7
Sum=7

Difference =3

Product =56

Quotient =6

Ans =343

Root of 400 =20

Arithmetic mean of the data =8.666667

[1] 104

[1] 1 3 6 11 14 20 29 39 59 72 87 104

Practical 1:- using R
array list and fra

```
> # Addition
> 3+4
> cat ("Sum=",7)
> # substraction
> n=10-7
> cat ("Difference
> # multiplication
> m=7*8
> cat ("Product="
> # Division
> d=3075/5
> cat(" Quotient =
> # Power
> P=7**3
> cat (" Ans=", P
> # Square root
> S = Sqrt (400)
> cat("Root of
> # Raw data
> # (1, 2, 3, 5,
> x = c(1, 2, 3, 5
> m=mean (x)
> cat ("Arithm
> # Summat
> sum (x)
> cumsum (x
> # Discrete
```

Practical 1 :- using R execute the basic commands, array list and frames

```
> # Addition
> 3+4
> cat ("Sum =",7)
> # substraction
> n=10-7
> cat ("Difference =", n)
> # multiplication
> m = 7 * 8
> cat (" Product=", m)
> # Division
> d = 3075/5
> cat(" Quotient =", d)
> # Power
> P = 7**3
> cat (" Ans =", P)
> # Square root
> s = sqrt (400)
> cat (" Root of 400 =", s)
> # Raw data
> # (1, 2, 3, 5, 3, 6, 9, 10, 20, 13, 15, 17)
> # (1, 2, 3, 5, 3, 6, 9, 10, 20, 13, 15, 17) # vector
> x = c (1, 2, 3, 5, 3, 6, 9, 10, 20, 13, 15, 17)
> m = mean (x)
> cat (" Arithmetic mean of the data =", m)
> # summation
> sum (x)
> cumsum (x) # cumulative sum
> # Discrete frequency distri distribution
```

y
1 2 3 4 5 6 7
5 5 3 4 3 4 3
y Freq
1 1 5
2 2 5
3 3 3
4 4 4
5 5 3
6 6 4
7 7 3
[1] 1 1 1 1 1 2 2 2 2 2 3 3 3 4 4 4 4 5 5 5 5 6
7 7 7
[1] 27
[1] 1
[1] 7
[1] 1 7
[1] 1.000000 1.414214 1.000000 1.000000 1.414214
1.414214 1.732051 1.732051 2.000000 2.00000
2.236068 2.236068 2.449490
[14] 2.000000 2.000000 2.645751 2.645751 1.0000
1.000000 1.414214 1.732051 2.449490 2.2360
1.414214 2.449490 2.49490
[27] 2.645751
[1] 4 1 1 2 4 4
1 4 7 10 13 16 19
[1] 100 93 86 79 72 65 58 51
[1] 1 16 49 100 169 256 36

> y = c (1, 2, 1, 1, 2, 2, 2, 3,
3, 6, 5, 2, 6, 6, 7)
> table (y)
> transform (table (y))
> sort (y) # as
> length (y) # n
> min (y)
> max (y)
> range (y)
> sqrt (y)
> x = c (44, 46,
> x = c (44, 46,
> x %% 5
> y = c (1, 4, 7
> seq (1, 20, 3
> seq (100, 50, -
> y^2

ndaram

```
> y = c(1,2,1,1,2,2,2,3,4,4,5,5, 6,4,4,7,7,1,1,2,
        3,6,5,2,6,6,7)
> table(y)

> transform(table(y))  #columnwise

> sort(y)      # ascending order
> length(y)    # no.of elements
> min(y)
> max(y)
> range(y)
> sqrt(y)

>  x = c(44,46,56,67,89,34) % %5
> x = c(44,46,56,67,89,34)
>  x %%5
>  y = c(1,4,7,10,13,16,19)  # A.P
> seq(1,20,3)
> seq(100,50,-7)
> y^2
```

FOR EDUCATIONAL USE

[1] 3 3 3 3

Arithmetic mean = 3.047619

Arithmetic mean = 3.047619

	x	f
1	1	2
2	2	5
3	3	7
4	4	4
5	5	3

[1] 4 16 49 64 81 100
[1] 8 64 343 512 729 1000
[1] 16 256 2401 4096 6561 10000

	x	x^2	x^3	x^4
1	2	4	8	16
2	4	16	64	256
3	7	49	343	2401
4	8	64	512	4096
5	9	81	729	6561
6	10	100	1000	10000

