Assignment-4

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1 Question 1

Code for R

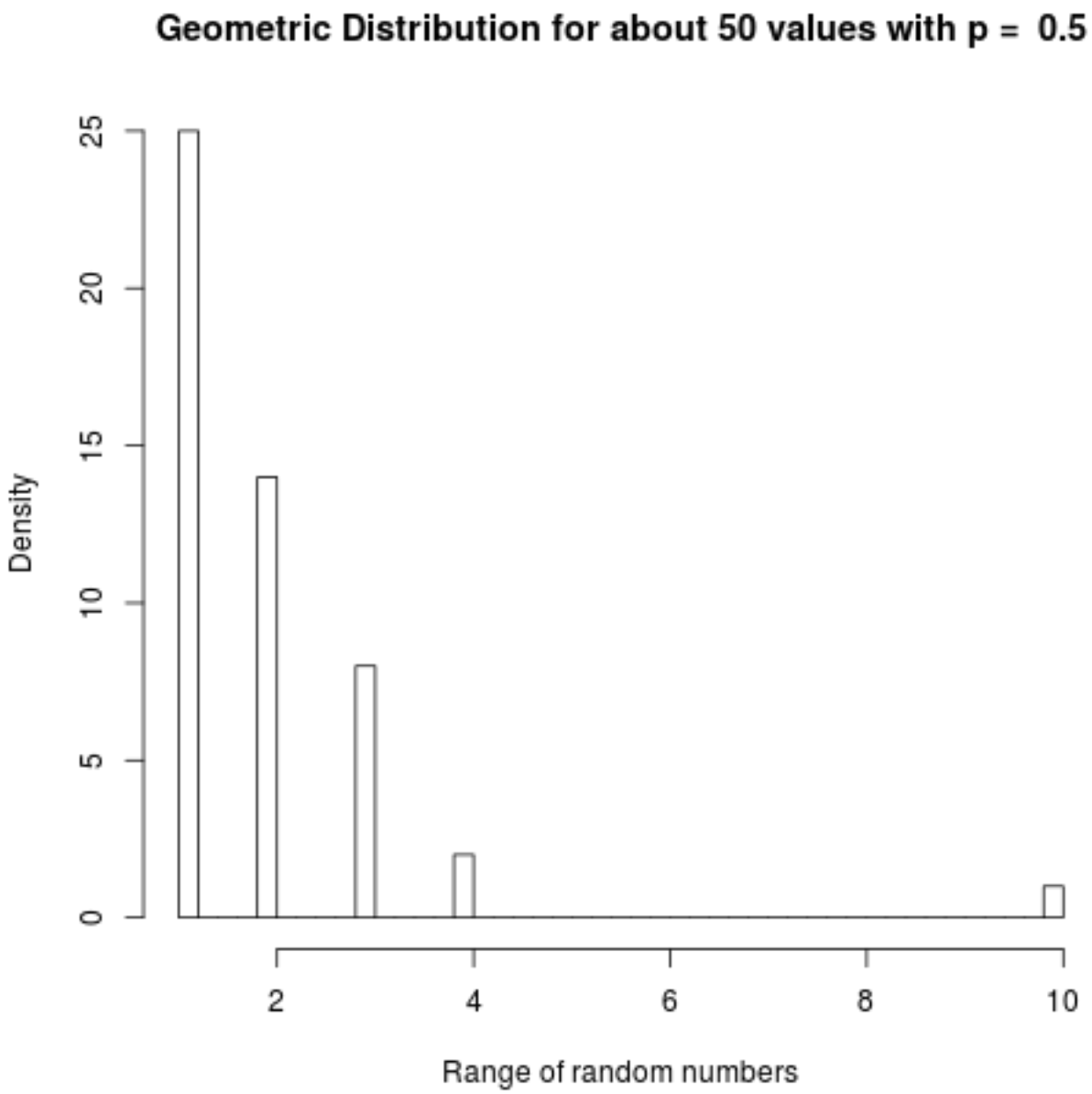
```
#taking 3 p randomly.
q <- c(0.5, 0.8, 0.25)

#no of random numbers
n <- 50

u <- runif(n)

for (i in 1:3)
{
   r <- as.integer(log(u)/log(q[i])) + 1
   print(1-q[i])
   print(r)
   hist(r, main=paste("Geometric Distribution for about 50 values with p = ", 1-q[i]) , xlab="
       Range of random numbers", ylab="Density", breaks=50)
   if(i == 1)
      dev.copy(png, "plot1_1.png")
   if(i == 2)
      dev.copy(png, "plot1_2.png")
   if(i == 3)
      dev.copy(png, "plot1_3.png")
   dev.off ()
}
```

