

**Activity 4:**

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**Aim:** Using R Studio to study correlation and moments

**Tools Used:** R Studio

**Syntax/ Commands used:**

We are using a special library available in R Studio which is moments. It has routines for calculating moments, Pearson's kurtosis, Geary's kurtosis, and skewness, as well as tests relating to these concepts.

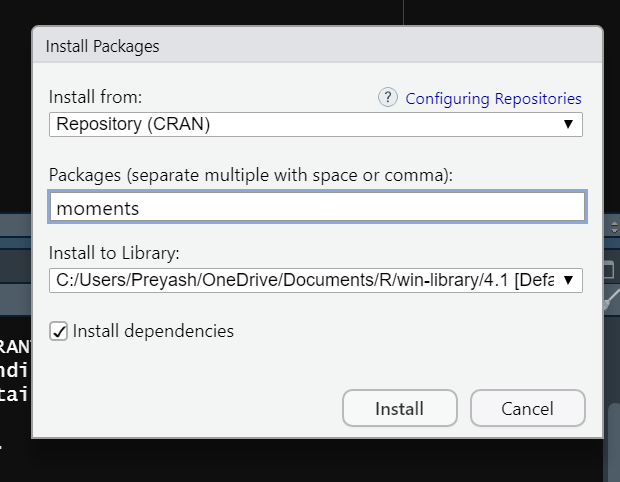
We majorly used:

**all.moments():** This function computes all the sample moments of the chosen type up to a given order

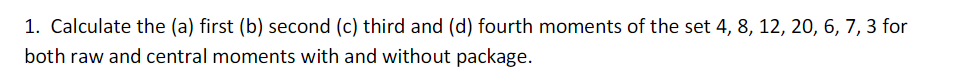
**kurtosis():** This function computes the estimator of Pearson's measure of kurtosis.

**cor():** Cor computes the variance of x and the covariance or correlation of x and y

**Installing packages:**



**Questions:**

**Task 1:** **Code:**

library(moments)

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

datasetLen=length(dataset)

mean=sum(dataset)/datasetLen

mom1=sum(dataset-mean)/datasetLen

mom2=sum((dataset-mean)^2)/datasetLen

mom3=sum((dataset-mean)^3)/datasetLen

mom4=sum((dataset-mean)^4)/datasetLen

momr1=sum(dataset)/datasetLen

momr2=sum((dataset)^2)/datasetLen

momr3=sum((dataset)^3)/datasetLen

momr4=sum((dataset)^4)/datasetLen

print("raw")

print("package")

all.moments(dataset,order.max=4,absolute = TRUE)

print("manual")

momr1

momr2

momr3

momr4

print("central")

print("package")

all.moments(dataset,order.max=4,central = TRUE, absolute = FALSE)

print("manual")

