TP 2 de probabilités

IS3

1/8/2021

Exercice 1

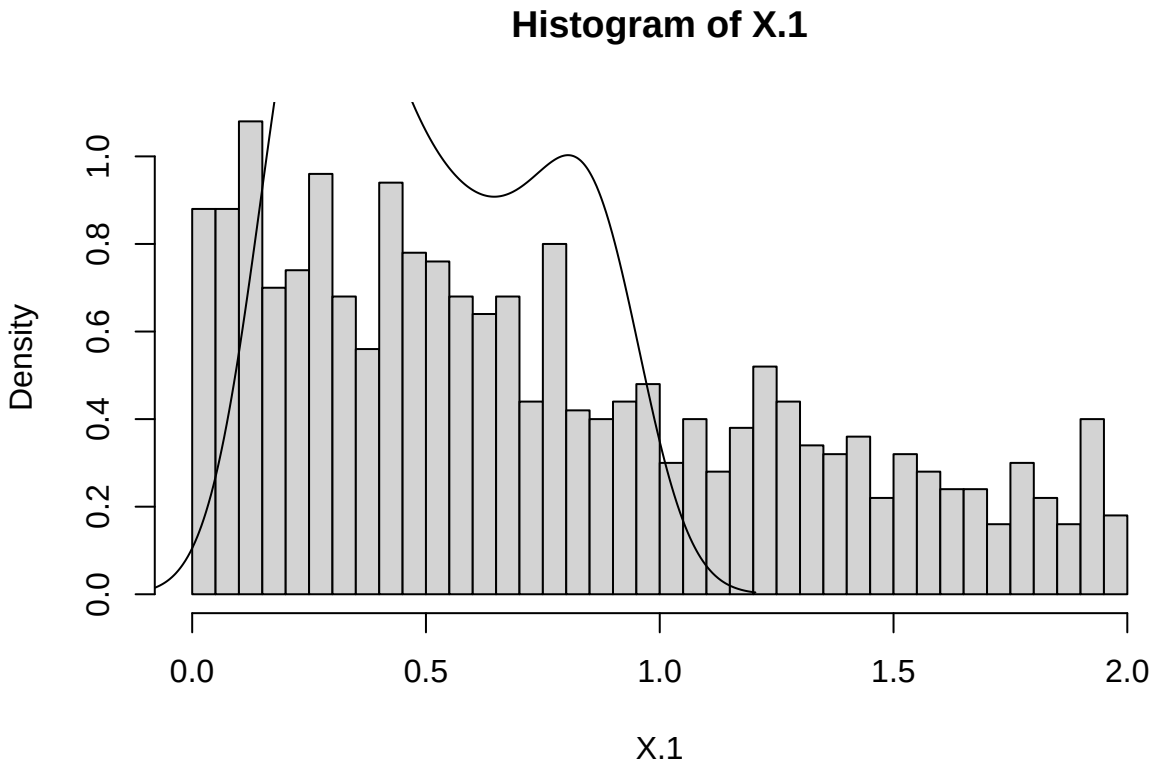
```
c <- 1/(atan(2)- atan(0)) # c=1/arctan(2)
c
```

```
## [1] 0.903221
```