Geometric Distribution

p = 0.5

Values

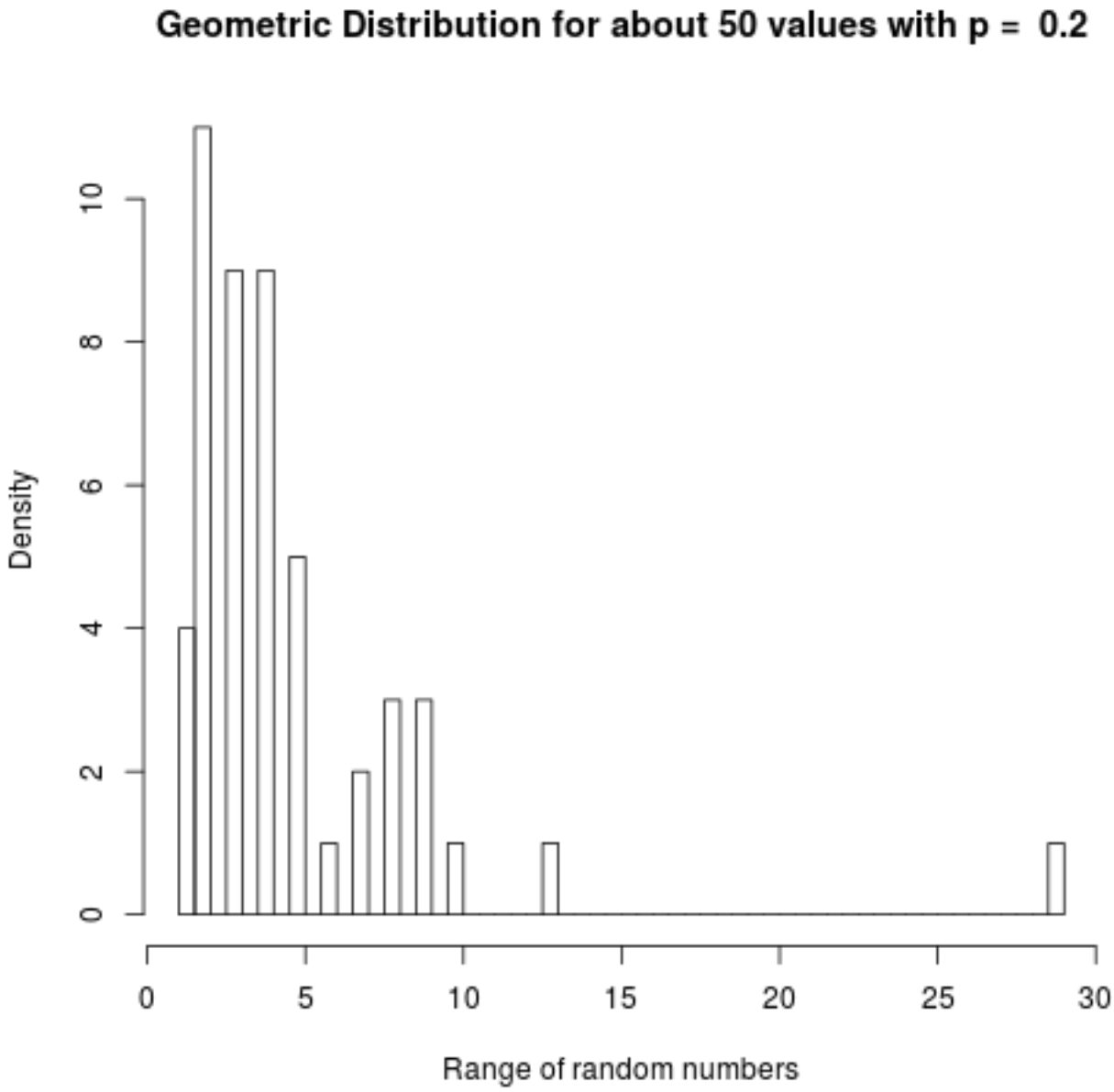
5 2 1 3 1 1 3 2 1 1 2 3 2 2 1 1 3 2 1 3 1 1 3 1 1 2 2 1 1 1 2 1 2 1 1 1 1 2 2 1 1 5 1 1 4 1 1 1 3 3



