Fitting and Plotting of Poisson Distribution

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Aim:

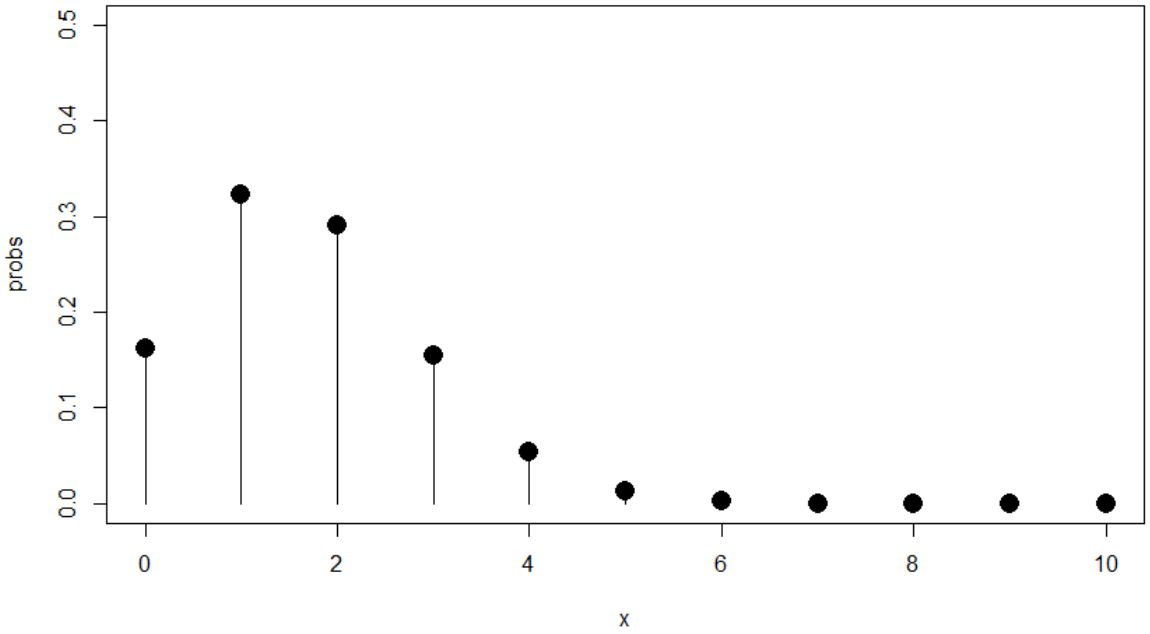
Fitting and Plotting of Poisson Distribution using R.

Program:

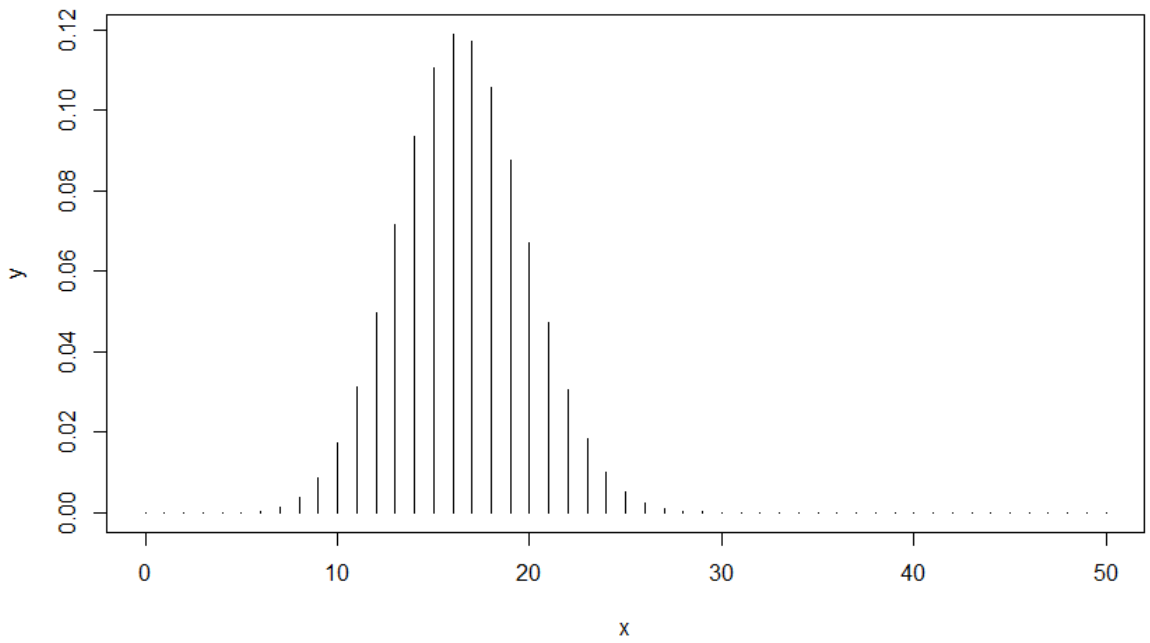
```
> p5=dpois(x=5,lambda=7)

> round(p5,4)
[1] 0.1277

> p5=dpois(x=0:5,lambda=7)

> round(p5,4)
[1] 0.0009 0.0064 0.0223 0.0521 0.0912 0.1277

> sum(dpois(x=0:5,lambda=7))
[1] 0.3007083

> round(ppois(q=5,lambda = 7,lower.tail = T),4)
[1] 0.3007

> round(ppois(q=5,lambda = 7,lower.tail = F),4)
[1] 0.6993

> #Problem 2 : Check the relationship between mean and variance in Poisson
Distribution (4) with n=100
> X.val = 0:100

> P.val = dpois(X.val,4)

> #mean
> EX=sum(X.val*P.val)

> EX
[1] 4

> #variance
> Var=sum((X.val-EX)^2*P.val)

> Var
[1] 4

#Problem 3 : Complete Probabilitites and cumulative probabilties of the va
lues between 0 and 10 for the parameter
#Probabilities use round command for restricting thye decimal places
dpois(0:10,2) [1] 1.353353e-01 2.706706e-01 2.706706e-01 1.804470e-01 9.02
2352e-02 3.608941e-02 1.202980e-02 3.437087e-03 8.592716e-04
[10] 1.909493e-04 3.818985e-05

> #Or
> P=data.frame(0:10,dpois(0:10,2))
```

```
> round(P,4)
   X0.10 dpois.0.10..2.
1      0         0.1353
2      1         0.2707
3      2         0.2707
4      3         0.1804
5      4         0.0902
6      5         0.0361
7      6         0.0120
8      7         0.0034
9      8         0.0009
10     9         0.0002
11    10         0.0000

> ppois(0:10,2) #Cumulative Probabilities
 [1] 0.1353353 0.4060058 0.6766764 0.8571235 0.9473470 0.9834364 0.9954662
0.9989033 0.9997626 0.9999535 0.9999917

#Problem 3 : If there are 12 cars crossing a bridge per minute on average,
find the probability of having seventeen or more cars crossing the bridge
in a particular minute is 10.1%

#Problem 4: Poisson distribution with parameter 2
# 1. How to obtain a sequence from 0:10
# 2. Calculate P(0),p(1),...P(10) when lambda = 2 and make the output pret
tier
# 3. Find P(X<=6)
# 4. Sum all probabilities
# 5. Find P(X>6)
# 6. Make a table of the first 11 Poisson probs and cumulative probs when
lambda=2
# 7. Plot the probabilities and put titles on the axes and give the plot a
title

> #1
> 0:10
[1]  0  1  2  3  4  5  6  7  8  9 10

> #2
> round(dpois(0:10,2),3)
 [1] 0.135 0.271 0.271 0.180 0.090 0.036 0.012 0.003 0.001 0.000 0.000

> #3
> print(ppois(q=6,lambda = 7,lower.tail = T))
[1] 0.4497111

> #4
> print(sum(ppois(q=0:6,lambda = 7,lower.tail = T)))
[1] 1.043019

> #5
> print(ppois(q=6,lambda = 7,lower.tail = F))
[1] 0.5502889

> #6
> round(cbind(0:10,dpois(0:10,2),ppois(0:10,2)),3)
      [,1]  [,2]  [,3]
 [1,]    0 0.135 0.135
 [2,]    1 0.271 0.406
 [3,]    2 0.271 0.677
 [4,]    3 0.180 0.857
```

```
 [5,]    4 0.090 0.947
 [6,]    5 0.036 0.983
 [7,]    6 0.012 0.995
 [8,]    7 0.003 0.999
 [9,]    8 0.001 1.000
[10,]    9 0.000 1.000
[11,]   10 0.000 1.000

> #7
> plot(0:10,dpois(0:10,2),type="h",xlab="y",ylab="p(y)",main="Poisson Dist
. (mu=2)")

> #For Another Type of Visualization
> points(0:10,dpois(0:10,2),pch=16,cex=2)
```




```
> #Problem 5: To compare Binomial and Poisson, Use same Expected Value n=8
> lambda=pn=2.4

> x<-8

> px<-dbinom(x,8,0.3)

> px
[1] 6.561e-05

> pbinom(x,8,0.3)
[1] 1

> plot(x,px,type="h",col=2,main="PMF for Binomial (n=8,p=0.3)",xlab="x",yl
ab="p(x)")

> points(x,px,col=2)

> abline(h=0,col=3)
```


y
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0
10
20
30
40
50
x