[1] -1 1 4 5 6 7
[1] 7 9 12 13 14 15
[1] 6 12 21 24 27 30

rep (3,4)
x = c(1,2,3,4,5) #
f = c(2,5,7,4,3) #
> m = sum (x*f) \
> cat ("Arithmetic m
> y = rep (x,f)
> n = mean (y)
> cat (" Arithmetic m
> data frame (x, f

> x = c(2,4,7,8,9,1
> x^2
> x^3
> x^4
> data frame (x, x

> x = c(2,4,7,8,9
> x-3
> x+5
> 3*x
> x = c(2,4,7,8,9

```
> rep (3,4)
> x = c(1,2,3,4,5) # Obs
> F = c(2,5,7,4,3) # Freq
> m = sum (x * F) \ sum (F)
> cat ("Arithmetic mean=", m)
> y = rep (x,F)
> n = mean (y)
> cat (" Arithmetic mean="n)
> data frame (x, F)
```

```
> x = c(2,4,7,8,9,10)
> x^2
> x^3
> x^4
> data frame (x, x^2, x^3, x^4
```

```
> x = c(2,4,7,8,9,10)
> x - 3
> x + 5
> 3 * x
> x = c(2,4,7,8,9,10)
```

	X	F	cumsum.F	F.x
1	2	1	1	2
2	4	2	3	8
3	7	3	6	21
4	8	5	11	40
5	9	2	13	18
6	10	1	14	10

[1] 6 4 1 0 1 2

[1] 3 4 5 6

[1] 18

[1] 20 19 18

```
> F=c(1,2,3,5,2,1)
> data frame (x, F, cumsum(F), F* x)
```

```
> x = c(2,4,7,8,9,10)
> abs (x-8)
> x = 3:20
> x
> length (x)
> y = 20:3
> y
```

	[,1]	[,2]	[,3]
[1,]	1	0	3
[2,]	4	7	-1

	[,1]	[,2]	[,3]
[1,]	1	3	7
[2,]	0	4	-1

	[,1]	[,2]
[1,]	1	4
[2,]	0	7
[3,]	3	-1

	[,1]	[,2]
[1,]	2	3
[2,]	4	5
[,3]	6	7

	[,1]	[,2]	[,3]
[1,]	2	4	6
[2,]	3	5	7

[1] 6

[1] 6

[1] 3 2

[1] 2 3

Practical 2 :- Create a matrix using R and perform the operations addition, inverse, transpose and multiplication operations

```
>A=matrix(c(1,0,3,4,7,-1),nrow=2,ncol=3,byrow=TRUE)
>A

>B=matrix(c(1,0,3,4,7,-1),nrow=2 ,ncol=3,byrow=FALSE)
>B

>C=matrix(c(1,0,3,4,7,-1),nrow=3 , byrow=FALSE)
>C

># Transpose of matrix
>A=matrix((2:7),nrow=3 ,byrow=TRUE)
>A


>t(A)          # transpose of A

>length(A)     # number of elements in A
>length(t(A))
>dim(A)
>dim(t(A))
># Algebra of matrices
># Addition
>A=matrix(c(2,4,5,0,-2,-1),nrow=3 ,byrow=TRUE)
>B=matrix(seq(1,7,3),nrow=3,byrow= TRUE)
>A
```

FOR EDUCATIONAL USE

	[,1]	[,2]
[1,]	1	4
[2,]	7	10
[3,]	13	16

	[,1]	[,2]
[1,]	3	8
[2,]	12	10
[3,]	11	15

	[,1]	[,2]
[1,]	1	0
[2,]	-2	-10
[3,]	-15	-17

	[,1]	[,2]
[1,]	6	12
[2,]	15	0
[3,]	-6	-3

	[,1]	[,2]
[1,]	8	20
[2,]	29	20
[3,]	20	29

	[,1]	[,2]	[,3]	[,4]
[1,]	28	36	44	52
[2,]	29	32	35	38

[1] 2 4

> B

> A + B

> A - B # Substraction

> # Scalar Multiplication

> 3 * A

> # linear multiplication

> 5 * A - 2 * B

> # matrix multiplication

> A = matrix(c(4, 7, -3, 0, 1, 2), nrow = 2, byrow = TRUE)

> B = matrix((3:14), nrow = 3, ~~brow~~ byrow = TRUE) # 3 by 4

> A %*% B

> dim(A %*% B)