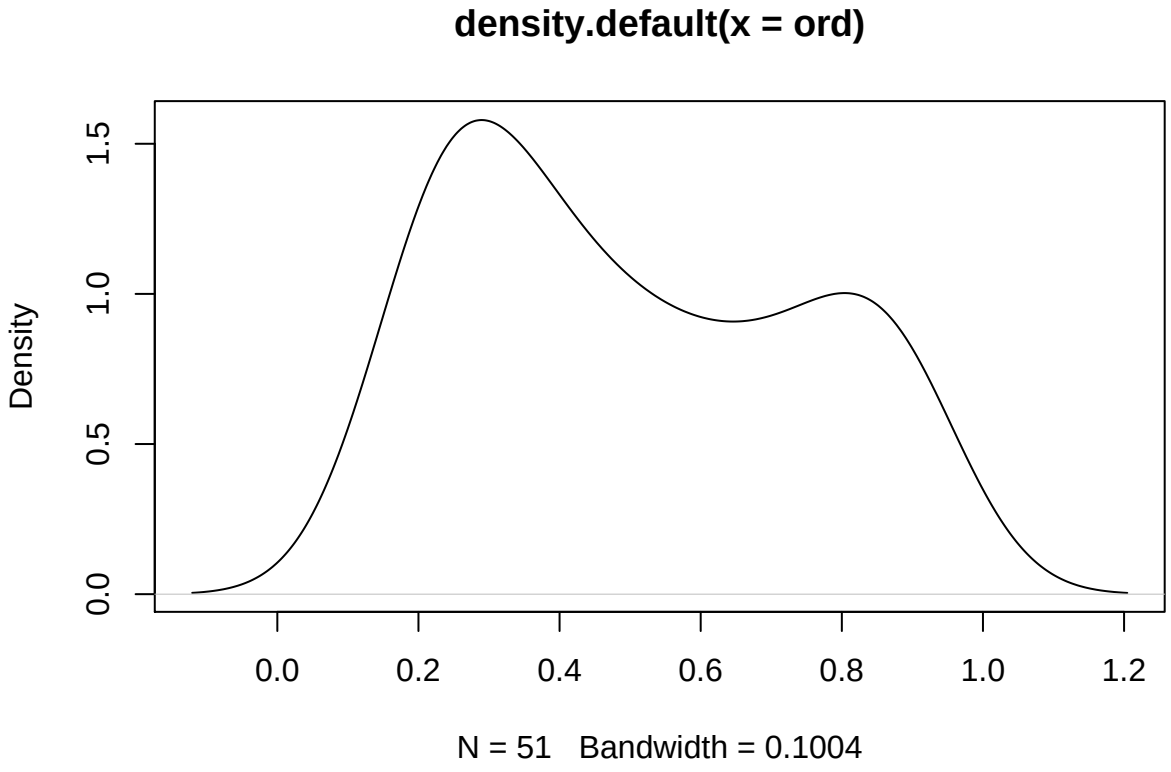
```
# F(x) = c*arctan(x) = arctan(x)/arctan(2)
# la reciproque est donc  tan(y.arctan(2))
U <- runif(1000,0,1)
X.1 <- tan(U*atan(2))


f.x <-  function(x){
  ifelse(x>=0 & x<=2,c/(1+x^2),0)
}
abs <- seq(0,2,by=0.04)
ord <- c()
for(k in abs) ord <-  c(ord,f.x(k))

hist(X.1,breaks=50,probability = TRUE )
lines(density(ord))
```



