HW6

Chengen Xie (cx22)

March 3, 2015

Exercise 1

Question a

$$p(y|x) \sim Uniform(max(0, x-c), min(x+c, 1))$$
$$p(x|y) \sim Uniform(max(0, x-c), min(x+c, 1))$$

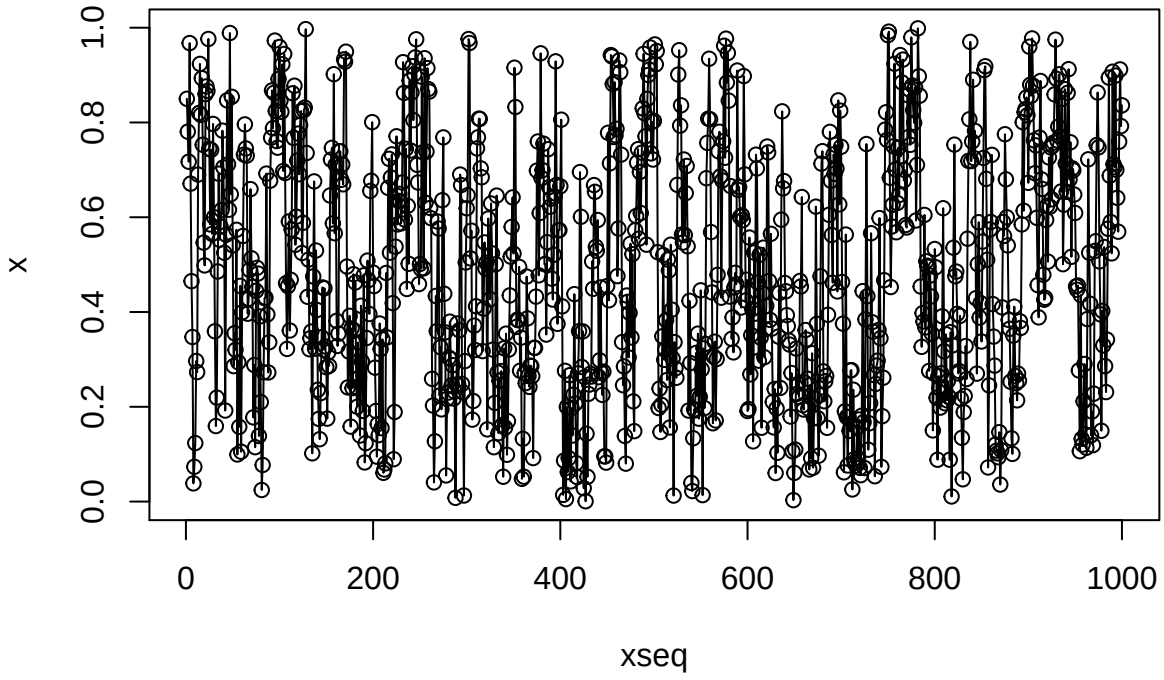
Question b

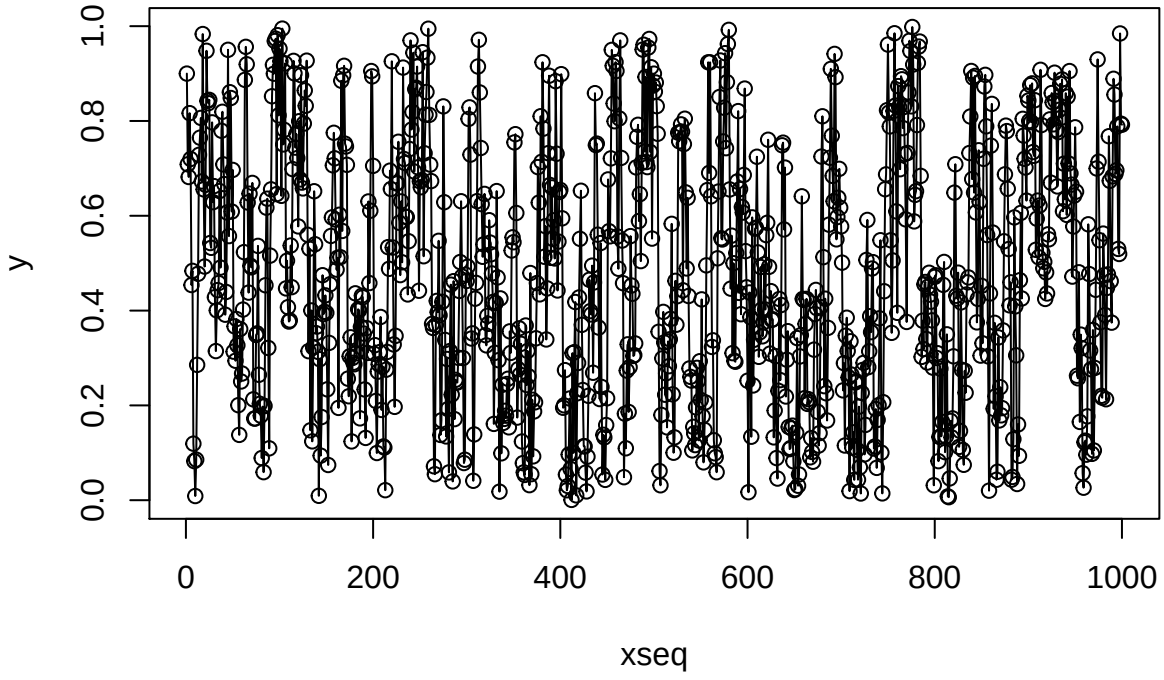
```
N <- 10^3

x<-rep(0,N)
y<-rep(0,N)
c<- c(0.25,0.05,0.02)

GS <- function(c){
y[1] <- 0.9
x[1] <- 0.85

for (i in 2:N){
  y[i] <- runif(1,max(0,x[i-1]-c),min(x[i-1]+c,1))
  x[i] <- runif(1,max(0,y[i]-c),min(y[i]+c,1))
}

xseq <-seq(1,N)
#traceplot of x
plot(xseq,x)
lines(xseq,x)
#traceplot of y
plot(xseq,y)
lines(xseq,y)

#scatterplot
plot(x,y)


return (NULL)
}
```