> H

	[,1]	[,2]	[,3]
[1,]	0	1	2
[2,]	1	2	3
[3,]	3	1	1

	[,1]	[,2]	[,3]
[1,]	0.5	-0.5	0.5
[2,]	-4.0	3.0	-1.0
[3,]	2.5	-1.5	0.5

[1] -2

	[,1]	[,2]	[,3]	[,4]
a	1	2	3	4
b	-2	4	6	-3
c	0	4	0	3

```
># inverse
>A =matri
> solve(A)

># vectors
> a=c(1,4
> b=c(0,
> C=c(2,
> rbind(c
```

```
># inverse of a matrix
>A =matrix (c(2,0,3,-4,6,7,11,8,2),nrow=3, byrow=TRUE)
> solve (A)

># vectors into matrix
> a=c(1,4,-2,5)
> b=c(0,4,0,3)
> c=c(2,2,1,2)
> rbind (a,b,c)
```

[1] 5.9375

Arithmetic mean = 5.9375

[1] 6.5

median = 6.5

mode = 7.625

$Q_1 = 4.75$

$Q_3 = 7$

$P_{46} = 7$

$D_6 = 7$

Range of x = 7

Coefficient of range of x = 0.6363636

Coefficient of Q.D. = 0.1914894

Practical 3

median, m

> x = c(2,3

> mean(x

> cat("Ar

> median(

> cat("me

> cat("m

Position

calculate

> cat("Q_1

> cat("Q_3

> cat("P46

> cat("D6

> # measur

> # range,

co-effi

> l = max(x

> s = min(x

> cat("Ra

> cat("Coe

> Q_1 = quar

> Q_3 = qua

> cat("co

Practical 3 : using R execute the statistical function: mean, median, mode, Quartiles, range, inter Quartile range.

```
> x=c(2,3,5,4,6,5,4,6,7,8,9,8,7,7,7)
> mean(x)
> cat("Arithematic mean =", mean(x))
> median(x)
> cat("median =", median(x))
> cat("mode=", (3*median(x)-2*mean(x)))

# Position values
# calculate Q1, Q2, Q3, Q4 P46, D6
> cat("Q1 =", quantile(x,0.25))
> cat("Q3 =", quantile(x,0.75))
> cat("P46 =", quantile(x,0.46))
> cat(" D6 =", quantile(x, 0.6))

> # measure of Dispersion
> # range, co-efficient of Range, Quartile deviation,
  co-efficient of Quartile.
> l=max(x)
> s=min(x)
> cat("Range of x =",(l-s))
> cat("Coefficient of range of x =", ((l-s)/(l+s)))

> Q1 = quantile(x,0.25)
> Q3 = quantile(x,0.75)
> cat(" co-efficient of Q.D =", ((Q3-Q1)/(Q3+Q1)))
```

```
>cat ("variance of data:", var(x))
>cat("S.D:", sd (x))
>cat ("Coefficient of variance:", sd(x)*100/mean(x))
>x=c (2,3,5,6,2,4,8,9,10,8,6,7,7,7)
>n=length (x)
>m1=sum (x)/n
>m1
>cat("First raw moment =",m1)
>m2 = sum (x^2)/n
>cat("second raw moment =", m2)
>m3=sum(x^3)/n
>cat(" Third raw moment = ",m3)
>m4=sum(x^4)/n
>cat(" Fourth raw moment=",m4)
>m=mean(x)
>cat ("M1 =", sum(x-m/n))
>cat ("M2 =", sum ((x-m)^2)/n )
>cat ("M3 =", sum ((x-m)^3 /n))
>cat(" M4 =", sum ((x-m)^4 /n ))

#ungrouped data
>x=c(2,3,5,6,9,10)        #observation
>F=c(1,2,3,4,2,1)         #frequency
>y=rep (x,f)
>mean(y)
>median (y)
>quantile (y,0.25)
>sd (y)
```

Variance of data : 3.795833

S.D. : 1.94829

Coefficient of variance : 32.8133

[1] 6

First raw moment = 6

second raw moment = 41.85714

Third raw moment = 317.5714

Fourth raw moment = 2538.714

$M_1 = 0$

$M_2 = 5.857143$

$M_3 = -3.857143$

$M_4 = 70.14286$

[1] 5.769231

[1] 6

```
>cat("variance of data:", var(x))

>cat("S.D:", sd(x))

>cat("Coefficient of variance:", sd(x)*100/mean(x))

>x=c(2,3,5,6,2,4,8,9,10,8,6,7,7,7)
>n=length(x)
>m1=sum(x)/n
>m1
>cat("First raw moment =",m1)
>m2 = sum(x^2)/n
>cat("second raw moment =",m2)
>m3=sum(x^3)/n
>cat(" Third raw moment = ",m3)
>m4=sum(x^4)/n
>cat(" Fourth raw moment=",m4)
>m=mean(x)
>cat("M1=", sum(x-m/n))
>cat("M2=", sum((x-m)^2)/n)
>cat("M3=", sum((x-m)^3/n))
>cat("M4=", sum((x-m)^4/n)

#ungrouped data
>x=c(2,3,5,6,9,10)           #observation
>F=c(1,2,3,4,2,1)            # frequency
>y=rep(x,f)
>mean(y)
>median(y)
>quantile(y,0.25)
>sd(y)
```

