**#experiment 13 hypergeometric distribution**

#i)

cn=function(n,x)

{c1=factorial(n)/(factorial(x)\*(factorial(n-x)))

return(c1)}

N=9;m=4;n=6;x=3

fx=cn(m,x)\*cn((N-m),(n-x))/cn(N,n)

fx

#ii)

cn=function(n,x)

{

c1=factorial(n)/(factorial(x)\*(factorial(n-x)))

return(c1)

}

N=16;m=5;n=8;x=3:5

fx=cn(m,x)\*cn((N-m),(n-x))/cn(N,n)

fx

**#experiment 14**

#a lot of 50 chickens---------- in the sample

cn=function(n,x)

{

c1=factorial(n)/(factorial(x)\*(factorial(n-x)))

return(c1)

}

N=50;n=3;m=6;x=0:3

fx=cn(m,x)\*cn((N-m),(n-x))/cn(N,n)

pdf=data.frame(x,fx)

Fx=cumsum(fx)

cdf= data.frame(pdf,Fx);cdf

#plotting

par(mfrow=c(2,1))

plot(x,fx,type="h",lwd=2, main="PDF of hypergeometric distribution")

points(x,fx,pch=16)

plot(x,Fx,type="s",lwd=2,main="CDF of hypergeometric disribution")

points(x,Fx,pch=16)

#ii)

N=40;m=5;n=6;nn=15

#rhyper(nn,m,N-m,n)

set.seed(2026)

x=rhyper(nn,m,N-m,n)

x

**#experiment 15 -binomial distribution**

#according to mendelian theory--------

**#i) there will be no red flowered plants**

cn=function(n,x)

{c1=factorial(n)/(factorial(x)\*factorial(n-x))

return(c1)}

binom=function(n,x,p)

{b1=cn(n,x)\*p^x\*(1-p)^(n-x)

return(b1)}

**#i) there will be no red flowered plants**

n=5;p=0.25;x=0;binomial=binom(n,x,p);binomial

**#ii)there will be 4 or more red flowered plants**

n=5;p=0.25;x=4:5;binomial2=binom(n,x,p);Binomial2

**#experiment 16**

cn=function(n,x)

{c1=factorial(n)/(factorial(x)\*factorial(n-x))

return(c1)}

binomial=function(n,x,p)

{fx=cn(n,x)\*p^x\*(1-p)^(n-x)

return(fx)}

**#i)consider 3 binomial distribution----------relative frequency distribution**

#a)

n1=5;x1=0:5;p1=0.8

f1=binomial(n1,p1,x1)

n2=5;x2=0:5;p2=0.5

f2=binomial(n2,p2,x2)

n3=5;x3=0:5;p3=0.2

f3=binomial(n3,p3,x3)

par(mfrow=c(1,3))

plot(x1,f1,type="h", main=paste("binomial pmf for p1=",p1))

points(x1,f1,pch=16)

plot(x2,f2,type="h", main=paste("binomial pmf for p2=",p2))

points(x2,f2,pch=16)

plot(x3,f3,type="h", main=paste("binomial pmf for p3=",p3))

points(x3,f3,pch=16)

#b)

set.seed(4000);r1=rbinom(100,n1,p1);r1t=sort(unique(r1))

r1x=table(r1);r1xt=r1t/length(r1)

set.seed(4000);r2=rbinom(100,n2,p2);r2t=sort(unique(r2))

r2x=table(r2);r2xt=r2t/length(r2)

set.seed(4000);r3=rbinom(100,n3,p3);r3t=sort(unique(r3))

r3x=table(r3);r3xt=r3t/length(r3)

par(mfrow=c(1,3))

plot(r1t,r1xt,type="h", main=paste("emperial pmf forp1=",p1))

points(r1t,r1xt,pch=16)

plot(r2t,r2xt,type="h", main=paste("emperial pmf forp2=",p2))

points(r2t,r2xt,pch=16)

plot(r3t,r3xt,type="h", main=paste("emperial pmf forp3=",p3))

points(r3t,r3xt,pch=16)