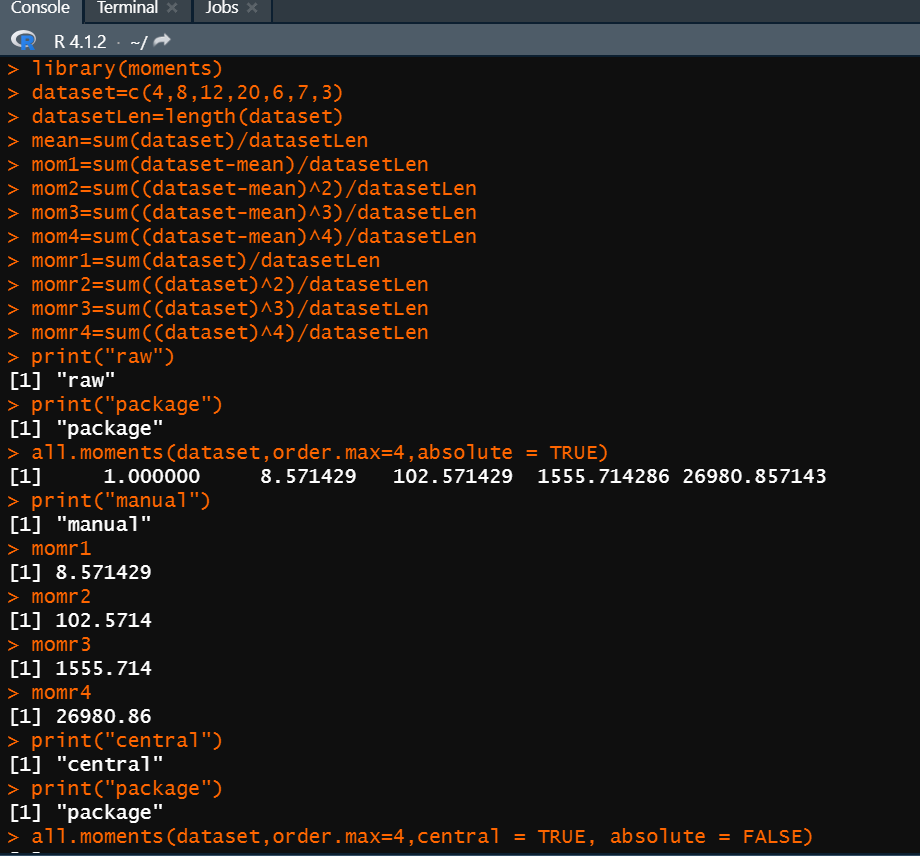
mom1

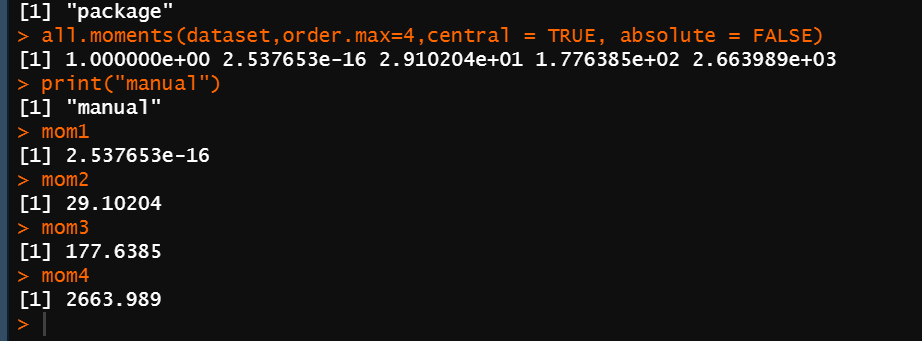
mom2

mom3

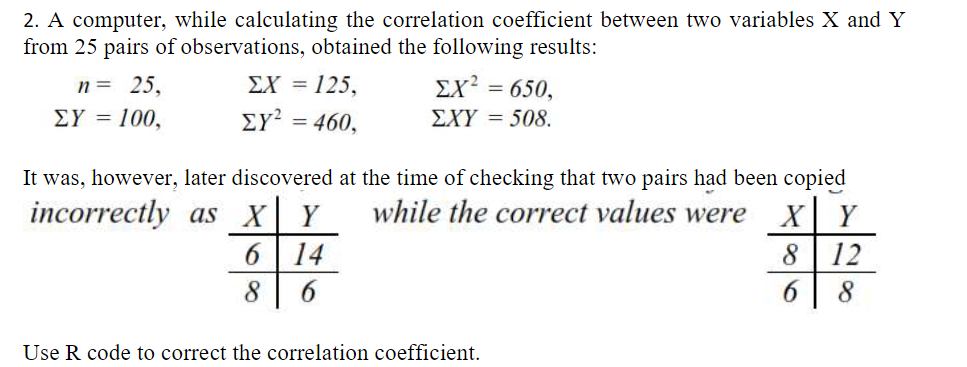
mom4

**Output:**





**Task 2:**

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**Code:**

n=25

isigx=125

isigxx=650

isigy=100

isigyy=460

isigxy=508

ip1x=6

ip1y=14

ip2x=8

ip2y=6

p1x=8

p1y=12

p2x=6

p2y=8

sigx=isigx-ip1x-ip2x+p1x+p2x

sigy=isigy-ip1y-ip2y+p1y+p2y

sigxx=isigxx-(ip1x\*ip1x)-(ip2x\*ip2x)+(p1x\*p1x)+(p2x\*p2x)

sigyy=isigyy-(ip1y\*ip1y)-(ip2y\*ip2y)+(p1y\*p1y)+(p2y\*p2y)

sigxy=isigxy-(ip1x\*ip1y)-(ip2x\*ip2y)+(p1x\*p1y)+(p2x\*p2y)