5

[1] 2.420532

[1] 5.858974

Arithematic mean of the data = 40.90476

median of the data = 39.79167

mode of the data = 36.42857

ver(y)

Grouped

Classes

Frequenc

> lb = seq(

> ub = seq

> x = (lb+

> f = c(

> am = s

> cat ("

> n = sur

> h = 10

> lcf = c

> mc =

> me =

> cat(

> f = c

> moc

> L =

> f1 =

> f0 =

> f2 =

> mo

> cat

```
var(y)

# Grouped data
# Classes : 0-10  10-20  20-30  30-40  40-50  50-60  60-70
# Frequency: 6     8      15     24     19     14     12
> lb = seq(0,70,10)          # lower bounds
> ub = seq(10,80,10)         # upper bounds
> x = (lb+ub)/2
> F = c(6,8,15,24,19,14,12,7)
> am = sum(x*F)/sum(F)
> cat("Arithematic mean of the data =",am)
> n = sum(F)
> h = 10                     # classwidth
> lCF = cumsum(F)            # C.F.
> mc = min (which (lCF >= n/2))      # median class
> me = lb[mc] + (n/2 - lCF[mc-1])*h/F[mc]    # Formula
> cat("median of the data =",me)
> F = c(6,8,15,24,19,14,12,7)
> moc = which (F == max(F))          # modal class
> L = lb[moc]
> F1 = F[moc]
> F0 = F[moc-1]
> F2 = F[moc+1]
> mo = L + (F1-F0)*h
> cat(" mode of the data =",mo)
```

[1] 0.2050781

[1] 0.828125

[1] 5

[1] 6 5 6 5 6 8 5 7 5 7 5 5 7 7 6 6 5 6

[1] 126 109 112 113 123 113 125 115 113 104 119 11
105 106 114 115 115 118 113

[1] 5.646917e-05

[1] 0.999845

[1] 42.86824 50.23960 50.29588 52.93246 53.008
53.89097 52.35800 51.51630

[9] 55.57225 52.08748 51.86291 56.59724 43.23428
50.27744 51.88562 50.63198

[17] 50.10814 49.19223 47.78830 44.85384 51.197
53.21037 53.15392 54.27955

[25] 52.89709

Practical 4
#Binomial
#Paramet
and p =
#dbinom (
Find t
> dbinom

>#Pbino
>#Find
coin
>Pbinom

>#qbinom
>#Pbin
>qbinom

>#rbi
m nur
>rbino

>rbinom

>#no
>#Pa
>#d
>#q
>dno
>Pno
>rno

Practical 4 :-

#Binomial distribution

#Parameter of Binomial distribution are n=no. of trials and P = probability of success.

dbinom (x,n,P) - This function gives the probability at

Find the probability of getting 6 heads in 10 tossed

> dbinom (6,10,0.5) #P (x=6)

># Pbinom (x,n,P) this Function gives cumulative probability

># Find the probability of getting 6 or less heads when a coin is tossed 10 times.

>Pbinom(6,10,0.5) #P(x<=6)

># qbinom (P(x),n,P)

># Pbinom is inverse of qbinom

>qbinom (0.4,10,0.5)

># rbinom (m,n,P) this function gives a distribution of m numbers out of n which probability of success.

> rbinom (20,10,0.6)

>rbinom (20,150,0.75)

># normal distribution

># Parameters of normal distribution are mean & tossed.

># dnorm(x, mean,sd)

># gives probability of x

> dnorm (40,35,1.2)

> Pnorm (40,35,1.2) # gives cumulative Probability of x, P(x<=40)

> rnorm (25,50,2.8)

[1] 6
[1] 6

Geometric mean of the data =6

Harmonic mean of the data =2

Geometric mean of the data = 4.304491

Harmonic mean of the data = 3.914943

Practical 5 :-

```
># Geometric mean and harmonic mean
> # Raw data
> # Calculate the geometric ~~data~~ mean of 3,6,9,8
> x=c(3,6,9,8)
> (3 * 6 * 9 * 8)^(1/4) # these three Formulas are same
> (Prod(x))^(1/4)
> g = exp(mean(log(x)))
> cat("geometric mean of the data =",g)
> ##Harmonic mean
> # calculate the harmonic mean of 2,3,5
> x = c(2,3,5)
> n=length(x)
> h=n/sum(1/x)
> cat("Harmonic mean of the data ",h)

# ungrouped Frequency distribution
> x=c(2,3, 5,7,8)
> F=c (2,4, 6,3,1)
> y = rep(x,F)
> g=rexp(mean(log(y)))
> cat ("Geometric mean of the data =",g)
> n =sum(F)
> h= n/sum(1/y)
> cat ("Harmonic mean of the data =", h)
```

