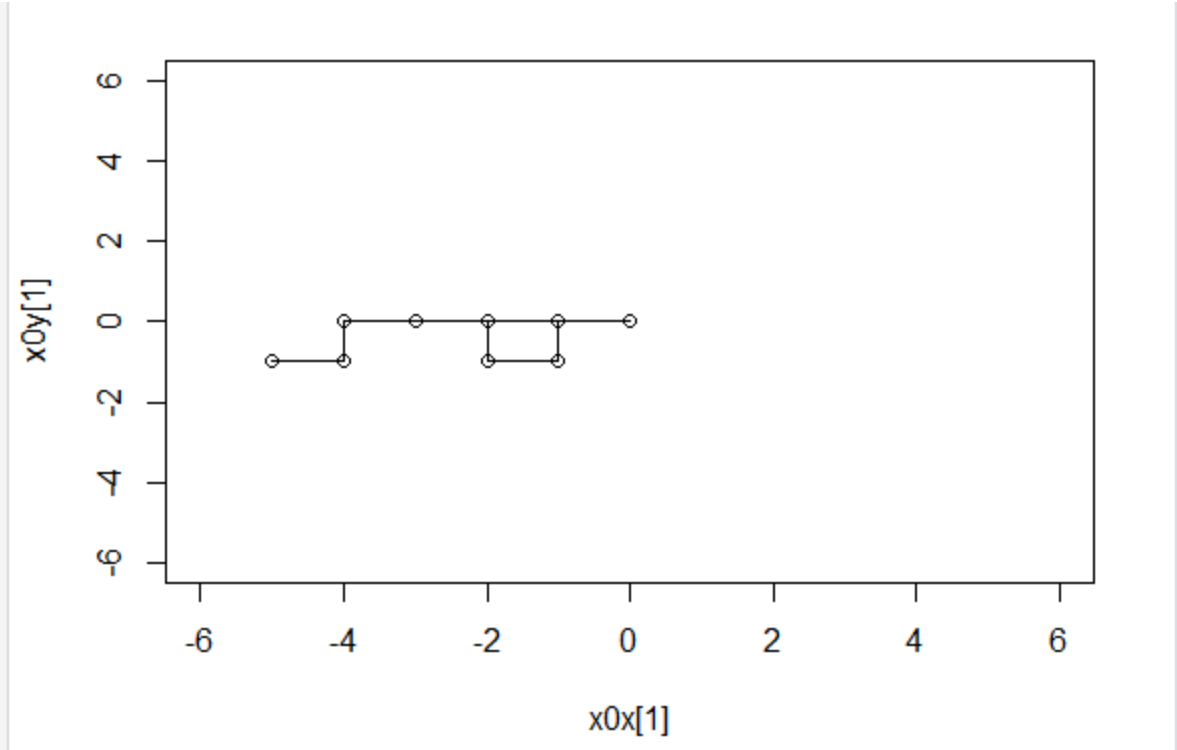
Name:Yuvraj Singh Rajpurohit Bmat2348

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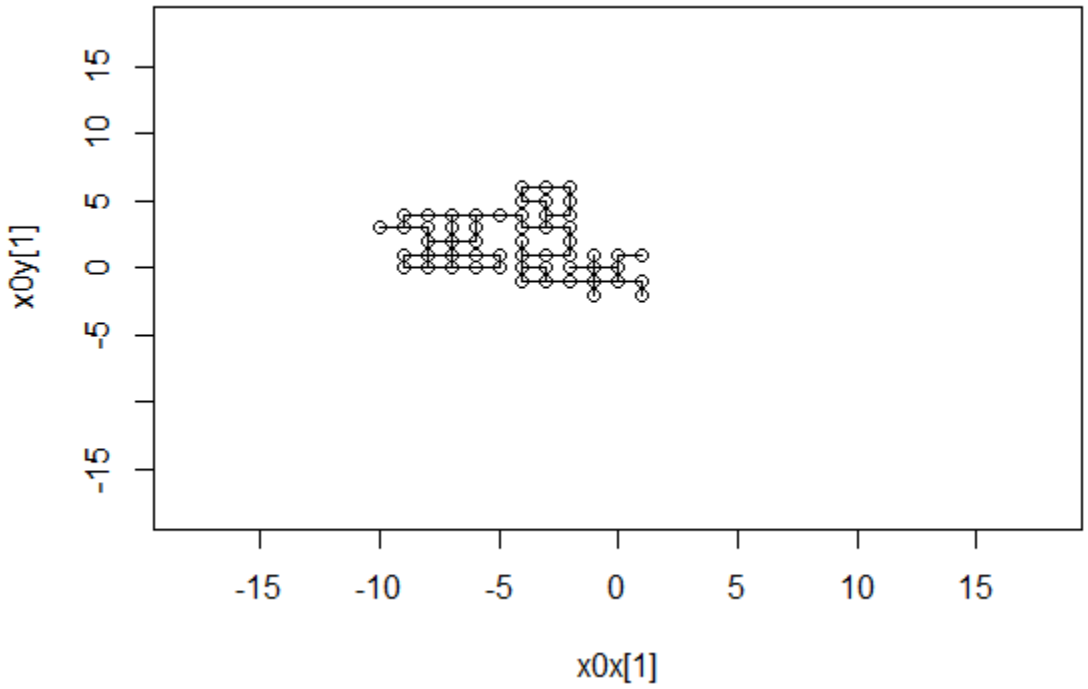
The following is my attempt to the apple bread problem.
(a)

```
x0x=0
> x0y=0
> x0x[1]=0
> x0y[1]=0
> plot(x0x[1],x0y[1],xlim=c(-6,6),ylim=c(-6,6))
> ## fix 1-top, 2-right, 3-down, 4-left
> for(i in 1:10){
+ d=sample(c(1:4),1)
+
+ if(d==1){
+ x0y[i+1]=x0y[i]+1
+ x0x[i+1]=x0x[i]
+ }
+ if (d==2){
+ x0x[i+1]=x0x[i]+1
+ x0y[i+1]=x0y[i]
+ }
+ if (d==3){
+ x0y[i+1]=x0y[i]-1
+ x0x[i+1]=x0x[i]
+ }
+ if (d==4){
+ x0x[i+1]=x0x[i]-1
+ x0y[i+1]=x0y[i]
+ }
+ points(x0x[i+1],x0y[i+1])
+
+ }
> lines(x0x,x0y)
```




```
x0x=0
> x0y=0
> x0x[1]=0
> x0y[1]=0
> plot(x0x[1],x0y[1],xlim=c(-18,18),ylim=c(-18,18))
> ## fix 1-top, 2-right, 3-down, 4-left
> for(i in 1:100){
+ d=sample(c(1:4),1)
+
+ if(d==1){
+ x0y[i+1]=x0y[i]+1
+ x0x[i+1]=x0x[i]
+ }
+ if (d==2){
+ x0x[i+1]=x0x[i]+1
+ x0y[i+1]=x0y[i]
+ }
+ if (d==3){
+ x0y[i+1]=x0y[i]-1
+ x0x[i+1]=x0x[i]
+ }
+ if (d==4){
+ x0x[i+1]=x0x[i]-1
+ x0y[i+1]=x0y[i]
+ }
+ points(x0x[i+1],x0y[i+1])
```