#ii)for n= 10 ,20, 50, 99 plot pmf of binomial distribution for p=0.3;n1=10;x1=0:10;p1=0.3

f1=binomial(n1,p1,x1)

n2=20;x2=0:20;p2=0.3

f2=binomial(n2,p2,x2)

n3=50;x3=0:50;p3=0.3

f3=binomial(n3,p3,x3)

n4=99;x4=0:99;p4=0.3

f4=binomial(n4,p4,x4)

par(mfrow=c(2,2))

plot(x1,f1,type="h", main=paste("binomial pmf for p1=",p1))

plot(x2,f2,type="h", main=paste("binomial pmf for p2=",p2))

plot(x3,f3,type="h", main=paste("binomial pmf for p3=",p3))

plot(x4,f4,type="h", main=paste("binomial pmf for p4=",p4))

points(x1,f1,pch=16)

points(x2,f2,pch=16)

points(x3,f3,pch=16)

points(x4,f4,pch=16)

**#experiment 17**

**#the following------------------------plot the expected frequencies against observed frequencies--- model**

x=0:10;n=max(x)

f=c(6,20,28,12,8,6,0,0,0,0,0)

N=sum(f)

smean=sum(f\*x)/N

p=smean/n

px=dbinom(x,n,p)

px=round(px,4)

ef=px\*N

fr.dist=data.frame(x,f,px,ef)

fr.dist

par(mfrow=c(1,1))

plot(f,ef,type='p',pch=16,xlab="observed frequency",ylab="expected frequency", main="fitting of binomial distribution")

abline(0,1)

**#experiment 18: Poisson Distribution**

**#i)for poisson variable x with para 0.2, compute P(x>3)**

Poisson=function(x,lam)

{p=(exp(-lam)\*(lam^x))/factorial(x)

return(p)}

x=0:3;lam=0.2

a=Poisson(x,lam);a

b=1-sum(a)

cat("P(x>3):",b,"\n")

plot(x,a,type="h",main=paste("spike plot for poisson distribution"))

points(x,a,pch=17)

**#ii)for poisson variable x with para 2.5, compute P(x>8)**

x=0:8;lam=2.5

a=Poisson(x,lam);a

b=1-sum(a)

cat("P(x>8):",b,"\n")

plot(x,a,type="h",main=paste("spike plot for poisson distribution"))

points(x,a,pch=17)

**#iii)for poisson variable x with para 5, compute P(x>12)**

x=0:12;lam=5

a=Poisson(x,lam);a

b=1-sum(a)

cat("P(x>8):",b,"\n")

plot(x,a,type="h",main=paste("spike plot for poisson distribution"))

points(x,a,pch=15)

**#experiment 19**

**#i) the average number of accidents-------------------**

Poisson=function(x,lam)

{p=(exp(-lam)\*(lam^x))/factorial(x)

return(p)}

**#a)no accident occurs on a day**

x=0;lam=3

a=Poisson(x,lam);a

b=sum(a);b

plot(x,a,type="h",col="red",main=paste("spike plot for poisson distribution"))

points(x,a,pch=17)

**#b)atmost two accidents occurs on a day**

x=0:2;lam=3

a=Poisson(x,lam);a

b=sum(a);b

plot(x,a,type="h",col="blue",main=paste("spike plot for poisson distribution"))

points(x,a,pch=17)

**#ii) suppose the number of defective screws-----**

**#a) exactly 2 defective screws**

x=2;lam=2

a=Poisson(x,lam);a

b=sum(a);b

plot(x,a,type="h",col="brown",main=paste("spike plot for poisson distribution"))

points(x,a,pch=17)

**#b)atleast one defective screw**

x=0;lam=2

a=Poisson(x,lam);a

b=1-sum(a);b

plot(x,a,type="h",col="magenta",main=paste("spike plot for poisson distribution"))

points(x,a,pch=17)

**#iii) consider n=20, p=0.1 and compute p(X=x) for x=0,1,2....n both binomial and poisson model**

n=20;p=0.2;lam=n\*p;x=0:20

a1=binomial(n,p,x);a1

a2=Poisson(x,lam);a2

b1=sum(a1)

cat("P(X=x) for binomial:",b1,"\n")

b2=sum(a2)

cat("P(X=x) for poisson:",b2,"\n")

**#experiment 20**

**#atmospheric dust=------- adequncy of the fitted model**

Poisson=function(x,lam)