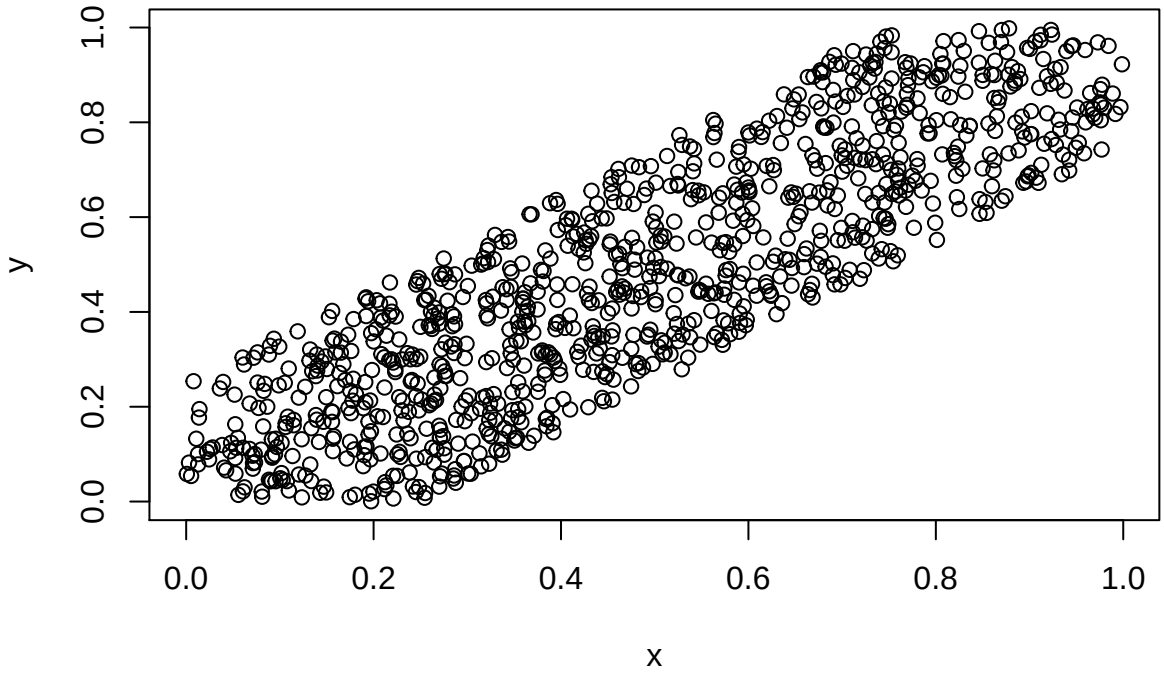
Question c

when c = 0.25

```
GS(c[1])
```


x
0.0
0.2
0.4
0.6
0.8
1.0
0
200
400
600
800
1000
xseq

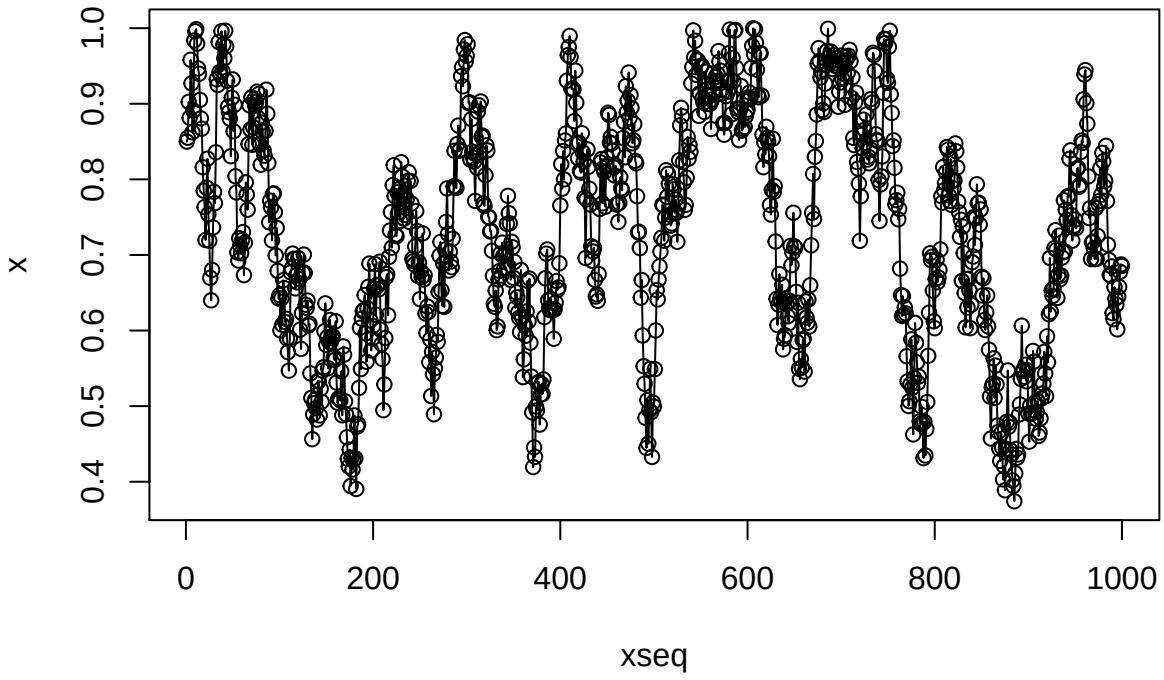

y
0.0
0.2
0.4
0.6
0.8
1.0
0
200
400
600
800
1000
xseq

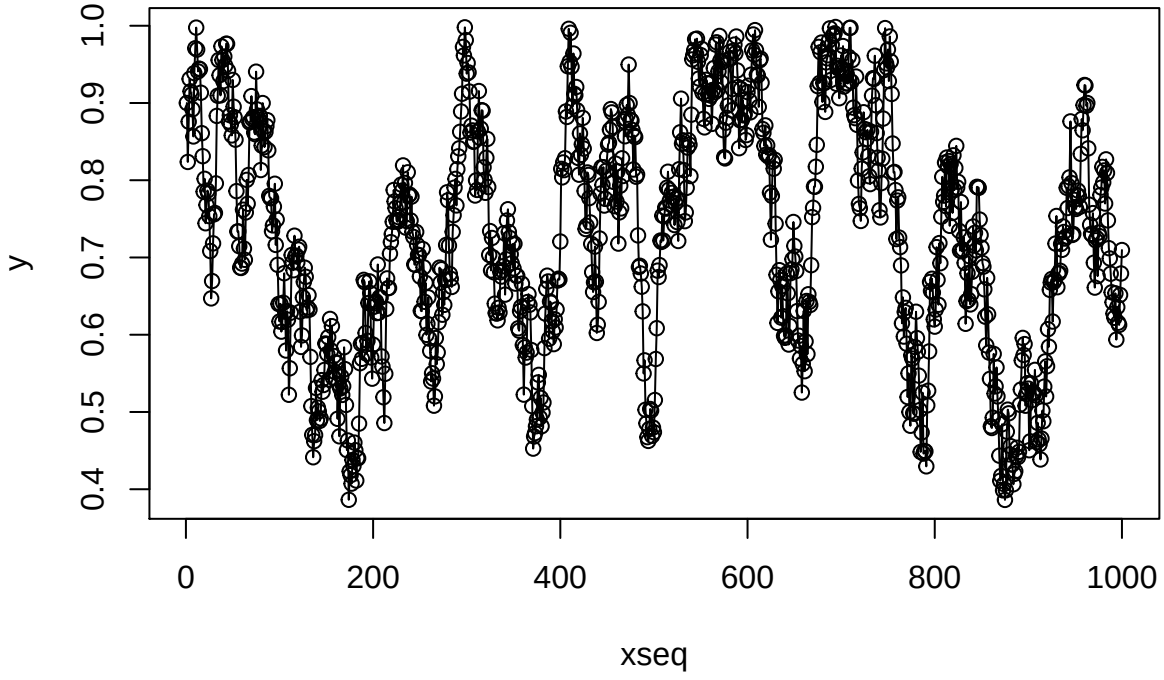


