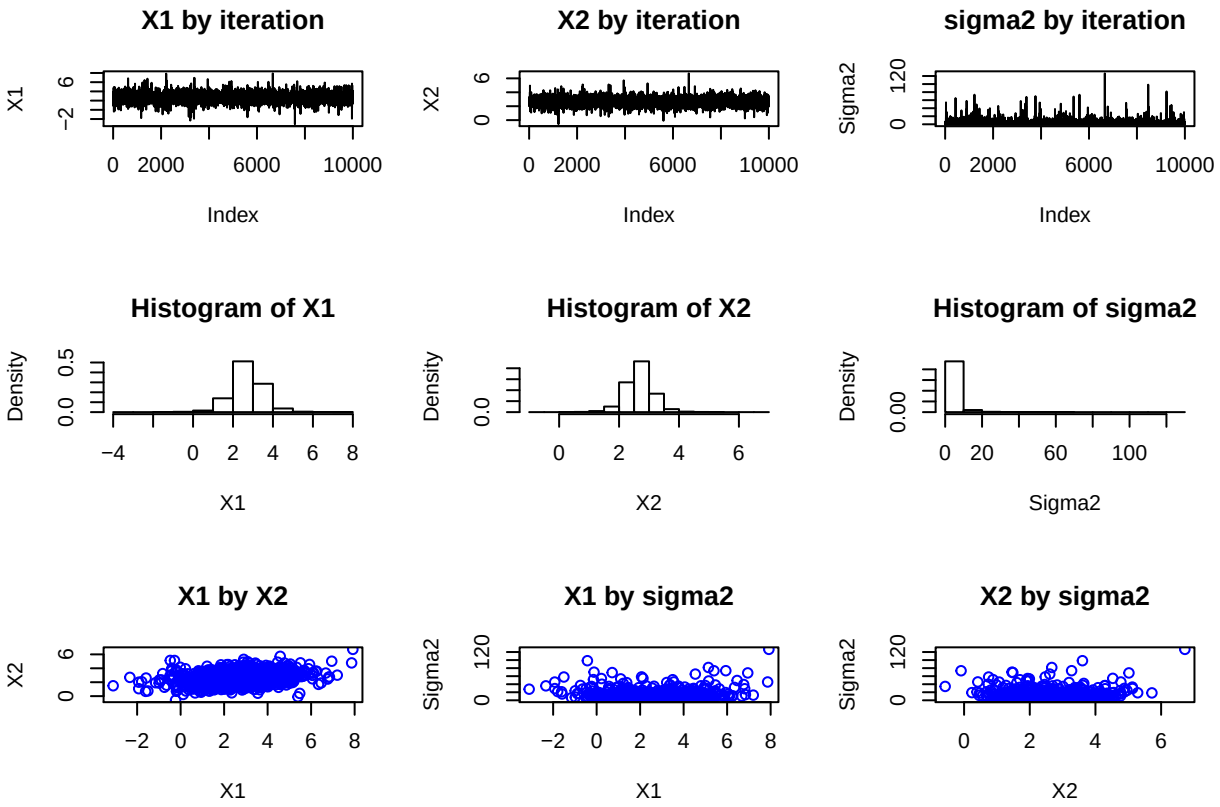
```
## 1  1.0000000 2.000000 1.0000000
## 2  2.9421410 2.460059 2.3400118
## 3  2.1514448 2.495870 1.9847196
## 4  2.6347513 2.200321 4.2318806
## 5  2.1260734 2.750372 3.0507447
## 6  3.4642948 2.951053 4.4166874
## 7  3.0886481 2.074251 7.0966868
## 8  2.3086452 2.303433 1.0837867
## 9  2.1875470 2.736557 1.5518882
## 10 2.5267058 2.624297 2.7799504
## 11 2.7524509 2.686224 0.6451784
## 12 1.9778506 2.563021 2.3211745
## 13 2.7503862 3.133437 5.1497375
## 14 2.0428260 2.535303 2.5431890
## 15 3.0797066 2.365697 4.5681495
## 16 3.9330982 2.748110 3.3841503
## 17 0.7993114 2.720313 5.2257196
## 18 2.5547710 2.572669 1.5572450
## 19 3.5289907 3.335821 2.0478646
## 20 1.8515614 2.328636 3.5456947
## 21 3.0227076 2.505907 2.5246685
## 22 2.1120767 3.140141 3.2124222
## 23 4.7854522 2.739682 4.8537044
## 24 2.7418182 3.351393 4.3261284
## 25 3.8261724 3.219930 2.6541697
## 26 3.4888085 2.677746 2.2145718
## 27 3.6462510 3.299440 3.1588432
## 28 2.0750489 2.219234 1.9601344
## 29 2.6992605 3.020986 0.8177641
## 30 3.1189997 3.014090 2.2693571
```

```
###Display joint distribution by summary statistics
sumstat=cbind(c(min(A$X1),max(A$X1),mean(A$X1),median(A$X1),sd(A$X1)),
              c(min(A$X2),max(A$X2),mean(A$X2),median(A$X2),sd(A$X2)),
              c(min(A$Sigma2),max(A$Sigma2),mean(A$Sigma2),median(A$Sigma2),sd(A$Sigma2)))
sumstat=data.frame(sumstat,row.names=c("Min","Max","Mean","Median","SD"))
colnames(sumstat)=c("X1","X2","Sigma2")
sumstat
```

```
##                X1         X2      Sigma2
## Min    -3.1015235 -0.5753613   0.4105053
## Max     7.9191924  6.7228430 126.6617680
## Mean    2.7011897  2.6648827   3.8744052
## Median  2.7040022  2.6679749   2.6987430
## SD      0.7948506  0.4659190   4.6228369
```

```
###Display joint distribution by graph
par(mfrow=c(3,3))
plot(A[,1],type="l",main="X1 by iteration",ylab="X1")
plot(A[,2],type="l",main="X2 by iteration",ylab="X2")
plot(A[,3],type="l",main="sigma2 by iteration",ylab="Sigma2")
hist(A[,1],freq=F,main="Histogram of X1",xlab="X1")
hist(A[,2],freq=F,main="Histogram of X2",xlab="X2")
```

```
hist(A[,3],freq=F,main="Histogram of sigma2",xlab="Sigma2")
plot(A[,1],A[,2],col="blue",type="p",main="X1 by X2",xlab="X1",ylab="X2")
plot(A[,1],A[,3],col="blue",type="p",main="X1 by sigma2",xlab="X1",ylab="Sigma2")
plot(A[,2],A[,3],col="blue",type="p",main="X2 by sigma2",xlab="X2",ylab="Sigma2")
```




```
par(mfrow=c(1,1))
```