p = 0.2

Values

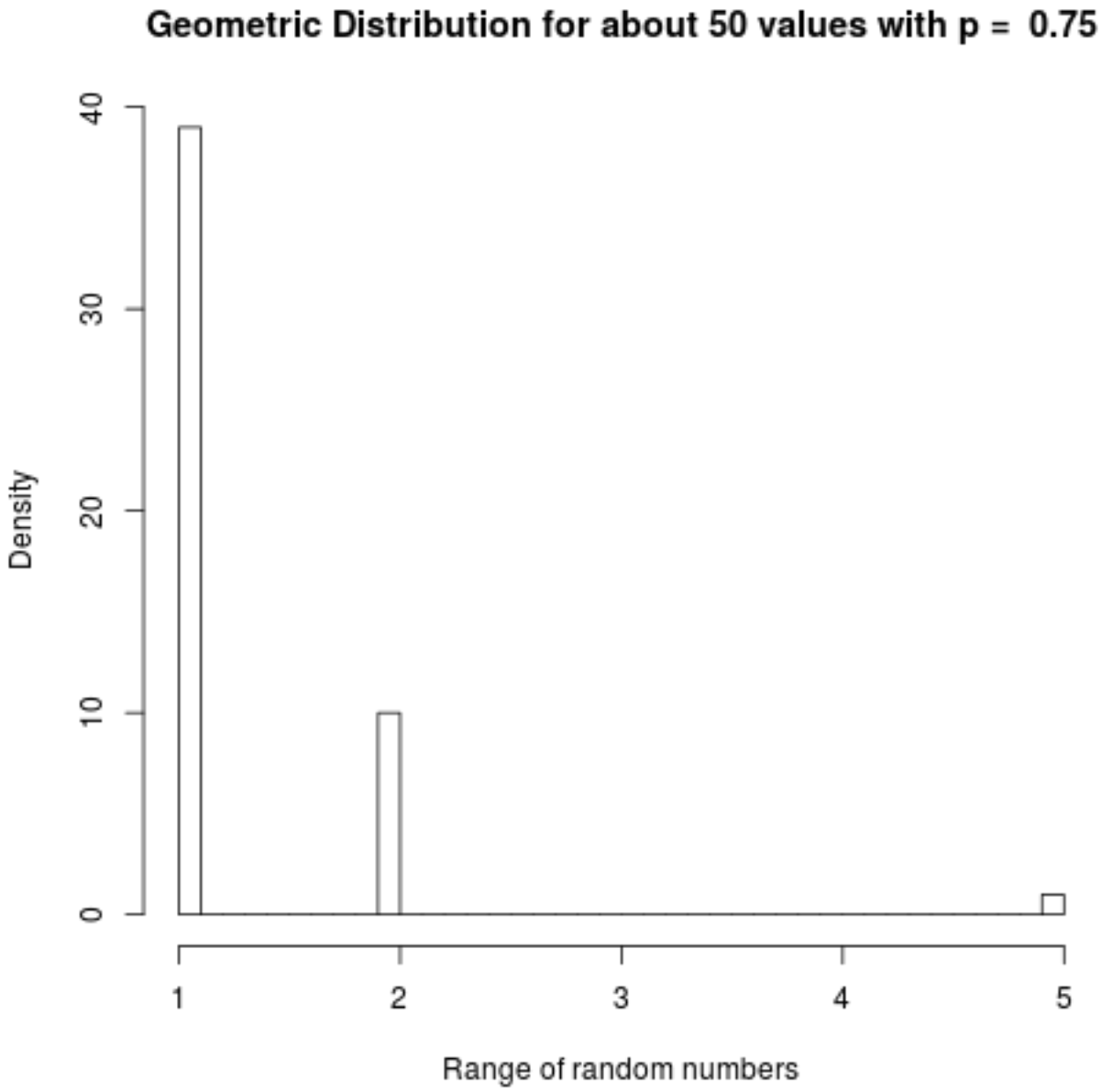
14 5 1 8 1 1 8 7 3 3 5 7 4 5 3 3 10 4 2 7 3 2 8 1 2 4 5 2 1 2 4 1 5 3 1 2 2 5 4 2 1 14 1 2 13 3 3 2 9 8



