

R version 4.0.2 (2020-06-22) -- "Taking Off Again"
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 Platform: x86_64-w64-mingw32/x64 (64-bit)

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Type 'demo()' for some demos, 'help()' for on-line help, or
 'help.start()' for an HTML browser interface to help.
 Type 'q()' to quit R.

[Previously saved workspace restored]

```
> #Experiment-5
> #Date-21/11/20
> #Slot-L1
> #Name-Amlan Shivam Nayak
> #Reg.no.-19BCD7143
> #Course-Mat1011
> #Poisson Distribution
> #n=20,p=0.5
> #for x=0,1,2,...,20
> #Compare binomial and poisson
> x=seq(0,20,length=21)
> x
[1] 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
> n<-20
> p=0.5
> l<-n*p
> l
[1] 10
> px<-dpois(x,l)
> px
[1] 4.539993e-05 4.539993e-04 2.269996e-03 7.566655e-03 1.891664e-02
[6] 3.783327e-02 6.305546e-02 9.007923e-02 1.125990e-01 1.251100e-01
[11] 1.251100e-01 1.137364e-01 9.478033e-02 7.290795e-02 5.207710e-02
[16] 3.471807e-02 2.169879e-02 1.276400e-02 7.091109e-03 3.732163e-03
[21] 1.866081e-03
> px1<-round(px,4)
> px1<-round(px,4)
> px1
[1] 0.0000 0.0005 0.0023 0.0076 0.0189 0.0378 0.0631 0.0901 0.1126 0.1251
[11] 0.1251 0.1137 0.0948 0.0729 0.0521 0.0347 0.0217 0.0128 0.0071 0.0037
[21] 0.0019
> px2<-dbinom(x,n,p)
> px2
[1] 9.536743e-07 1.907349e-05 1.811981e-04 1.087189e-03 4.620552e-03
[6] 1.478577e-02 3.696442e-02 7.392883e-02 1.201344e-01 1.601791e-01
[11] 1.761971e-01 1.601791e-01 1.201344e-01 7.392883e-02 3.696442e-02
[16] 1.478577e-02 4.620552e-03 1.087189e-03 1.811981e-04 1.907349e-05
[21] 9.536743e-07
> px3<-round(px2,4)
> px3
[1] 0.0000 0.0000 0.0002 0.0011 0.0046 0.0148 0.0370 0.0739 0.1201 0.1602
[11] 0.1762 0.1602 0.1201 0.0739 0.0370 0.0148 0.0046 0.0011 0.0002 0.0000
[21] 0.0000
> plot(x,px1,type="b",col=c('blue'),main="comp of binomial and pos")
> #plotting binomial case
> lines(x,px3,type="l",col=c('red'))
Error in plot.xy(xy.coords(x, y), type = type, ...) :
  invalid plot type 'l'
> lines(x,px3,type="l",col=c('red'))
> #try for p=0.1
> #try for p=0.01
> n<-20
> p=0.1
```

```

> l<-n*p
> x=seq(0,20,length=21)
> x
[1] 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
> p4x<-dpois(x,l)
> p4x
[1] 1.353353e-01 2.706706e-01 2.706706e-01 1.804470e-01 9.022352e-02
[6] 3.608941e-02 1.202980e-02 3.437087e-03 8.592716e-04 1.909493e-04
[11] 3.818985e-05 6.943609e-06 1.157268e-06 1.780413e-07 2.543447e-08
[16] 3.391262e-09 4.239078e-10 4.987150e-11 5.541278e-12 5.832924e-13
[21] 5.832924e-14
> #binomial
> p6x<-dbinom(x,n,p)
> p7x<-round(p6x,4)
> p7x
[1] 0.1216 0.2702 0.2852 0.1901 0.0898 0.0319 0.0089 0.0020 0.0004 0.0001
[11] 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
[21] 0.0000
> plot(x,p5x,type="b",col=c('blue'))
Error in xy.coords(x, y, xlabel, ylabel, log) : object 'p5x' not found
> p5x<-round(p4x,4)
> plot(x,p5x,type="b",col=c('blue'))
> lines(x,p7x,type="l",col=c('red'))
> #Finding Cumulative distribution
> l<-0.2
> l
[1] 0.2
> p1<-1-ppois(3,l)
> p1
[1] 0.01898816
> p1<-1-ppois(3,l)
> p1
[1] 5.684024e-05
> #random density for poisson case
> l<-1.5
> n=100
> dx<-rpois(n,l)
> dx
[1] 2 1 2 0 1 0 0 4 2 0 0 0 1 1 2 2 5 1 1 0 3 1 2 1 0 2 1 1 2 0 0 0 2 1 0 2 2
[38] 1 4 0 1 1 0 1 1 0 3 3 2 0 2 0 1 2 1 1 1 1 0 2 1 2 4 1 0 0 3 1 0 2 5 2 0 3
[75] 1 1 2 0 4 2 3 0 0 2 2 1 0 0 0 2 0 0 0 2 0 0 0 5 1 2
> plot(dx,pch=16)
> smean<-mean(dx)
> smean
[1] 1.27
> n<-100
> dx<-rpois(n,l)
> dx
[1] 1 1 0 3 2 4 4 4 1 2 1 0 0 1 0 0 0 1 3 3 1 1 2 1 2 1 0 4 2 0 2 3 5 0 2 3 1
[38] 0 1 0 0 2 2 0 0 1 0 3 2 2 0 0 3 0 1 1 1 2 1 1 0 2 1 1 0 1 1 0 2 0 1 2 0 1
[75] 1 5 3 0 0 3 1 2 0 1 1 3 1 1 0 4 2 1 3 0 1 1 1 0 3 1
> n=100
> dx<-rpois(n,l)
> dx
[1] 1 0 0 1 3 2 1 2 0 2 0 2 0 1 3 1 2 0 1 2 5 2 0 1 0 3 1 1 3 1 1 0 1 0 3 0 2
[38] 0 2 1 1 1 0 1 1 1 5 3 0 1 2 0 4 0 0 1 0 3 3 1 4 2 3 1 4 2 1 0 1 0 2 3 2 1
[75] 0 3 2 2 0 0 2 1 0 2 3 2 2 3 3 2 2 1 1 1 1 2 2 0 3 2
>

```

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```
> #Suppose a baseball player has a p=.300 batting average.
> #What is the probability of X<=150 hits in n=500 at bats? X=150? X>150?
> # probability of x <= 150
> ppois(q = 150, lambda = .300 * 500, lower.tail = TRUE)
[1] 0.5216972
> # probability of x = 150
> dpois(x = 150, lambda = .300 * 500)
[1] 0.03255541
> # probability of x > 150
> ppois(q = 150, lambda = .300 * 500, lower.tail = FALSE)
[1] 0.4783028
> library(ggplot2)
> library(dplyr)
```

Attaching package: 'dplyr'

The following objects are masked from 'package:stats':

filter, lag

The following objects are masked from 'package:base':

intersect, setdiff, setequal, union

```
> options(scipen = 999, digits = 2) # sig digits
>
> hits <- 0:100 * 3
> density <- dpois(x = hits, lambda = .300 * 500)
> prob <- ppois(q = hits, lambda = .300 * 500, lower.tail = TRUE)
> df <- data.frame(hits, density, prob)
> ggplot(df, aes(x = hits, y = density)) +
+   geom_col() +
+   labs(title = "Poisson(150)",
+         subtitle = "PMF and CDF of Poisson(3) distribution.",
+         x = "Hits (x)",
+         y = "Density") +
+   geom_line(data = df, aes(x = hits, y = prob))
>
```