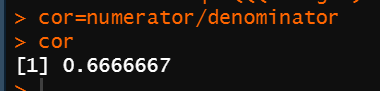
numerator=(n\*sigxy)-(sigx\*sigy)

denominator=sqrt(((n\*sigxx)-(sigx^2))\*((n\*sigyy)-(sigy^2)))

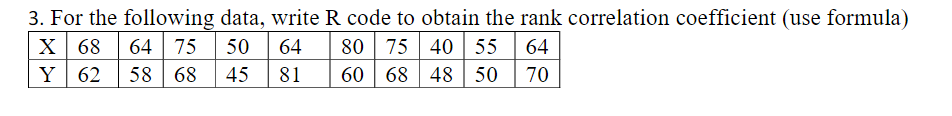
cor=numerator/denominator

cor

**Output:**



**Task 3:**



**Code:**

d1=c(68,64,75,50,64,80,75,40,55,64)

d2=c(62,58,68,45,81,60,68,48,50,70)

d1=rank(d1)

d2=rank(d2)

count=10

d=(d1-d2)^2

cf2=(2\*((2^2)-1))/12

cf3=(3\*((3^2)-1))/12

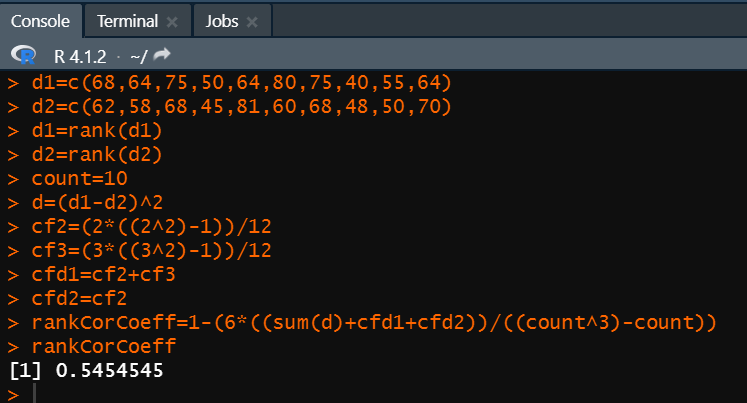
cfd1=cf2+cf3

cfd2=cf2

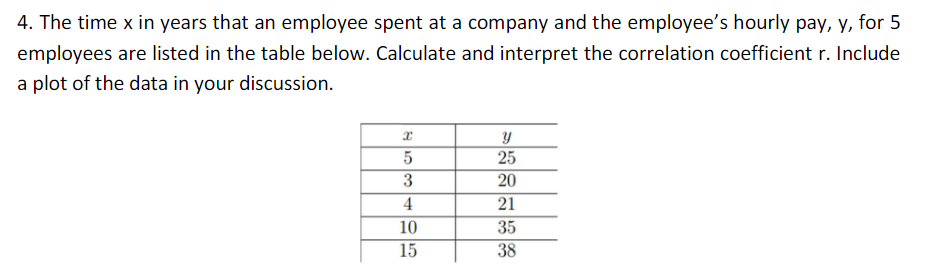
rankCorCoeff=1-(6\*((sum(d)+cfd1+cfd2))/((count^3)-count))

rankCorCoeff

**Output:**



**Task 4 :**



**Code:**

d1=c(5,3,4,10,15)