FOR EDUCATIONAL USE

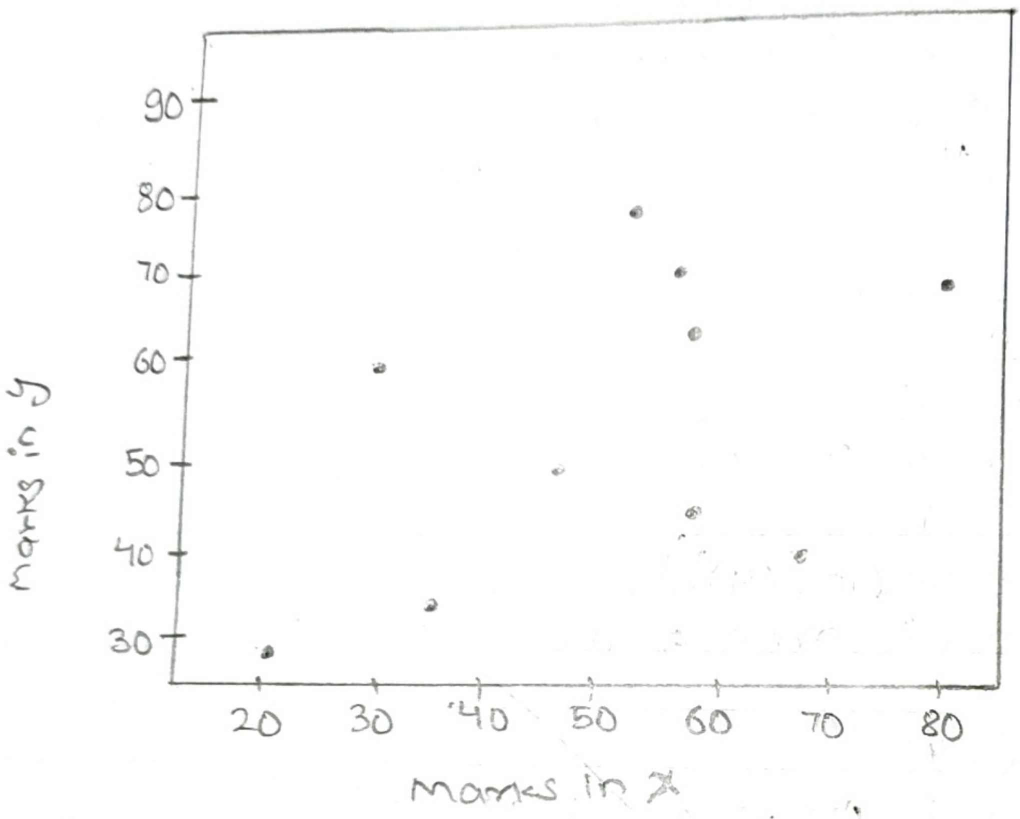
Geometric mean of the data = 30.82104

Harmonic mean of the data = 24.33666

```
># Grouped
># calculat
># classes:
># freq :

>lb = seq(0
>ub = seq(
>x = (lb +
> f = c(10
> y = rep(
>g = exp
>cat("Ge
>n = sum
>h = n/su
>cat("H
```

```
># Grouped frequency distribution
># calculate the G.M , H.M for the data.
># classes: 0-10   10-20   20-30   30-40   40-50   50-60
># freq   : 10     20      30      50      40      30

>lb = seq(0,50,10)
>ub = seq(10,60,10)
>x = (lb+ub)/2
>F = c(10,20,30,50,40,30)
>y = rep(x,F)
>g = exp(mean(log(y)))
>cat("Geometric mean of the data=", g)
>n = sum(F)
>h = n/sum(1/y)
>cat("Harmonic mean of the data=", h)
```