p = 0.75

Values

3 1 1 2 1 1 2 1 1 1 1 2 1 1 1 1 2 1 1 2 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 3 1 1 2 1 1 1 2 2



2 Question 2

Code for R

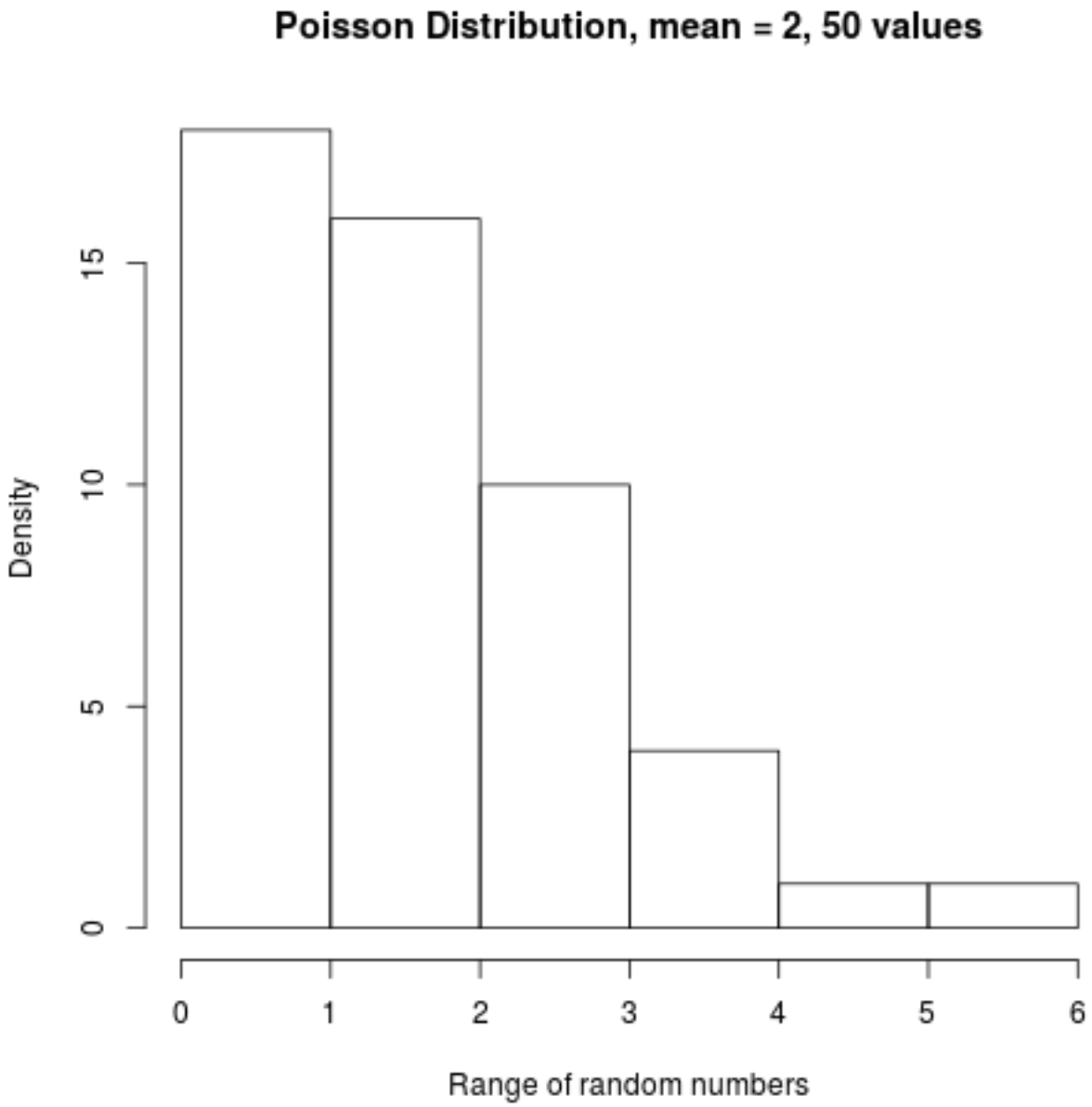
```
n <- 50
lamda <- 2
u <- runif(n)
p0 <- exp(-lamda)
x <- vector(,n)
pms <- vector(,10)

for(j in 1:n)
{
   p <- p0
   f <- p
   i <- 0
   repeat {
      if(u[j] < f) {
         x[j] <- i
         if(i <= 10) {
            pms[i] <- pms[i] + 1
         }
         break
      }
      p <- (lamda * p) / (i+1)
      f <- f + p
      i <- i + 1
   }
}

print(x[1:50])

pms <- pms/sum(pms)
cdf <- cumsum(pms)

hist(x, main="Poisson Distribution, mean = 2, 50 values", xlab="Range of random numbers", ylab
    ="Density")
dev.copy(png,"plot2a.png");
dev.off ();

plot(1:10, pms, col='black', cex=1, main="Poisson Distribution, mean = 2, 50 values", xlab="
    Range of random numbers", ylab="Probability Mass Function")
dev.copy(png,"plot2b.png");
dev.off ();

plot(1:10, cdf, col='black', cex=1, main="Poisson Distribution, mean = 2, 50 values", xlab="
    Range of random numbers", ylab="Cumulative distribution Function")
dev.copy(png,"plot2c.png");
```