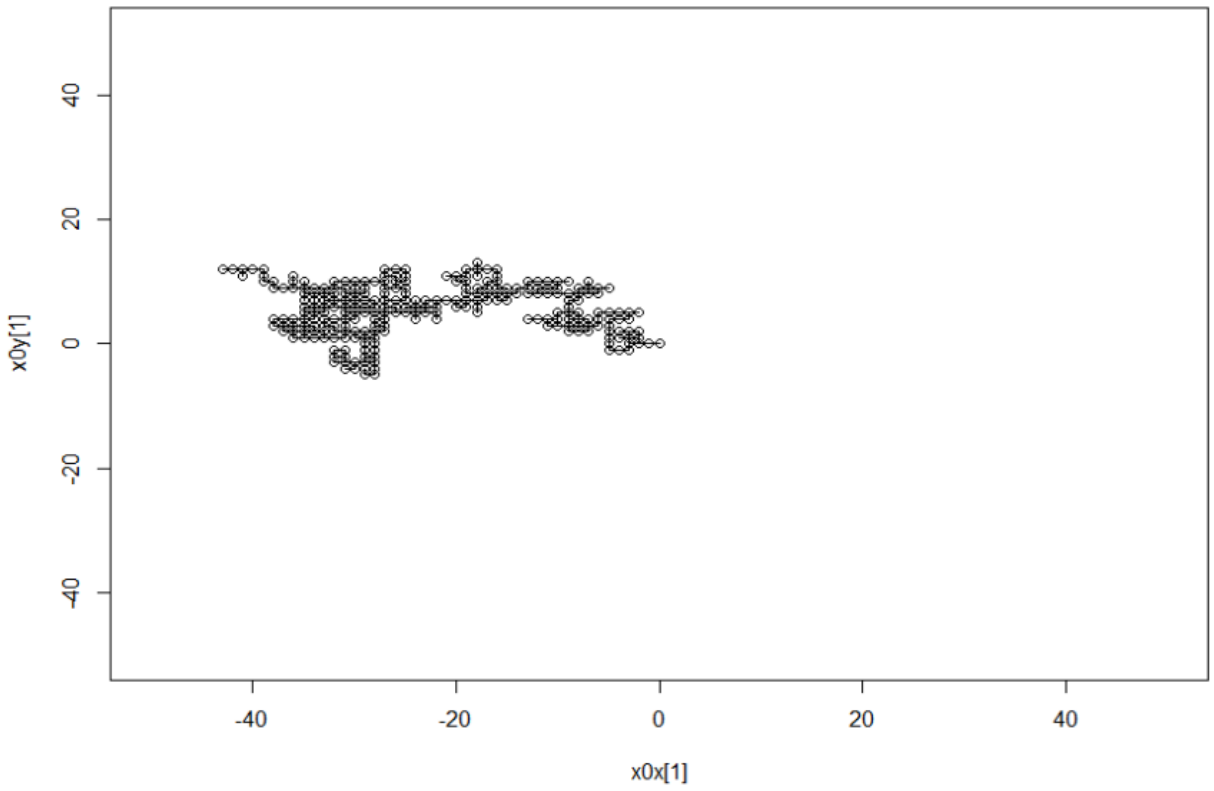
```
+
+ }
> lines(x0x,x0y)
```




(c)

```
x0x=0
> x0y=0
> x0x[1]=0
> x0y[1]=0
> plot(x0x[1],x0y[1],xlim=c(-50,50),ylim=c(-50,50))
> ## fix 1-top, 2-right, 3-down, 4-left
> i=1
> while(abs(x0x[i])+abs(x0y[i])<55){
+ d=sample(c(1:4),1)
+
+ if(d==1){
+ x0y[i+1]=x0y[i]+1
+ x0x[i+1]=x0x[i]
+ }
+ if (d==2){
+ x0x[i+1]=x0x[i]+1
+ x0y[i+1]=x0y[i]
+ }
+ if (d==3){
+ x0y[i+1]=x0y[i]-1
+ x0x[i+1]=x0x[i]
+ }
+ if (d==4){
```

```
+ x0x[i+1]=x0x[i]-1
+ x0y[i+1]=x0y[i]
+
+ }
+ points(x0x[i+1],x0y[i+1])
+ i=i+1
+
+ }
> lines(x0x,x0y)
> i-1
[1] 503
```

