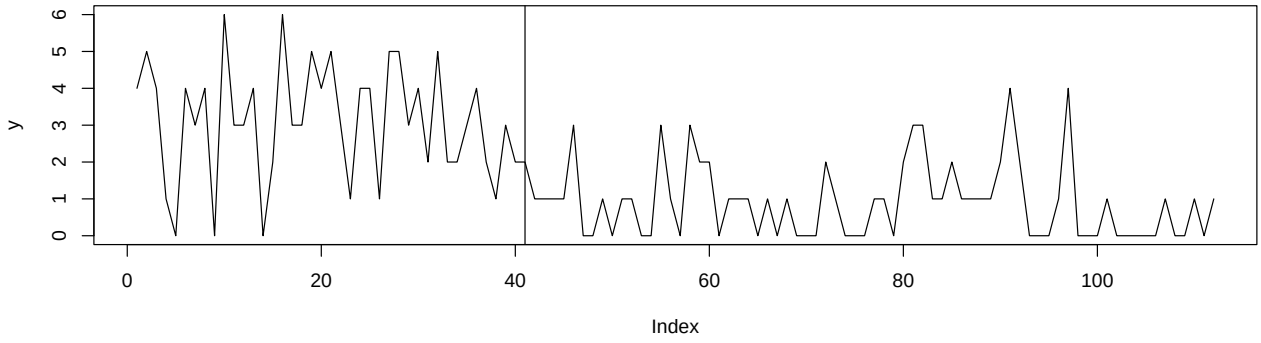
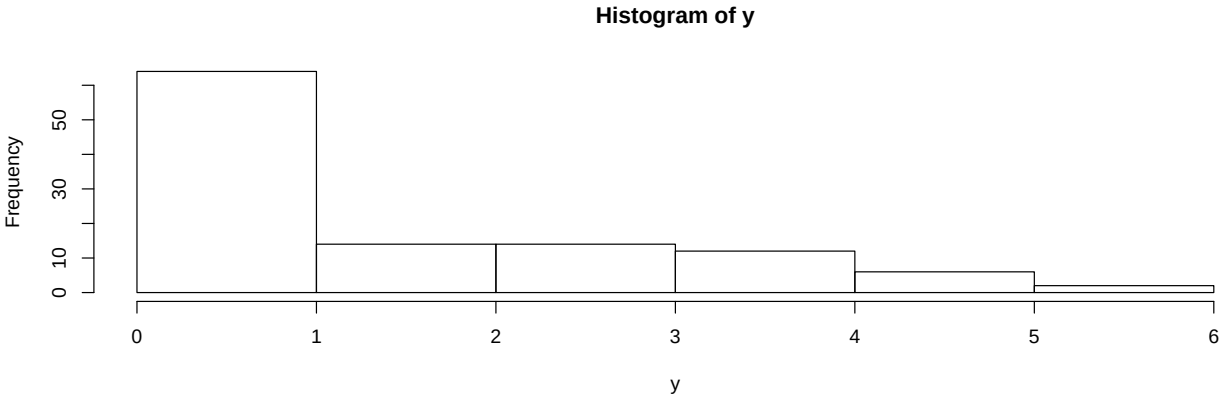
```
# Poisson Process with a Change Point:  Originally analysed by
# Carlin, Gelfand and Smith (1992) and used in Tanner's Tools
# for Statistical Inference (page 147)
# ----------------------------------------------------------
y<-c(4,5,4,1,0,4,3,4,0,6,3,3,4,0,2,6,
3,3,5,4,5,3,1,4,4,1,5,5,3,4,2,5,2,2,3,
4,2,1,3,2,2,1,1,1,1,3,0,0,1,0,1,1,0,0,3,
1,0,3,2,2,0,1,1,1,0,1,0,1,0,0,0,2,1,0,0,
0,1,1,0,2,3,3,1,1,2,1,1,1,1,2,4,2,0,0,0,
1,4,0,0,0,1,0,0,0,0,0,1,0,0,1,0,1)
n<-length(y)

# Likelihood function
lik<-function(k,theta,lambda,y,n){
   theta^(ifelse(k>1,sum(y[1:k]),0))*exp(-k*(theta-lambda))
  *lambda^(ifelse(k<n,sum(y[(k+1):n]),0))
}

# hyperparameters
# ---------------
a1<-1.0
b1<- 1.0
a2<-1
b2<-1

# initial value for k
# -------------------
k<-41
```