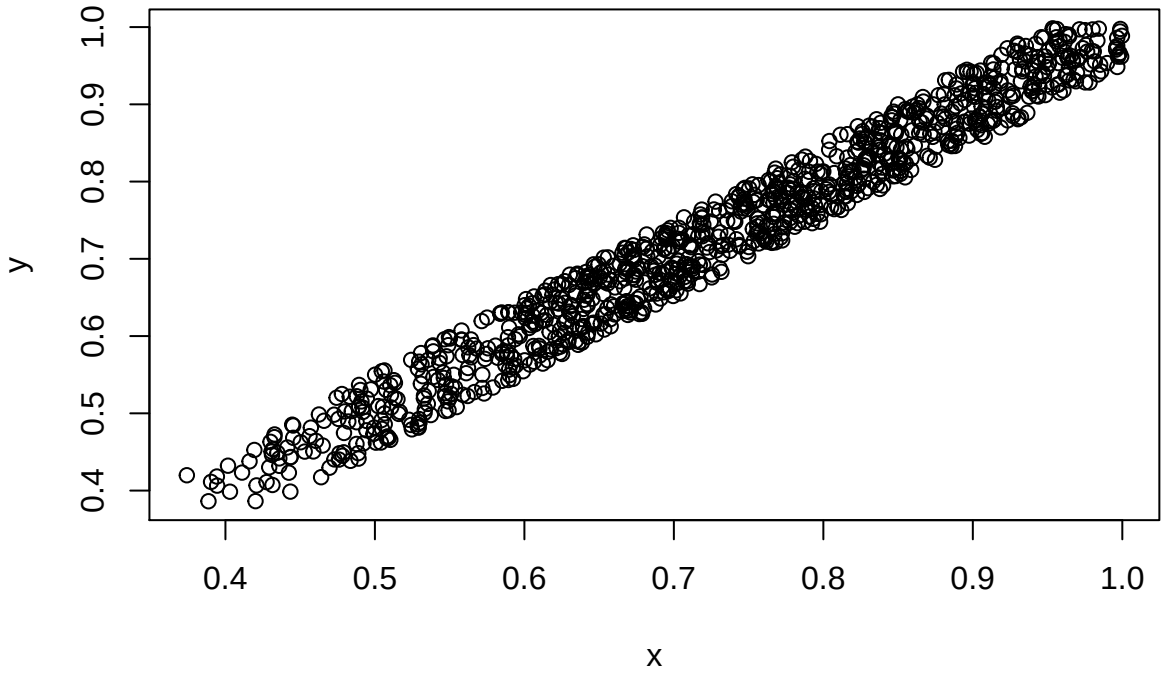

```
## NULL
```

when c= 0.05

```
GS(c[2])
```


x
0.4
0.5
0.6
0.7
0.8
0.9
1.0
0
200
400
600
800
1000
xseq

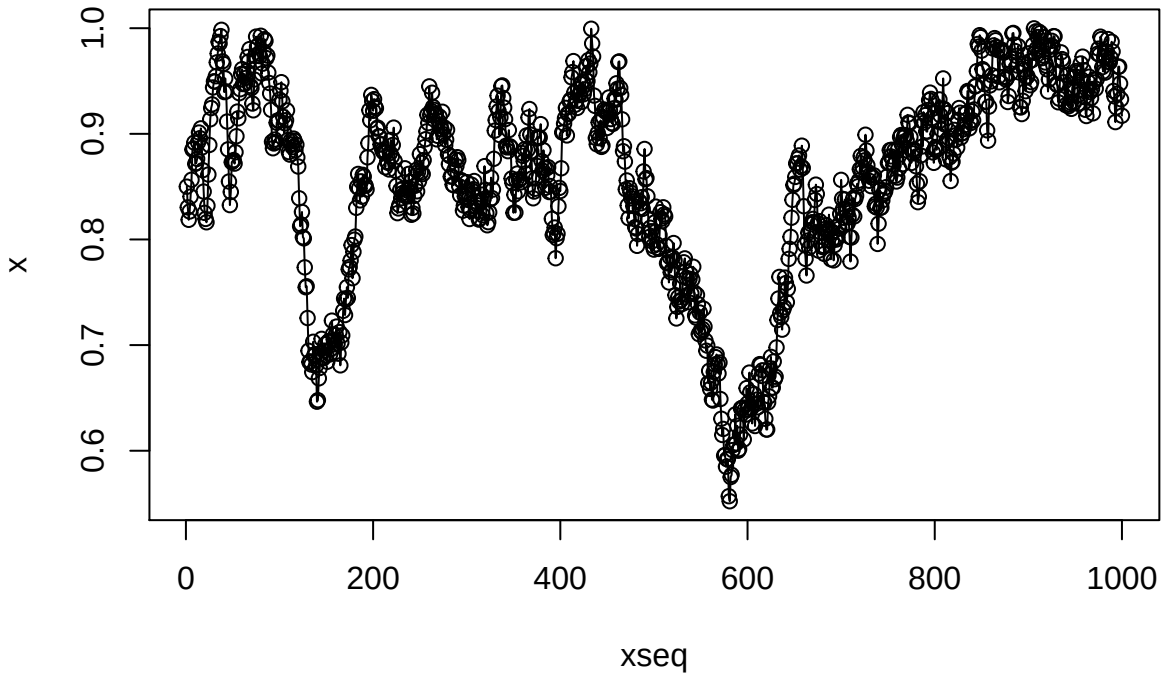

y
0.4
0.5
0.6
0.7
0.8
0.9
1.0
0
200
400
600
800
1000
xseq

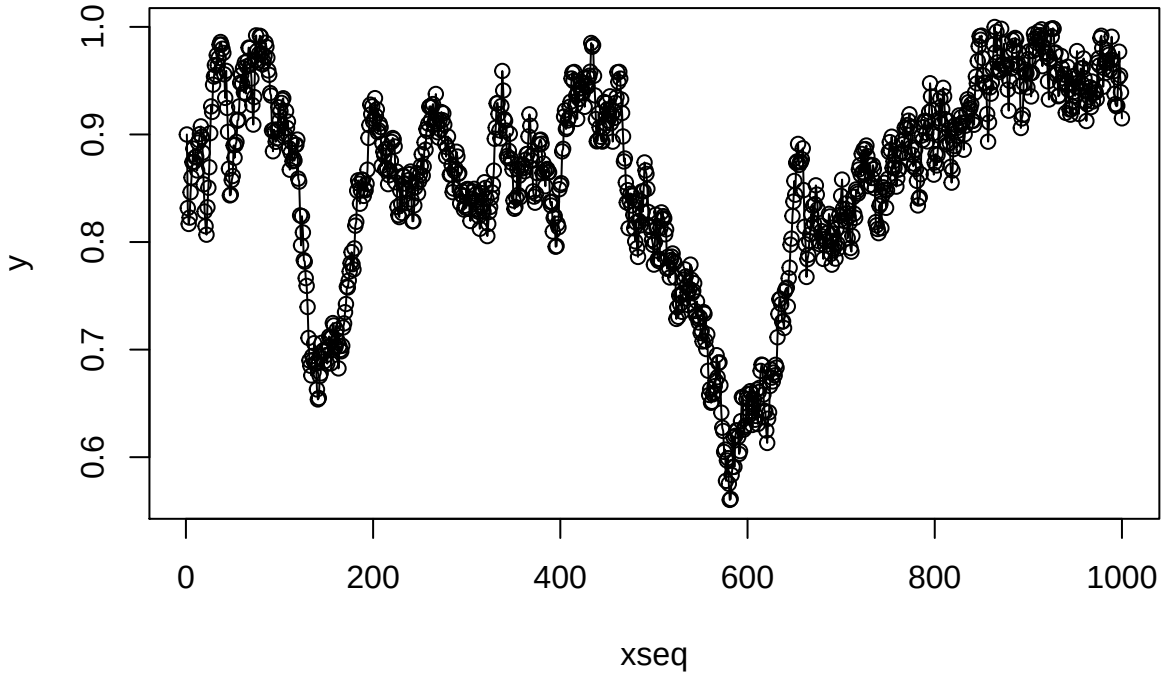