Scattered Diagram



Coefficient of correlation = 0.6511619

call :
lm (formula = y~x)
coefficients :
(Intercept) x
3 4

(Intercept) x
3 4

[1] 63
[,1]
[1,] 3
[2,] 4

[1] 3
[1] 4

Practical 6:-

```
>#1. Draw Scattered Diagram 2. Calculate correlation coefficients
>x=c(34, 56, 78, 21, 45, 32, 78, 53, 65, 54)
>y=c(32, 45, 62, 27, 49, 59, 90, 76, 43, 65)
>plot(x,y,main="Scattered Diagram", xlab="marks in x",
  ylab="marks in y")


>r=cor(x,y)
>cat ("coefficients of correlation", r)
>x = c(2,4,6,8,10,12)
>y=c(11,19,27,35,43,51)
#y on x
>lm(y~x)          #linear model y on x (y=a+bx)

>co=coef (lm(y~x))
>co
>#find xy if x=15
>x1=63
>y1= a+b * x1
>y1
>mco=matrix(co)
>mco
>a=mco[1,1]
>a
>b=mco[2,1]
>b
```

call :
lm(formula = x~y)
coefficients :
(Intercept) y
-0.75 0.25

(Intercept) y
-0.75 0.25

	[,1]
[1,]	-0.75
[2,]	0.25

[1] -0.75
[1] 0.25

[1] 15

(Intercept) x
37.16316 2.71002

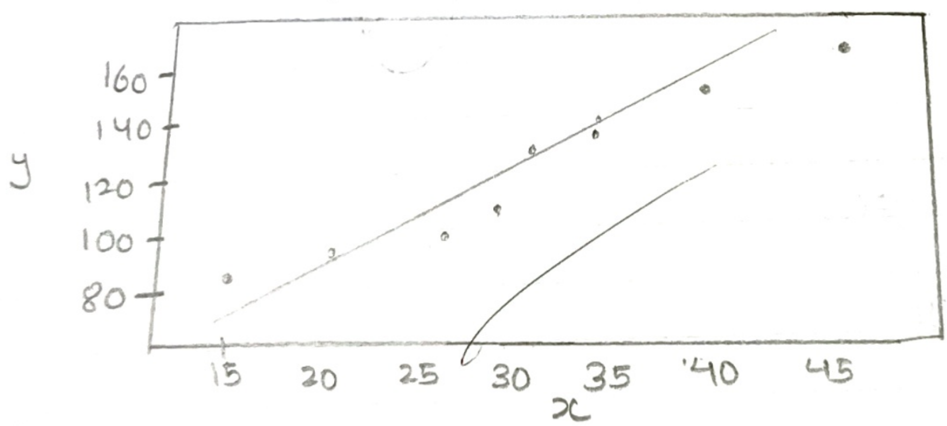
	[0,1]
[1,]	37.16316
[2,]	2.71002

[1] 37.16316

```
># x on y
>lm(x~y)

>co=coef(lm(x~y))
>co

>mco=matrix(co)
>mco

>a=mco[1,1]
>a
>b=mco[2,1]
>b
># find x if y=63
> y1=63
>x1=a+b*y1
>x1

>x=c(15,26,20,28,30,35,40,45)
>y=c(82,99,92,107,125,135,145,160)
>#x on y
>yox=lm(x~y)
> co=coef(yox)
>co
>mco=matrix(co)
>mco

>a=mco[1,1]
>a
```

[1] 2.71002

	x	y	esty
1	15	82	77.81346
2	26	99	107.62367
3	20	92	91.36355
4	28	107	113.04371
5	30	125	118.46375
6	35	135	132.01385
7	40	145	145.56395
8	45	160	159.11405



Intercept y

-12.2157099 0.3563235

[,1]