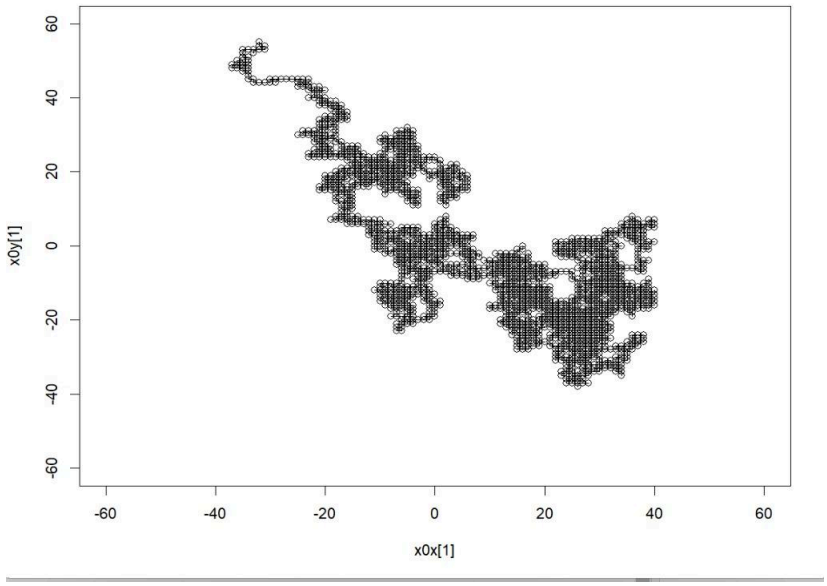



(d)

I am modifying the question as discussed in class. That the point starts at origin and keeps randomly walking till it hits the square at 55 unit distance vertically and horizontally from the origin.

x0x=0
> x0y=0
> x0x[1]=0
> x0y[1]=0
> plot(x0x[1],x0y[1],xlim=c(-60,60),ylim=c(-60,60))
> ## fix 1-top, 2-right, 3-down, 4-left
> i=1

```
> while(x0x[i]!=55 && x0y[i]!=55 && x0x[i]!=-55 && x0y[i]!=-55 ){
+   d=sample(c(1:4),1)
+
+   if(d==1){
+     x0y[i+1]=x0y[i]+1
+     x0x[i+1]=x0x[i]
+   }
+   if (d==2){
+     x0x[i+1]=x0x[i]+1
+     x0y[i+1]=x0y[i]
+   }
+   if (d==3){
+     x0y[i+1]=x0y[i]-1
+     x0x[i+1]=x0x[i]
+   }
+   if (d==4){
+     x0x[i+1]=x0x[i]-1
+     x0y[i+1]=x0y[i]
+   }
+
+
+   points(x0x[i+1],x0y[i+1])
+   i=i+1
+ }
> lines(x0x,x0y)
> i
[1] 5662
>
```




Also i am attaching the code for the actual part d but my laptop couldn't run it through(got hanged after 10 mins). So i don't have an output but hopefully the code should work on a good enough machine.

```
> x0x=0
> x0y=0
> x0x[1]=55
> x0y[1]=0
> plot(x0x[1],x0y[1],xlim=c(-1000,1000),ylim=c(-1000,1000))
> ## fix 1-top, 2-right, 3-down, 4-left
> i=1
> while(x0x[i]!=0 ||x0y[i]!=0){
+   d=sample(c(1:4),1)
+
+   if(d==1){
+     x0y[i+1]=x0y[i]+1
+     x0x[i+1]=x0x[i]
+   }
+   if (d==2){
+     x0x[i+1]=x0x[i]+1
+     x0y[i+1]=x0y[i]
+   }
+   if (d==3){
+     x0y[i+1]=x0y[i]-1
+     x0x[i+1]=x0x[i]
+   }
+   if (d==4){
+     x0x[i+1]=x0x[i]-1
```

```
+     x0y[i+1]=x0y[i]
+   }
+
+
+   points(x0x[i+1],x0y[i+1])
+   i=i+1
+ }
lines(x0x,x0y)
i
```