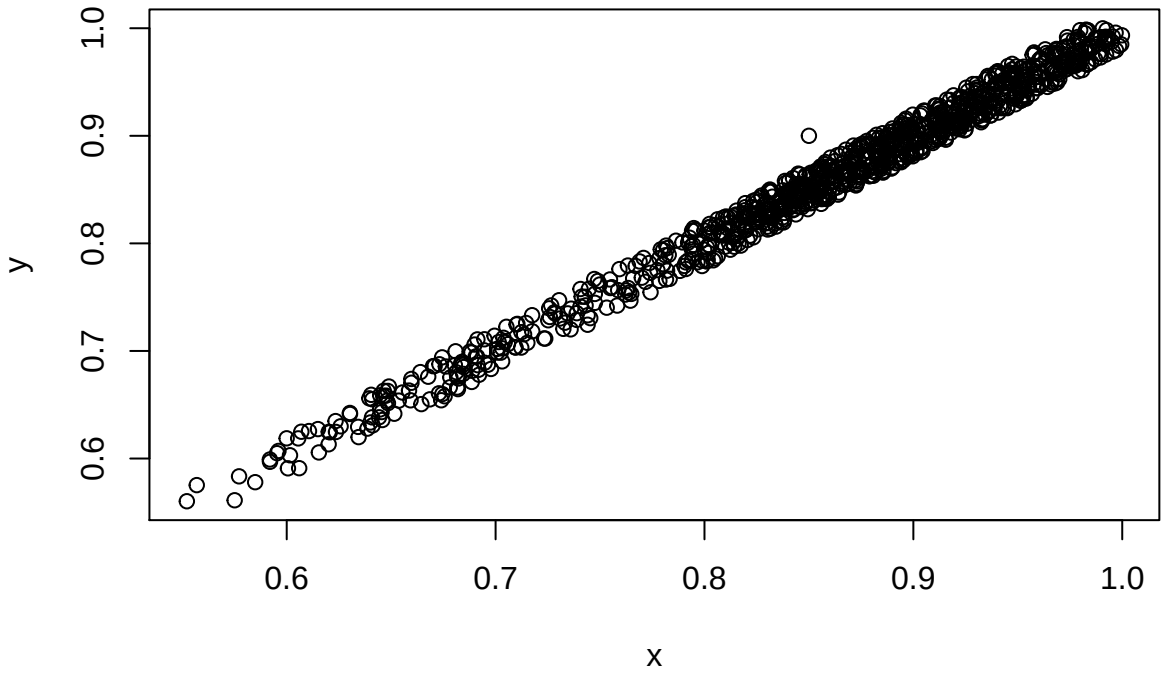

```
## NULL
```

when c = 0.002

```
GS(c[3])
```


x
1.0
0.9
0.8
0.7
0.6
0
200
400
600
800
1000
xseq


y
1.0
0.9
0.8
0.7
0.6
0
200
400
600
800
1000
xseq




```
## NULL
```

Qustion d

Because when c is smaller, the sample will fuctuate and focus on certain areas, which is no longer a normal distribution.

Excercise 2

Question a

$$p(u|v) \sim Uniform(|v|, 1-|v|)$$

$$p(v|u) \sim Uniform(-min(u, c/2, 1-u), min(u, c/2, 1-u))$$

##Question b

```
N <- 10^3

u<-rep(0,N)
v<-rep(0,N)
c<- c(0.25,0.05,0.02)

GS <- function(c){
```

