Expotential task 1

Chao XIA

01/14/2019

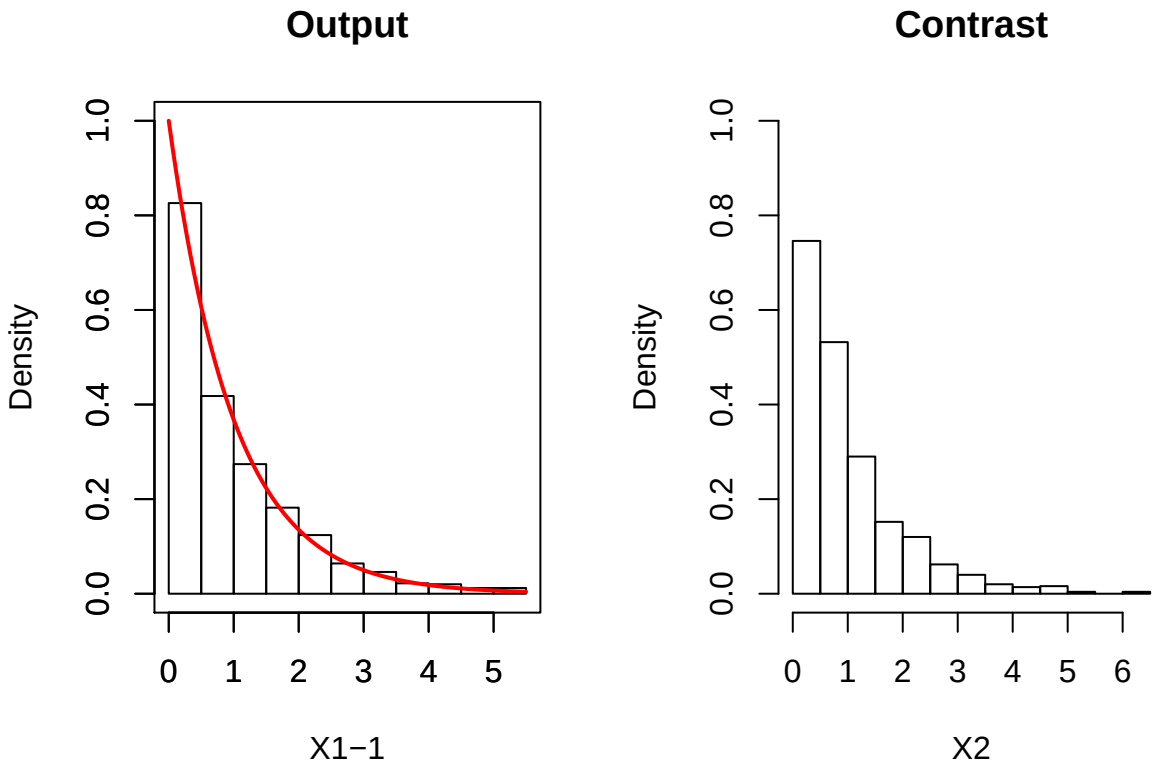
Generate X1 with exponential distribution larger than y

```
set.seed(2018)
X1<-numeric()
GenerateX1<-function(y,t){
  x<-0
  while (x<y){
    x <- rexp(1,t)
  }
  return(x)
}
n = 1000
for (i in 1:n){
  X1[i] = GenerateX1(1,1)
}
```

Plot histogram and Density Curve

```
X2 <- rexp(1000,1)
output <- X1-1

par(mfrow = c(1,2))
h <- hist(output, main = 'Output', xlab = 'X1-1', ylim = 0:1, freq = F, breaks = 10)
par(new = T)
curve(dexp(x), col = 'red', lwd = 2, xlab = '', ylab = '', xlim = range(h$breaks), ylim = 0:1)
hist(X2, main = 'Contrast', freq = F, breaks = 10, ylim = 0:1)
```



Discussion

From the these two figure, we found that the distribution of exponential conditional on y and t is just as same as the exponential density function.

I think this is because the memoryless property of Expotential Distribution, which means:

$$P(T > s + t | T > t) = P(T > s)$$

In this example,

$$P(T > 0 + 1 | T > 1) = P(T > 0)$$
$$P(T > 1 + 1 | T > 1) = P(T > 1)$$
$$\textit{and so on}$$

it is obvious that their distribution will be the same.