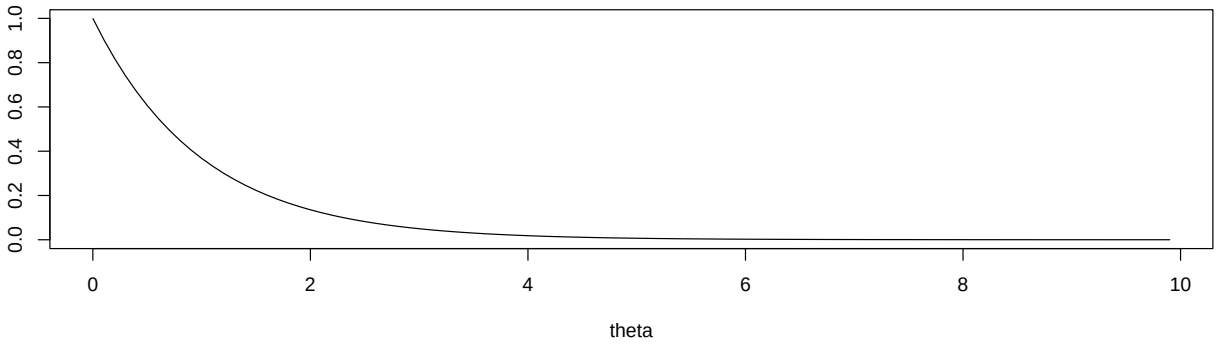
```
# Gibbs Sampler
# -------------
M<-1000
draws<-NULL
# Gibbs Sampler
for (i in 1:M){
print(i)
theta<-rgamma(1,shape=ifelse(k>1,sum(y[1:k]),0)+a1,rate=k+b1)
lambda<-rgamma(1,shape=ifelse(k<n,sum(y[(k+1):n]),0)+a2,rate=n-k+b2)
   liks<-NULL
   for (j in 1:n){liks<-c(liks,lik(j,theta,lambda,y,n))}
   k<-sample(1:n,size=1,prob=liks)
   draws<-rbind(draws,c(theta,lambda,k))
}
nome<-c("theta","lambda","k")
par(mfrow=c(3,2))
for (i in 1:3){
plot(draws[,i],xlab="iteration",ylab=nome[i],type='l')
hist(draws[,i],xlab=nome[i],prob=T)
}
```

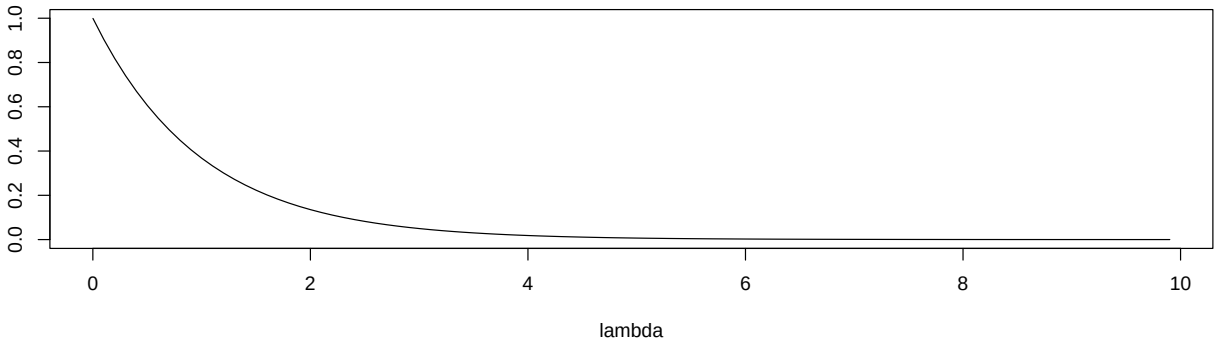
Time series and histogram of the data





Prior distributions on θ and λ





Posterior simulations and histograms for (θ, λ, k)