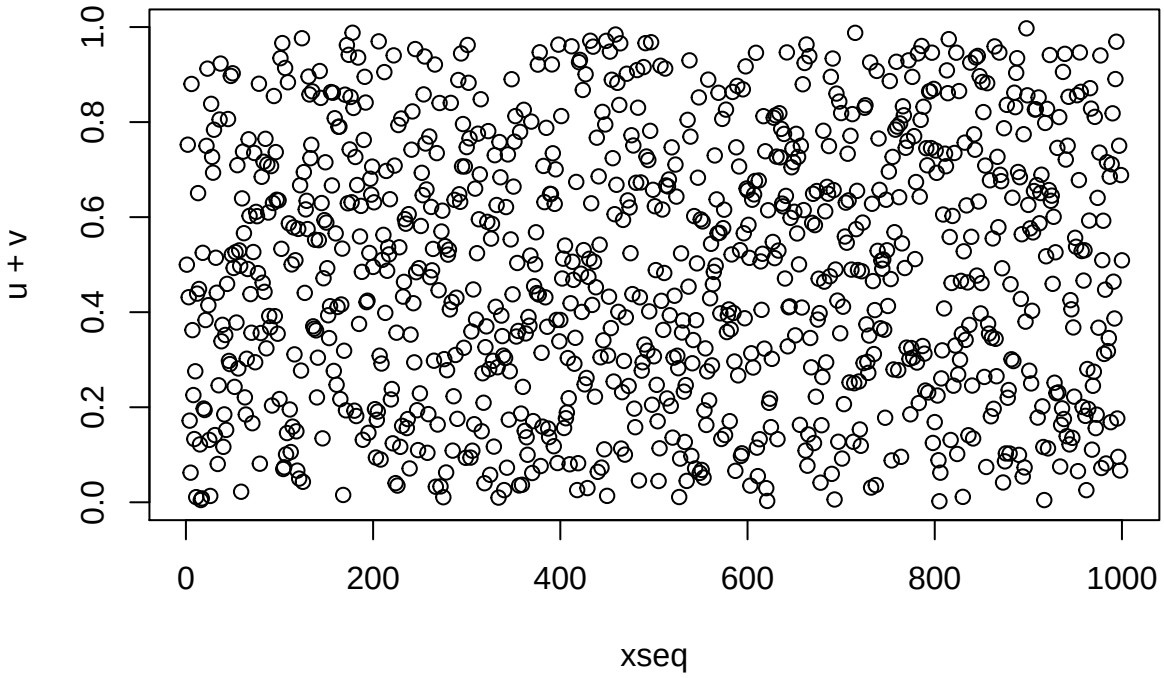
```
u[1] <- 0.3
v[1] <- 0.2

for (i in 2:N){
  u[i] <- runif(1,abs(v[i-1]),1-abs(v[i-1]))
  v[i] <- runif(1,-min(u[i],c/2,1-u[i]),min(u,c/2,1-u))
}

xseq <-seq(1,N)
#traceplot of x
plot(xseq,u+v)
#traceplot of y
plot(xseq,u-v)

#scatterplot
plot(u+v,u-v)


return (NULL)
}
```