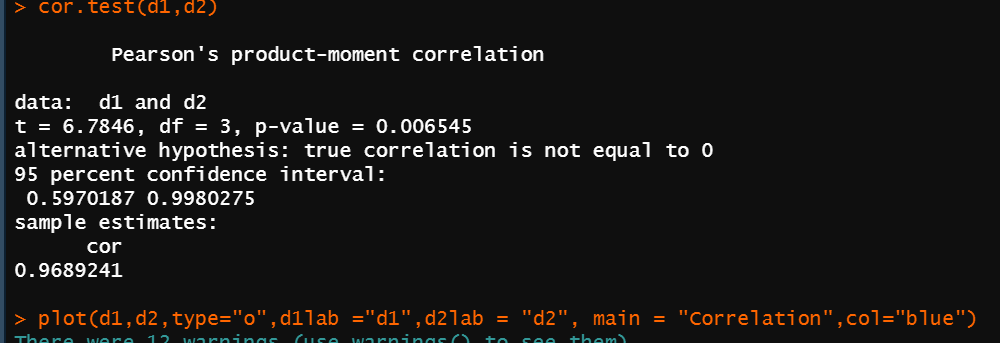
d2=c(25,20,21,35,38)

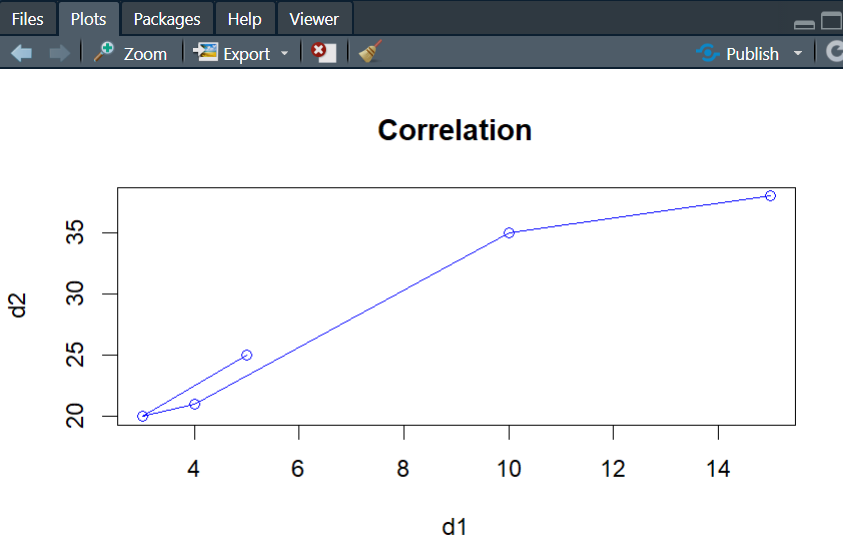
count=5

cor.test(d1,d2)

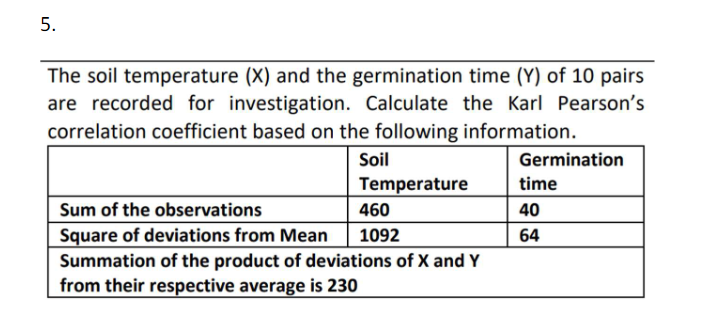
plot(d1,d2,type="o",d1lab ="d1",d2lab = "d2", main = "Correlation",col="blue")

**Output:**





**Task 5:**

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**Code:**

sigx=460

sigy=40

count=10

sigdxx=1092

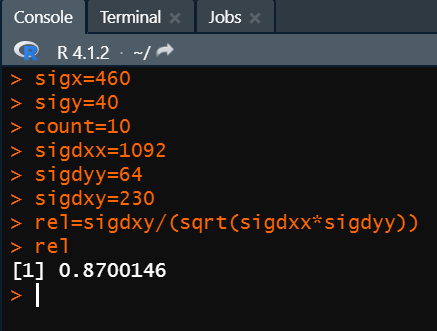
sigdyy=64

sigdxy=230

rel=sigdxy/(sqrt(sigdxx\*sigdyy))

rel

**Output:**



**Result:** We successfully solved all the questions and they were verified manually.