[1,] -12.2157099

[2,] 0.3563235

[1] -12.21571

[1] 0.3563235

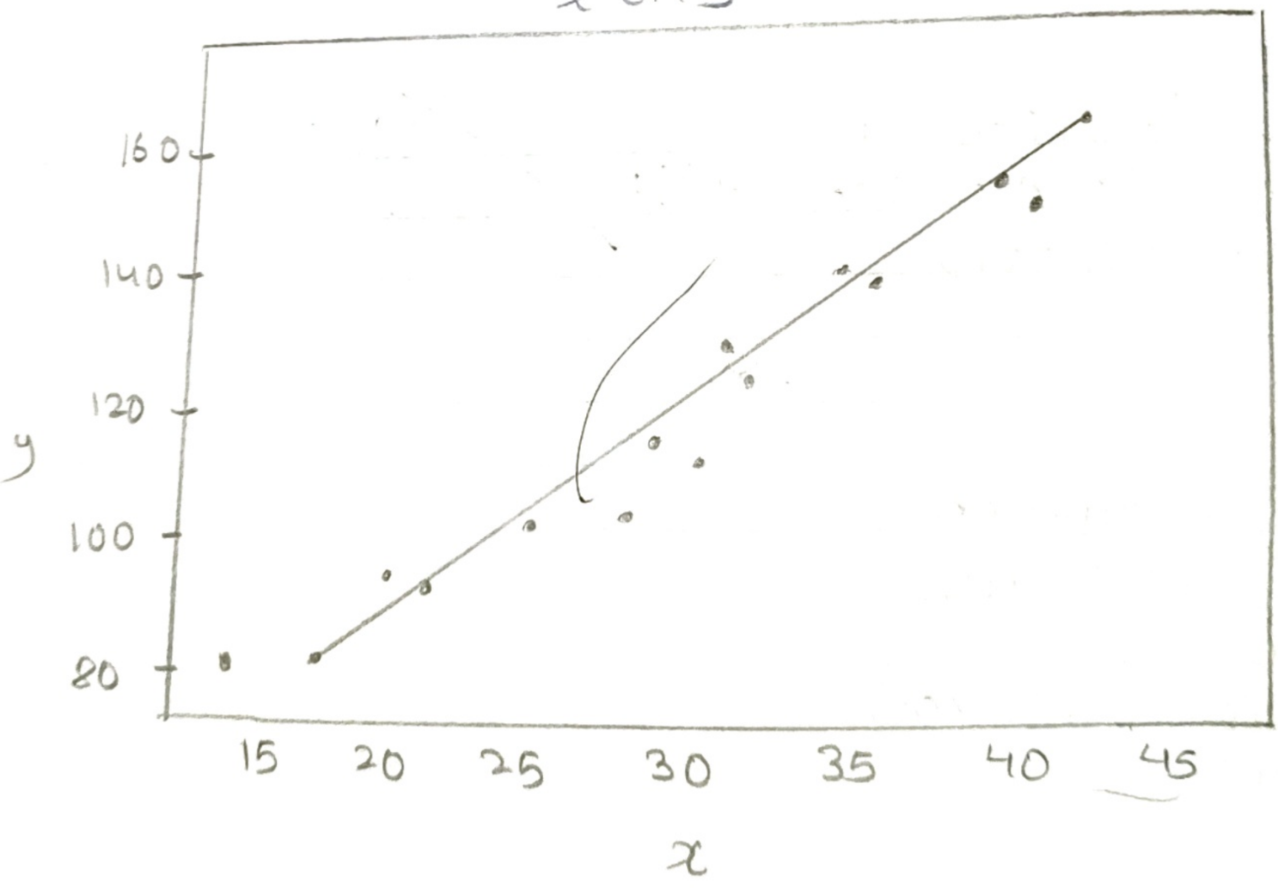
```
>b=mco[2,1]
>b
># line of Regression y on x is y=37.16316+2.71002*x
>esty=fitted(yox)
>data.frame(x,y,esty)
```

```
>plot(x,y,pch="+")
>points(x,esty,pch="*");
>lines(x,esty)
```

```
># x on y
>xoy=lm(x~y)
>co=coef(xoy)
>co
>mco=matrix(co)
>mco
>a=mco[1,1]
>a
>b=mco[2,1]
>b
># line of Regression of x on y is
>x=-12.2157099+0.3563235*y
```

x	y	estx
15	82	17.00281
26	94	23.06031
20	92	20.56605
28	107	25.91090
30	125	32.32472
35	135	35.88796
40	149	39.45119
45	160	44.79605

x on y



```
>estx = Fitted (y xoy)
>data.frame (x, y, estx)
```

```
> Plot (x, y, main = "x on y", Pch = "+");
>Points (estx , y , Pch = " * ");
>lines (estx, y)
```

Z calculated : 1.777778

P value : 0.07544036

Z calculated : -4.535574

Practical 7

```
># Hyothesis Testing large Sample Test (z test)
># A random sample of 400 Chocolate bars is taken
 Showing the mean weight 10.2 gm and sd 2.25,
 test the hypothesis that mean weight of bar is
 10 gm.
> n=400        # sample size
> mx = 10.2
> sd = 2.25          # sd
> mo = 10            # std value
> # Ho : m =10
> # H1 : m != 10
> zcal = (mx - mo) / (sd / sqrt(n))
> cat ("z calculated :", zcal)
> pv = 2 * (1 - pnorm (abs (zcal)))       # z failed test
> cat ("P value :", pv)
> # conclusion : P value > 0.05, therefore accept Ho.
> # mean weight of chocolate bar is 10 gm.

># Experience has shown that 20% of a manufacture
product is of the Top quality in one days production
of 400 articles only 50 are of the Top quality.
> # Test the hypothesis los = 5%
> n=400
> Po = 20/100
> P = 50/400
> # Ho = Population Proportion = 0.2
> # H1 = Population Proportion = 0.2
> zcal = (p - Po) / (sqrt ((p * (1-p)) / n))
> cat ("z calculated ", zcal)
```