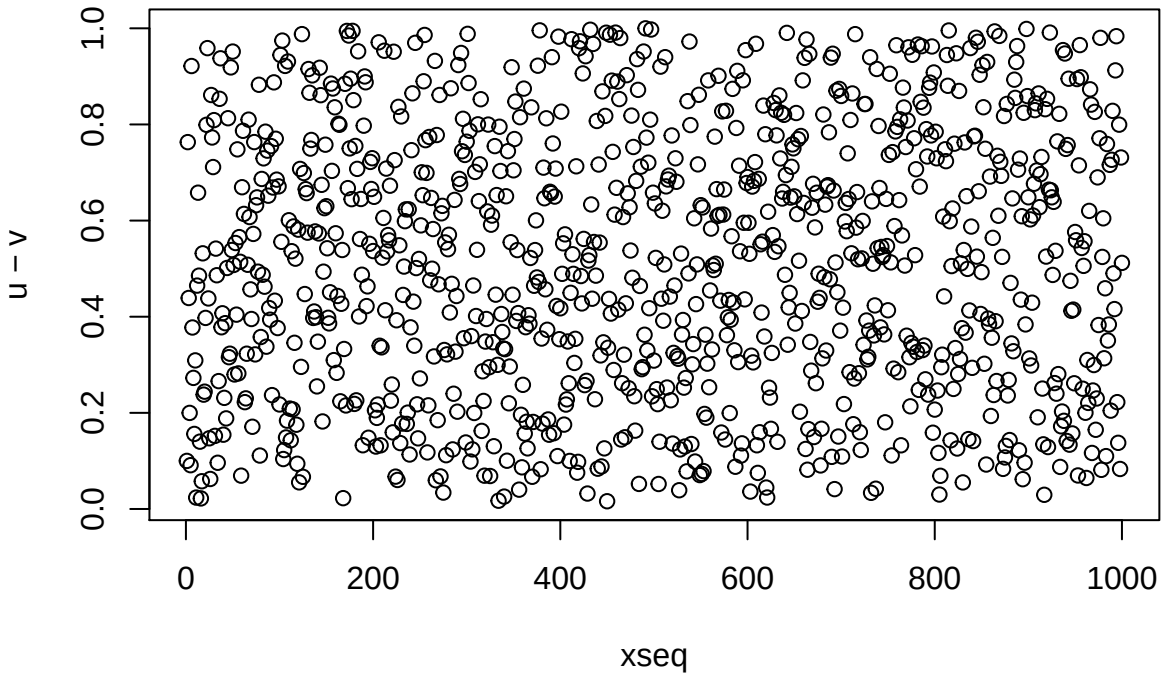
Question c

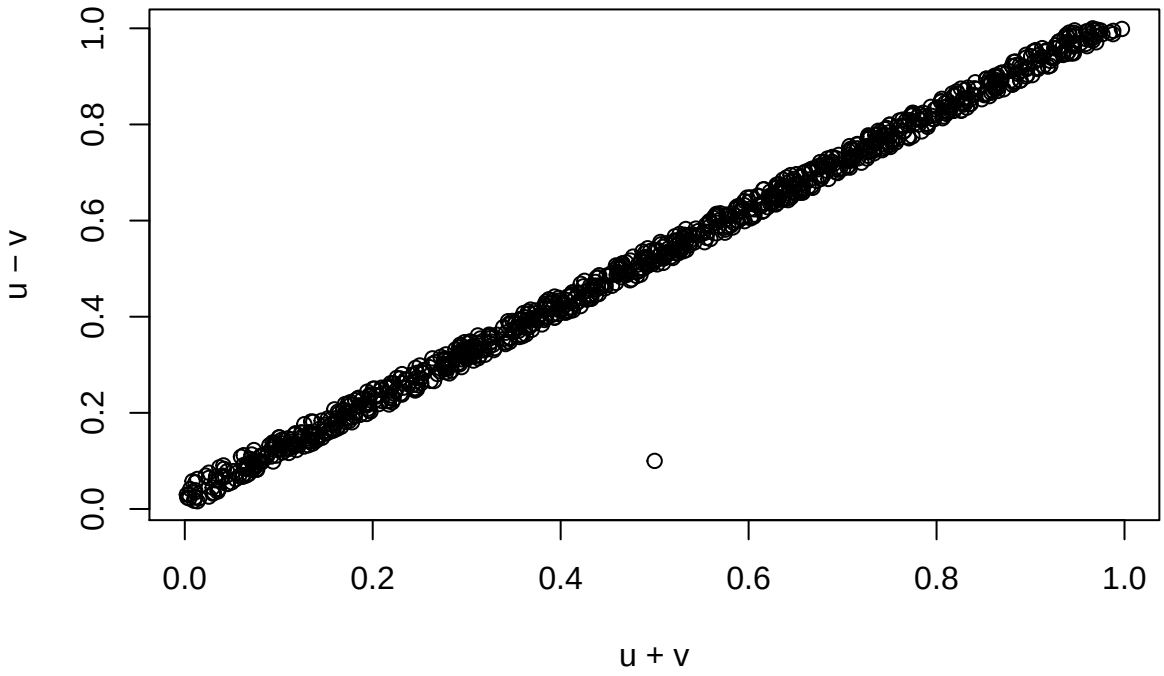
when c = 0.25

when c= 0.05

```
GS(c[2])
```


u + v
0.0
0.2
0.4
0.6
0.8
1.0
0
200
400
600
800
1000
xseq

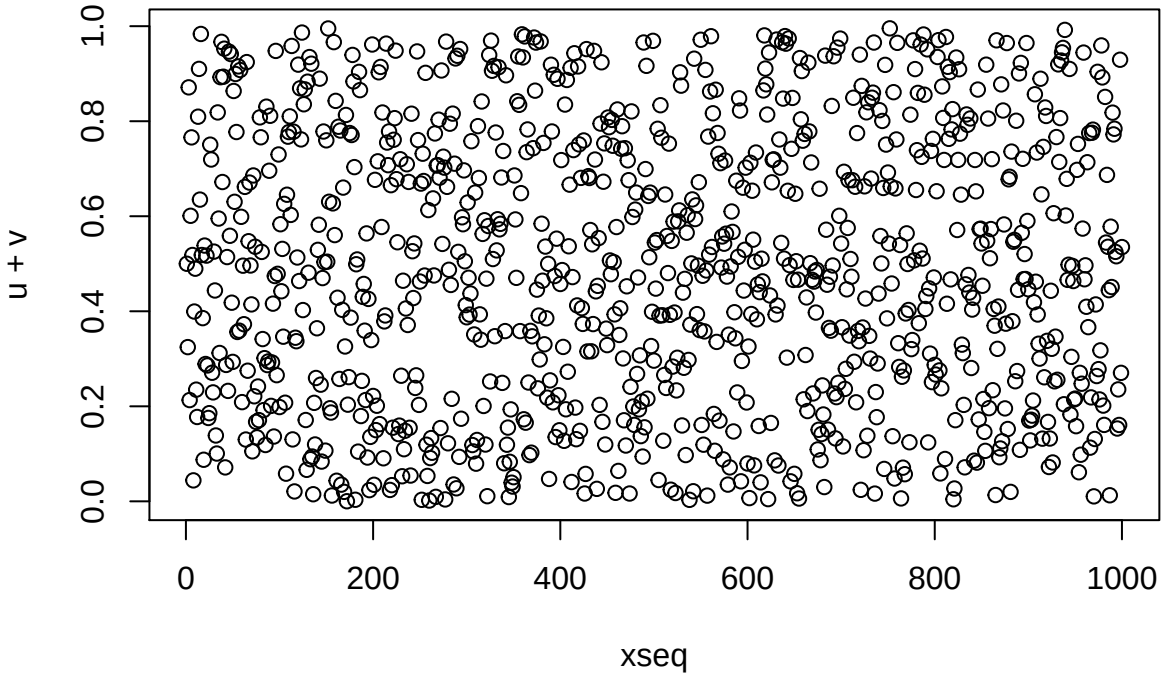

u – v
0.0
0.2
0.4
0.6
0.8
1.0
0
200
400
600
800
1000
xseq