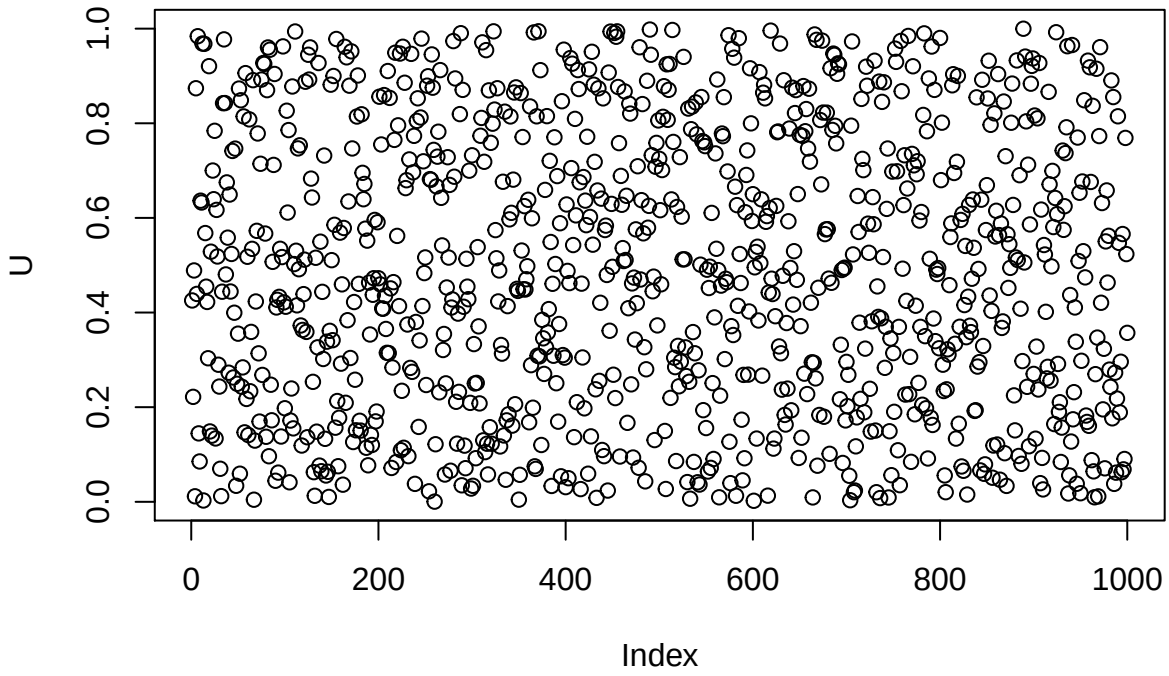

```
plot(density(ord))
```



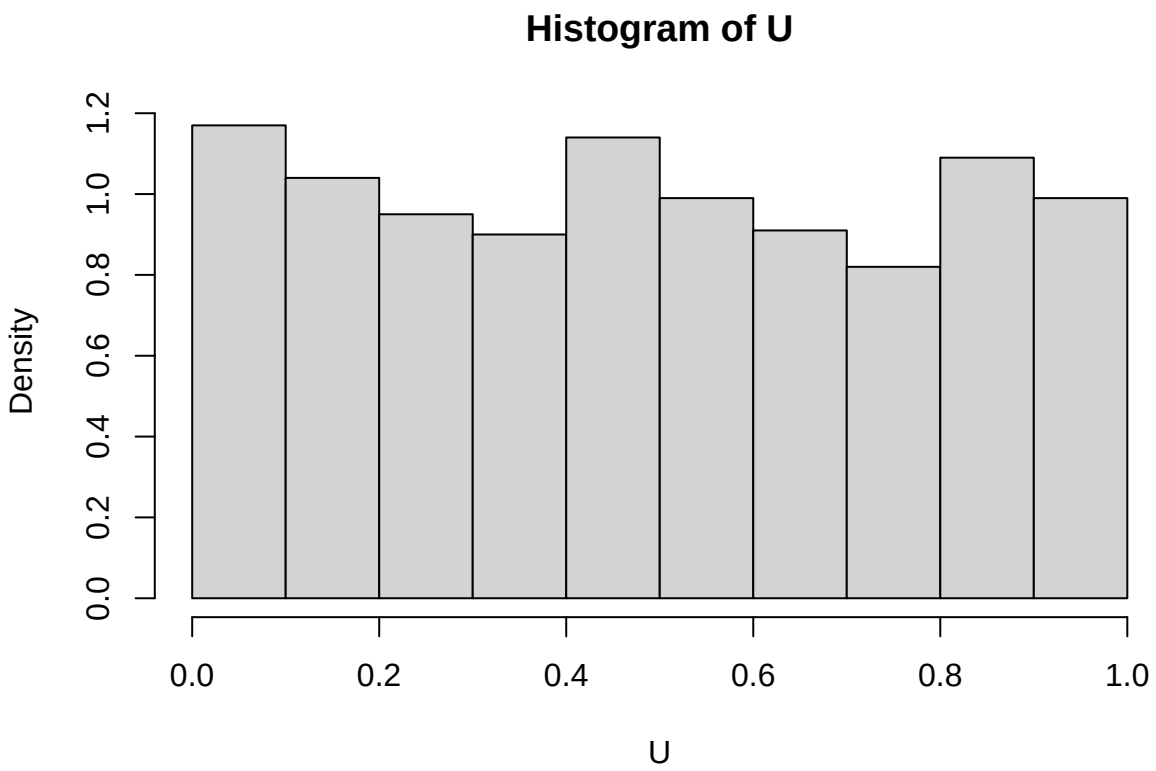

```
#curve(density(ord))
```

Exercice 2

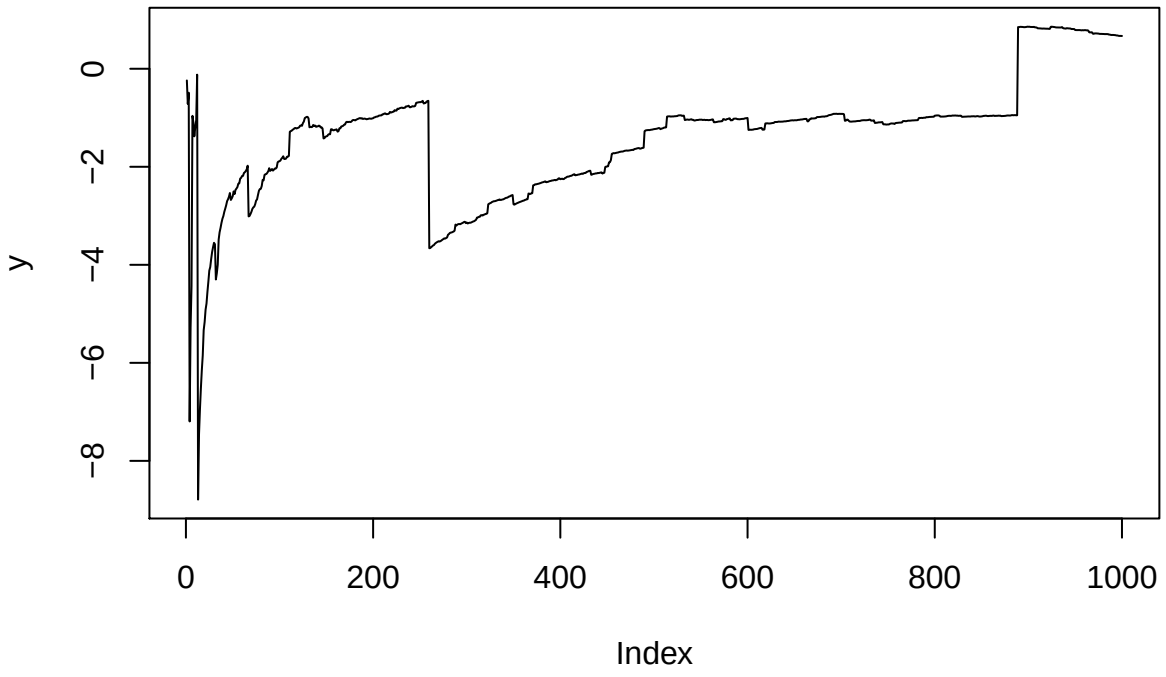
```r
#F(x) = 1/pi(arctan(x)+1/2)
#la reciporque est tan(pi*U-1/2)
U <- runif(1000,0,1)
plot(U)
```




```r
X <- tan(pi*(U-0.5))
hist(U,freq=FALSE)
```




```
extrapolation <- function(n,X){
  return(sum(X[1:n])/n)
}
x<-1:1000
y<-c()
for(j in x){
  y <- c(y,extrapolation(j,X))
}
plot(y,type='l')
```