FOR EDUCATIONAL USE

P value : $5.744712e^{-06}$

Z calculated = 2.119996

P value = 0.03400064

```
>Pv=2* (1-Pnorm (abs (zcal)))
>cat("Pvalue :", Pv)
># conclusion : Pvalue < 0.05 therefore Reject Ho
># Proportion of TOP Quality product is not 20%

># Intelligence test on two group of boys and girls
  gave following results
>#          Mean     S.D     N
># Girls    61       2       64
># Boys     60       4       100
# Is there any significant difference in the mean
  score obtained by boys and girls (LOS=1%)
>n1=64
>n2=100
>x1=61
>x2=60
>s1=2
>s2=4
>#H0 : M1=M2
>#H1 : m1 != m2
>zcal =(x1-x2) /(sqrt((s1^2/n1)+(s2^2)/n2)))
>cat ("z calculated =", zcal)
>Pv=2 * (1-Pnorm (abs(zcal)))
>cat ("P value=", Pv)
#> # conclusion :P value >0.01 therefore accept Ho.
># so there is no significant difference in mean
  score of girls and boys.
```

```
>pv=2*(1-pnorm(abs(zcal)))
>cat("P value :",pv)
># conclusion : Pvalue < 0.05 therefore Reject H0
># proportion of TOP Quality product is not 20%

># Intelligence test on two group of boys and girls
  gave following results
>#          Mean      S.D      N
># Girls     61        2       64
># Boys      60        4       100
># Is there any significant difference in the mean
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>n1=64
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>x2=60
>s1=2
>s2=4
>#H0 : m1=m2
>#H1 : m1 != m2
>zcal =(x1-x2)/(sqrt((s1^2/n1)+(s2^2)/n2))
>cat ("z calculated =",zcal)
>pv=2*(1-pnorm(abs(zcal)))
>cat ("p value =",pv)
># conclusion :p value >0.01 therefore accept H0.
># so there is no significant difference in mean
  score of girls and boys.
```

	Name	Statistics	Math
1	Geeta	45	56
2.	Reeta	24	76
3	Dia	77	65
4	Roohi	65	56
5	Divya	87	66.
6	Triveni	45	77.
7	mahi	68	87
8	Khushi	54	76
9	Anshu	88	76

'data.frame : 9 obs. of 3 variables :
$Name : chr "Geeta" "Reeta" "Dia"
$Statistics : int 45 24 77 65 87 45 68 54 88
$math : int 56 76 65 56 66 77 87 76 76

[ ] 45 24 77 65 87 45 68 54 88
[1] 56 76 65 56 66 77 87 76 76

75%
-0.25

```
>#Practical 8
>#import the data from CSV(common separated value)
 to R.
>D = read.csv (File.choose(), header =TRUE)
>D

> Str (D)

> x = (D$Statistics)
>x
>y= (D$Math)
>y
># Find the skewness for x
>Q1=quantile (x,0.25)
>Q2=quantile (x,0.5)
>Q3= quantile (x,0.75)
>SK = (Q3 + Q1- 2 *Q2 ) /(Q3 -Q1)
>SK
```

FOR EDUCATIONAL USE

Skewness: -0.25

[1] 56 76 65 56 66 77 87 76 76

Coefficients of Kurtosis: - 0.3079884

```
>cat ("skewness :", sk)

>y
># calculate coefficient of kurtosis for y
> m= mean (y)
> m4= sum ((x-m)^4) /length(y)
> m2 = sum ((x-m)^2) /length(y)
> k= (m4/(m2 ^2)) -3
> cat ("coefficient of kurtosis ", k)
```

	a	b
1	21	48
2	36	26
3	30	19

Pearson's Chi-squared test

data: D
X-squared = 14.464 , df = 2 , P-value = 0.0007232

Chi-squared Test for given probabilities

data: x
x-squared = 4.1667 , dF = 6 , P-value = 0.6541

```
> # Practical 9
> # hypertension chi
> a = c (21, 36, 30)
> b = c (48, 26, 19)
> D = data.frame (a,b)
> D

> chisq.test (D)

> # P value < .05 reject H0
> # conclusion: smoking habits and hypertension are
  associated.
> # Q2 Aircraft accidents
> #   S    m    t    w    th   f   Sa
> #   14   16   8    12   11   9   14
> # H0: Accidents are evenly distributed
> # H1: Accidents are not evenly distributed
> x = c(14, 16, 8, 12, 11, 9, 14)
> chisq.test (x)

> # P value > .05
> # Accept H0
> # conclusion: Accidents are ~~no~~ evenly distributed.
```