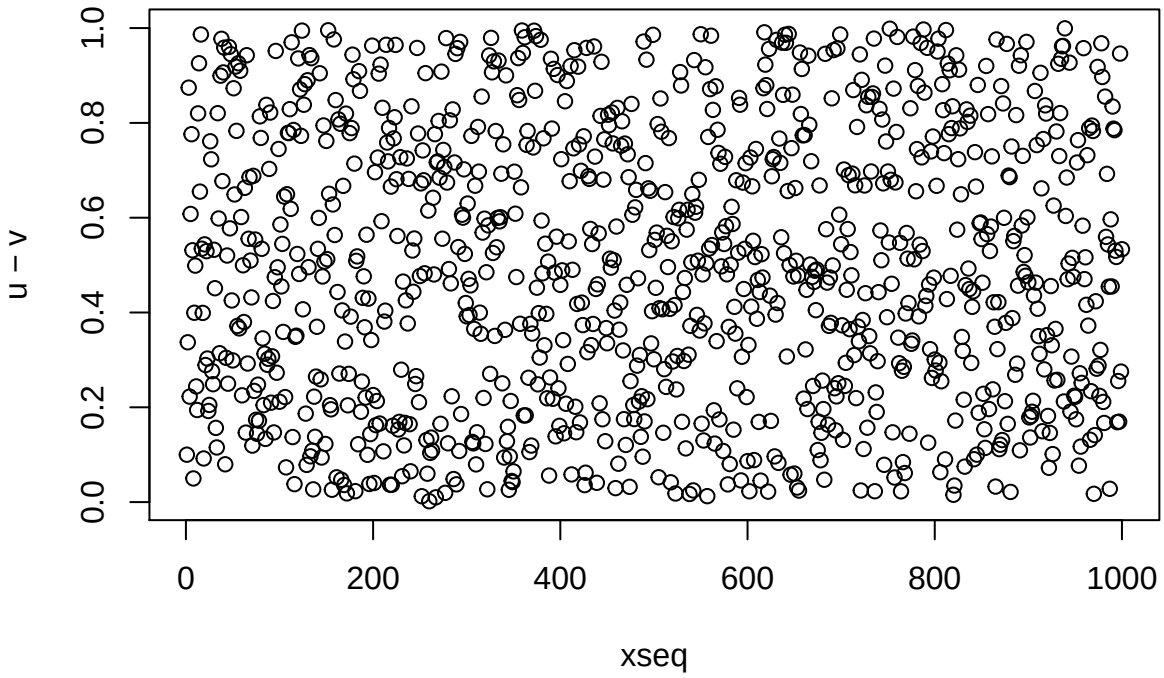


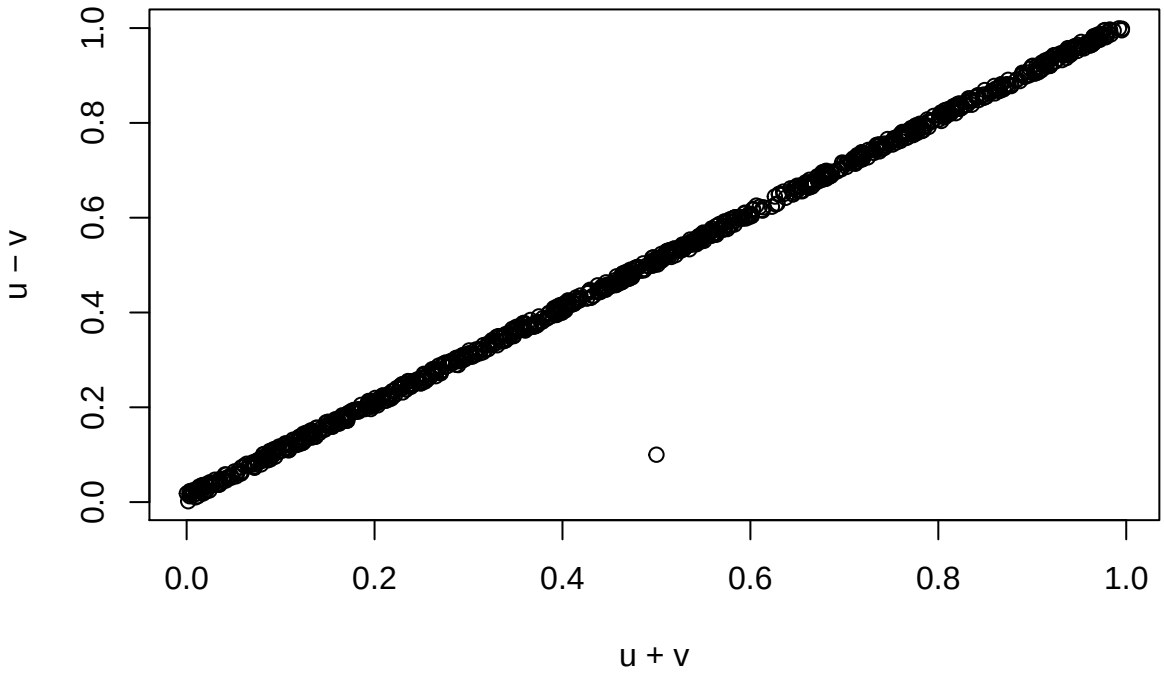

```
## NULL
```

when c = 0.002

```
GS(c[3])
```


u + v
0.0
0.2
0.4
0.6
0.8
1.0
0
200
400
600
800
1000
xseq


u – v
0.0
0.2
0.4
0.6
0.8
1.0
0
200
400
600
800
1000
xseq




```
## NULL
```

Excercise 3

Question a

##Question b

Question c