Lab 4

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Problem 8d)

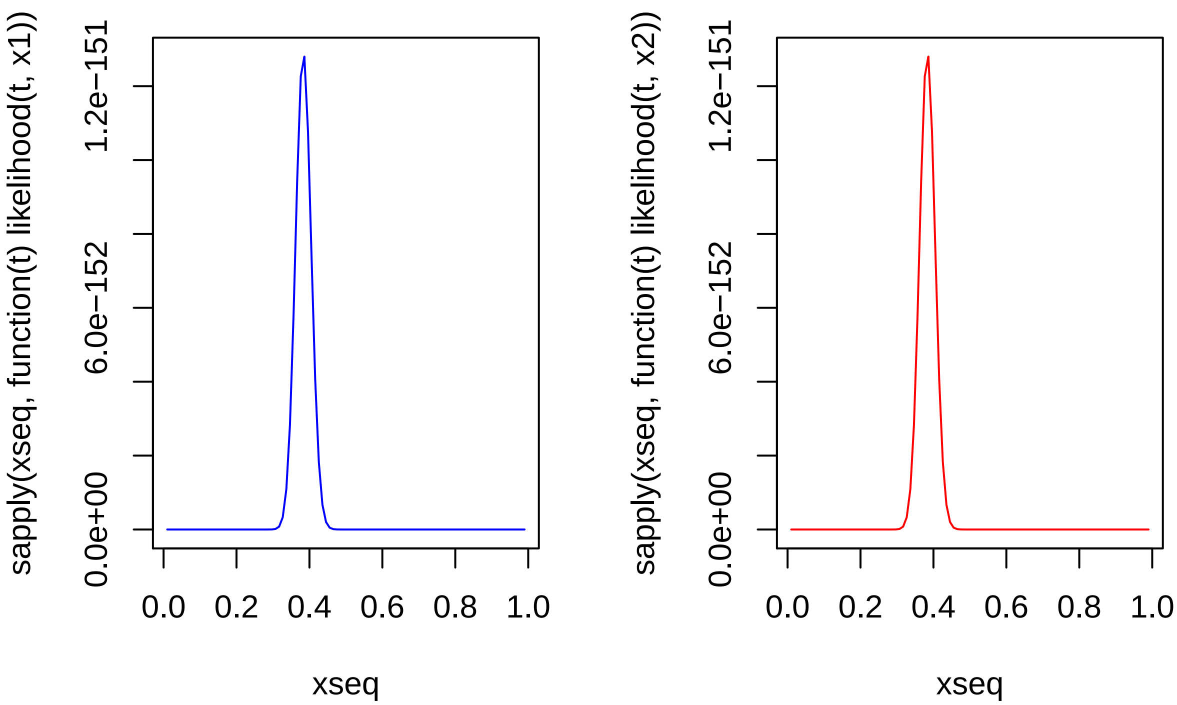
Since $X + 1 = Z$ where Z is geometrically distributed with parameter π this means that we can generate a sample from X by first generating geometrically distributed random variables and then removing 1.

```
T <- function(X){
  sum(X)
}

likelihood <- function(t,X){
  prod(dgeom(X,t))
}

x1 <- rgeom(200,0.4)
x2 = sample(x1,length(x1),replace=FALSE)

xseq <- seq(0+0.01,1-0.01,length=100)
par(mfrow=c(1,2))
plot(xseq,sapply(xseq,function(t) likelihood(t,x1)),type="l",col="blue")
plot(xseq,sapply(xseq,function(t) likelihood(t,x2)),type="l",col="red")
```



T is a sufficient statistic for π and since we are sampling form x_1 without replacement we will get the same sample but in a different order. This means that $T(x1) = T(x2)$ so the sufficiency principle says that we should draw the same conclusions regarding π from sample x_1 and sample x_2. We see that the likelihood functions for x_1 and x_2 are exactly the same which makes it reasonable to draw the same conclusions about π.