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**19BCE1027**

**1)**

library(moments)

data1=c(3,4,6,7,8,12,20)

**a)**

moment(data1,absolute=TRUE,central=FALSE)

moment(data1,order=1,absolute=FALSE,central=TRUE)

r=sum(data1)/7

r

c=sum((data1 - sum(data1)/7))/7

c

**b)**

moment(data1,order=2,absolute=TRUE,central=FALSE)

moment(data1,order=2,absolute=FALSE,central=TRUE)

r2=sum(data1^2)/7

r2

c2=sum((data1 - sum(data1)/7)^2)/7

c2

**c)**

moment(data1,order=3,absolute=TRUE,central=FALSE)

moment(data1,order=3,absolute=FALSE,central=TRUE)

r3=sum(data1^3)/7

r3

c3=sum((data1 - sum(data1)/7)^3)/7

c3

**d)**

moment(data1,order=4,absolute=TRUE,central=FALSE)

moment(data1,order=4,absolute=FALSE,central=TRUE)

r4=sum(data1^4)/7

r4

c4=sum((data1 - sum(data1)/7)^4)/7

c4)

**Output:**

> library(moments)

> data1=c(3,4,6,7,8,12,20)

**a)**

> moment(data1,absolute=TRUE,central=FALSE)

[1] 8.571429

> moment(data1,order=1,absolute=FALSE,central=TRUE)

[1] 2.537653e-16

> r=sum(data1)/7

> r

[1] 8.571429

> c=sum((data1 - sum(data1)/7))/7

> c

[1] 2.537653e-16

**b)**

> moment(data1,order=2,absolute=TRUE,central=FALSE)

[1] 102.5714

> moment(data1,order=2,absolute=FALSE,central=TRUE)

[1] 29.10204

> r2=sum(data1^2)/7

> r2

[1] 102.5714

> c2=sum((data1 - sum(data1)/7)^2)/7

> c2

[1] 29.10204

**c)**

> moment(data1,order=3,absolute=TRUE,central=FALSE)

[1] 1555.714

> moment(data1,order=3,absolute=FALSE,central=TRUE)

[1] 177.6385

> r3=sum(data1^3)/7

> r3

[1] 1555.714

> c3=sum((data1 - sum(data1)/7)^3)/7

> c3

[1] 177.6385

**d)**

> moment(data1,order=4,absolute=TRUE,central=FALSE)

[1] 26980.86

> moment(data1,order=4,absolute=FALSE,central=TRUE)

[1] 2663.989

> r4=sum(data1^4)/7

> r4

[1] 26980.86

> c4=sum((data1 - sum(data1)/7)^4)/7

> c4

[1] 2663.989

**2)**

[joint](https://rdrr.io/cran/discreteRV/man/joint.html)(X, Y, sep = ",", fractions = ([attr](https://rdrr.io/r/base/attr.html)(X, "fractions") & [attr](https://rdrr.io/r/base/attr.html)(Y,"fractions")))

**3)**

p0=(choose(n=3,k=0)\*choose(n=5,k=2))/choose(n=8,k=2)

p1=(choose(n=3,k=1)\*choose(n=5,k=1))/choose(n=8,k=2)

p2=(choose(n=3,k=2)\*choose(n=5,k=0))/choose(n=8,k=2)

p=matrix(c(0,p0,1,p1,2,p2),ncol=3)

p

**Output:**

> p0=(choose(n=3,k=0)\*choose(n=5,k=2))/choose(n=8,k=2)

> p1=(choose(n=3,k=1)\*choose(n=5,k=1))/choose(n=8,k=2)

> p2=(choose(n=3,k=2)\*choose(n=5,k=0))/choose(n=8,k=2)

> p=matrix(c(0,p0,1,p1,2,p2),ncol=3)

> p

[,1] [,2] [,3]

[1,] 0.0000000 1.0000000 2.0000000

[2,] 0.3571429 0.5357143 0.1071429

**4)**

x=c(1,2,3,4,5,6)

prob=c(1/6,1/6,1/6,1/6,1/6,1/6)

EX=sum(x\*prob)

EX

EX2=sum(x^2\*prob)

e=sum((x^2)\*prob)

variance=EX2-EX^2

variance

**Output:**

> x=c(1,2,3,4,5,6)

> prob=c(1/6,1/6,1/6,1/6,1/6,1/6)

> EX=sum(x\*prob)

> EX

[1] 3.5

> EX2=sum((x^2)\*prob)

> EX2

[1] 15.16667

> variance=EX2-(EX)^2

> variance

[1] 2.916667

**5)**

x=c(0,1,2)

prob=c(1/4,2/4,1/4)

sum(prob)

plot(x,prob,type="h",xlab="X",ylab="PMF",ylim=c(0,1))

cdf=c(0,cumsum(prob))

cdf.plot=stepfun(x,cdf)

plot.stepfun(cdf.plot,xlab="X",ylab="CDF",do.points = T)

plot.stepfun(cdf.plot,xlab="Y",ylab="CDF",verticals=F,do.points = T)

**Output:**

> x=c(0,1,2)

> prob=c(1/4,2/4,1/4)

> sum(prob)

[1] 1

> plot(x,prob,type="h",xlab="X",ylab="PMF",ylim=c(0,1))

> cdf=c(0,cumsum(prob))

> cdf.plot=stepfun(x,cdf)

> plot.stepfun(cdf.plot,xlab="X",ylab="CDF",do.points = T)

> plot.stepfun(cdf.plot,xlab="Y",ylab="CDF",verticals=F,do.points = T)