{p=(exp(-lam)\*(lam^x))/factorial(x)

return(p)}

x=0:5;f=c(13,24,30,18,7,8)

lam=sum(f\*x)/sum(f)

px=Poisson(x,lam)

ef=px\*(sum(f))

da=data.frame(x,f,ef);da

plot(f,ef,type="p",col="green",main=paste("fitting of poisoon distribution"),xlab="observed frequency",ylab="expected frequency")

abline(0,1)

**#EXPERIMENT 21**

set.seed(3009)

x=rnorm(20,5,2);x

mean1=function(x)

{m1=sum(x)/length(x)

return(m1)}

cat("mean =",mean1(x),'\n')

cat("median =",median(x),'\n')

sd=function(y)

{ n=length(y)

ot=sum((y-sum(y)/n))^2/(n-1)

ssd=sqrt(ot)

return(ot)}

cat("standard deviation =",sd(x),'\n')

**#ii)**

p1=pnorm(35,30,4)-pnorm(30,30,4)

cat("P(30,x,35) is:",p1,'\n')

a=pnorm(40,30,4)

result=1-a

cat("P(x>40) is:",result,'\n')

**#experiment 22**

**#i)**

p1=pnorm(2,0,1)

cat("P(X<=2) is:",p1,'\n')

p2=pnorm(2.5-pnorm(0.84))

cat("P(0.84<=X<=2.5) is:",p2,'\n')

p3=1-pnorm(2)

cat("P(X>=2) is:",p3,'\n')

**#ii)**

c1=qnorm(01151)

cat("the c in P(z<=c)=0.1151 is:",c1,'\n')

c2=qnorm(0.8238)

cat("the c in P(z<=c)=0.8165 is:",c2,'\n')

c3=qnorm(0.1525+pnorm(1))

cat("the c in P(1<=z<=c)=0.1525 is:",c3,'\n')

c4=qnorm(0.8164/2+0.5)

cat("the c in P(-c<=z<=c)=0.8165 is:",c3,'\n')

**#experiment 23**

midx=seq(17.05,86.35,7.7);midx

f=c(2,10,16,37,43,39,29,13,06,05)

m=sum(f\*midx)/sum(f)

ssd=sqrt((sum(f\*(midx-m)^2)/sum(f)))

l=c(13.2,20.9,28.6,36.3,44,51.7,59.4,67.1,74.8,82.5)

l=c(l,90.2)

cdf=pnorm(l,m,ssd);cdf=c(0,cdf,1)

pcf=diff(cdf);f=c(0,f,4)

ef=round(pcf\*sum(f),4)

fr=data.frame(f,ef);fr

plot(f,ef,type="p",col= "red",pch=16, main="fitting of normal distribution",xlab="observed frequency", ylab="expected frequency")

abline(0,1)

**#experiment 24**

exponential=function(lam,x)

{ot=lam\*exp(-lam\*x)

return(ot)}

x=c(time intervls mostly given in question);x=sort(x)

smean=sum(x)/length(x)

y=exponential(1/smean,x)

hist(x,prob=T,col="pink",xlab="Inter Arrival Times",ylab="Density")

lines(x,y,type='o',col="blue",pch=16,lwd=2)

text(locator(1),col="red",'Histogram and',cex=0.8)

text(locator(1),col="green",'Exponential density with parametres 1.8',cex=0.4)

**#ii)**

x=rivers;x=sort(x)

smean=sum(x)/length(x);smean

y=exponential(1/smean,x)

hist(x,prob=T,col="pink",xlab="Rivers",ylab="Density")

lines(x,y,type='o',col="blue",pch=16,lwd=2)

text(locator(1),col="red",'Histogram and',cex=0.8)

text(locator(1),col="green",'Exponential density with parametres 1.8',cex=0.4)

**#exp25**

smean=function(x)

{ot=sum(x)/length(x)

return(ot)}

m1=smean(women[,1]);m1

m2=smean(women[,2]);m2

v1=var(women[,1]);v1

v2=var(women[,2]);v2

corr=function(x,y)

{nr=sum((x-mean(x))\*(y-mean(y)))

dr=sqrt(sum((x-mean(x))^2)\*sum((y-mean(y))^2))

op=nr/dr

return(op)}

corr(women[,1],women[,2])

plot(women[,1],women[,2],type='p',col="purple",main="scatter plot")