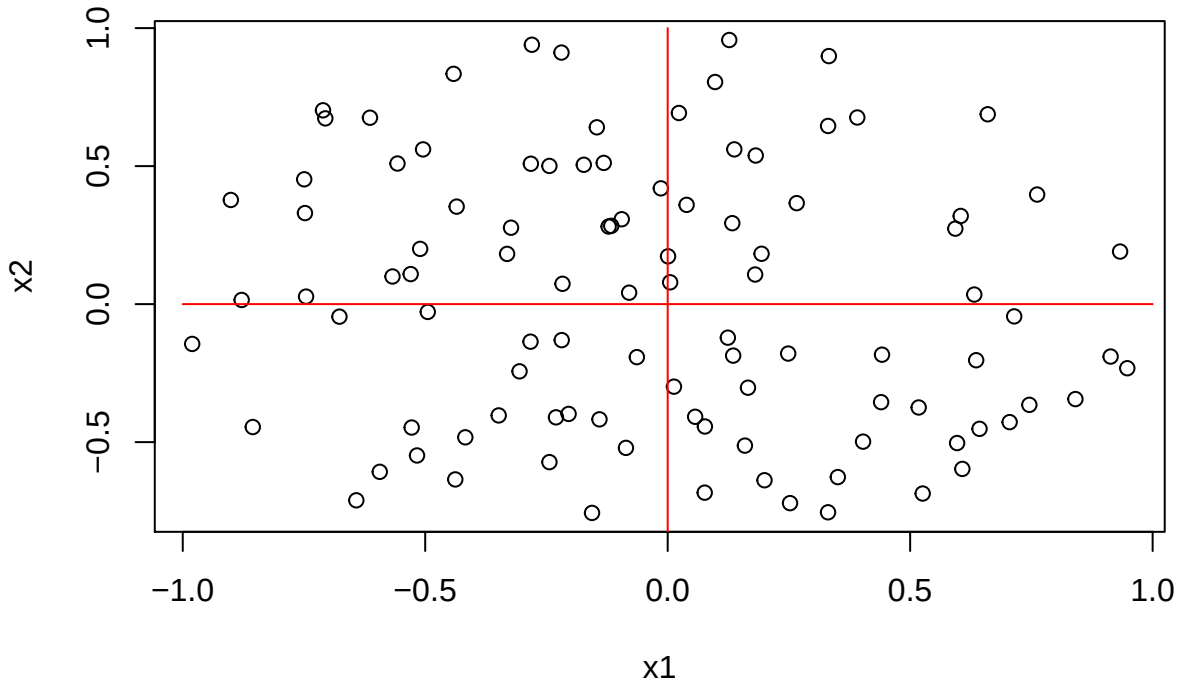


Exercice 4

```
x1 <- c()
x2 <- c()
k  <- 0

N_max <- 100 # taille du vecteur uniforme
while ( k< N_max){
  u <-runif(2,-1,1)
  # Appartenance au disque => x^2 + y^2=1
  if(u[1]^2+u[2]^2 <= 1){
    k <- k+1
    x1 <- c(x1,u[1])
    x2 <- c(x2,u[2])
  }
}
plot(x1,x2)
abs <-seq(-1,1,by=0.1)
ord <-rep(0,21)

lines(abs,ord,col="red")
lines(ord,abs,col="red")
```




```
moyenne_unif <- mean(sqrt(x1^2 +x2^2))
print(moyenne_unif)
```

```
## [1] 0.6243591
```