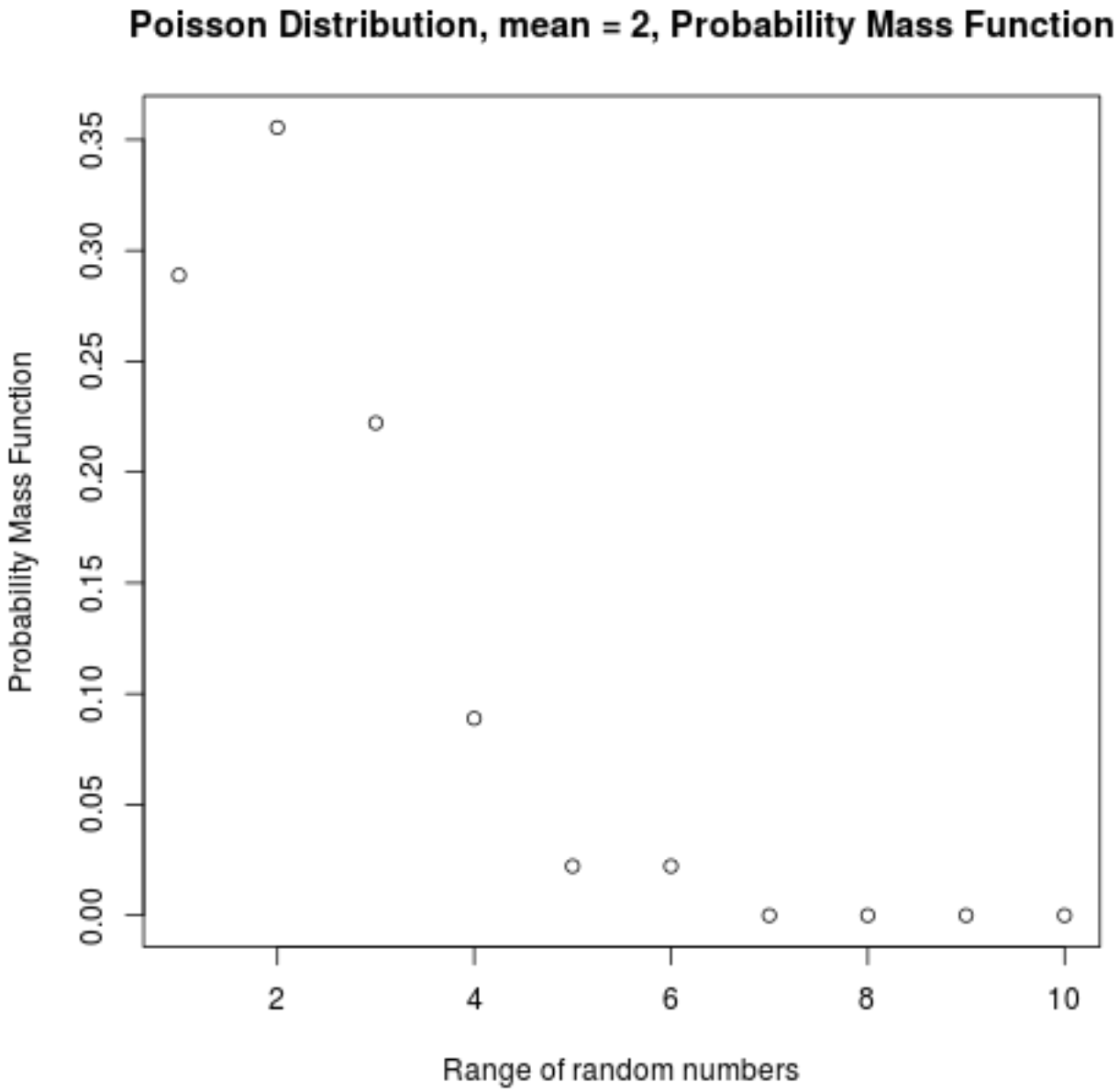
```
42 dev.off();
```

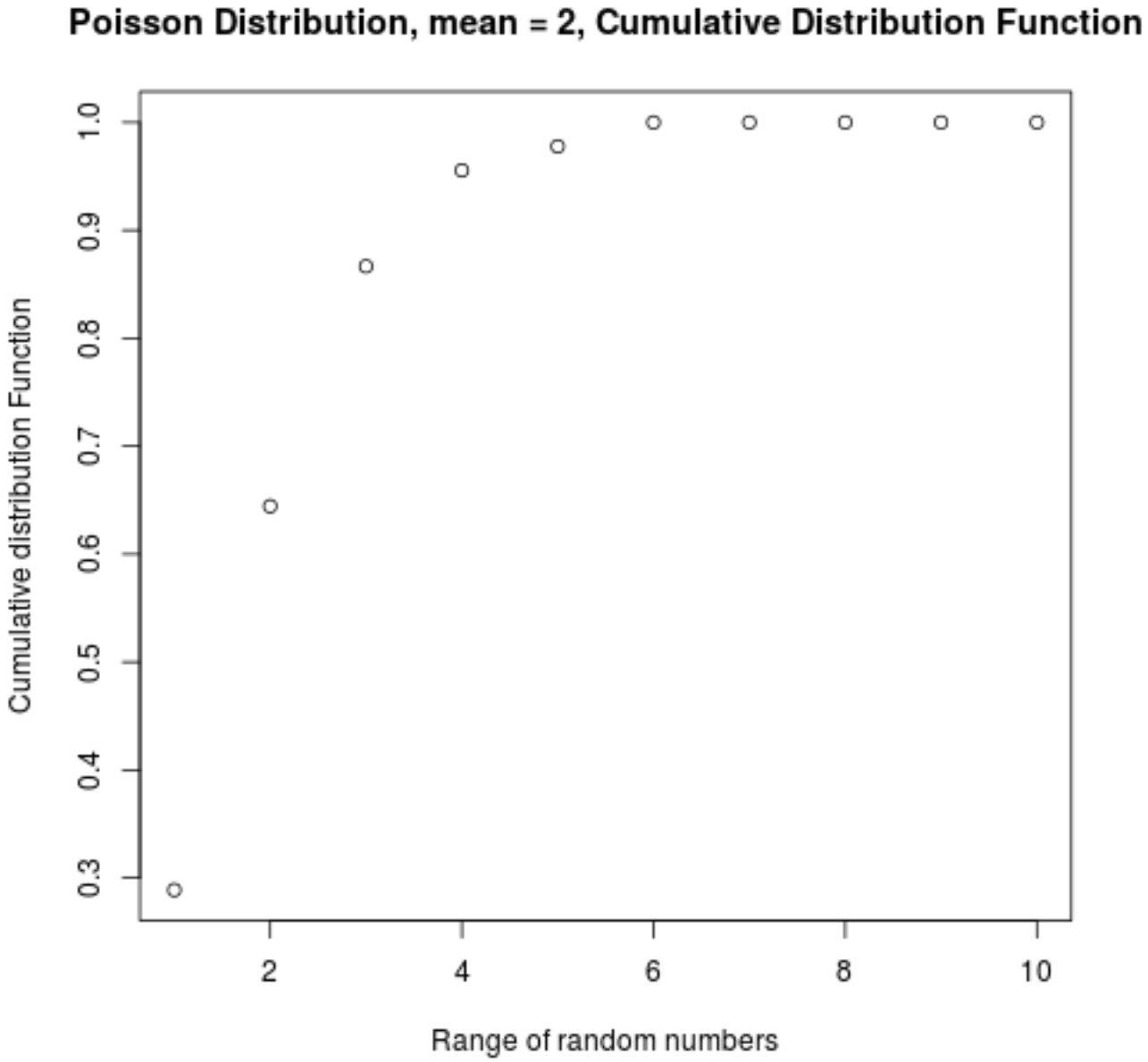
Poisson Distribution with mean = 2.

Generated random numbers

1 1 2 3 2 0 2 0 3 2 1 2 1 5 3 1 0 3 3 6 4 4 3 2 1 2 0 1 3 0 3 1 1 1 2 3 0 3 0 5 1 5 1 3 3 1 2 3 2 3




Poisson Distribution, mean = 2, Probability Mass Function
Probability Mass Function
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
2
4
6
8
10
Range of random numbers


Poisson Distribution, mean = 2, Cumulative Distribution Function
Cumulative distribution Function
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
2
4
6
8
10
Range of random numbers

3 Question 3

Code for R

```
weibull <- function(u, b, t) {
   return ( exp( (log(-log(1-u))/b) - log(t) ))
}

b1 <- 2
t1 <- 1
b2 <- 1.5
t2 <- 1
p <- 0.4

n <- 50

u1 <- runif(n)
u2 <- runif(n)
x <- vector(,n)

for (i in 1:n)
{
   if(u1[i] < p) {
      x[i] <- weibull(u2[i], b1, t1)
   } else {
      x[i] <- weibull(u2[i], b2, t2)
   }
}

print(x)

hist(x, main="Mixed Weibull Distribution, parameters (2, 1, 1.5, 1, 0.4), 50 values", xlab="
    Range of random numbers", ylab="Density")
dev.copy(png,"plot3.png");
dev.off ();
```

Weibull Transformation.

$$\beta_1 = 2,\ \theta_1 = 1,\ \beta_2 = 1.5,\ \theta_2 = 1,\ p = 0.4$$

Values generated

0.51340342 1.65981104 0.35708428 0.33864543 0.90015026 0.48173004
0.90146400 1.35998194 1.05895335 0.72202120 1.74569550 0.41448123
1.28357966 1.59452058 0.59331917 0.66916975 0.78349218 0.18203587
0.35765881 1.88747443 1.21824326 0.75508734 0.95769445 1.12843392
2.35256249 1.18500213 1.44337543 1.11540900 0.20877404 0.51849504

0.96475145 2.45482151 0.02652456 0.93861928 0.60031390 0.67181850
0.19249440 1.16159278 0.30561273 0.93054568 1.20750012 0.58390542
0.84283298 0.33951827 0.96317679 0.93258008 0.99216777 0.44624422
1.27564358 1.38776060

Histogram