


**SEAT NO.-2018120**

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## PRACTIAL NO.1 (A)

**AIM:** Create Matrix A and B using R, $A=\begin{matrix}-3 & 2 & 6\\ 4 & 0 & -1\\ 5 & 2 & 3\end{matrix}$, $B=\begin{matrix}1 & 5 & 4\\ -3 & 2 & 6\\ 0 & -4 & 3\end{matrix}$

Find the following matrices.

a) A+B b) AB c) BA d) $A^T$ e) $(A+B)^T$ f) $A^{-1}$

## SOURCE CODE:

```
> "Practical no.1A "
[1] "Practical no.1A "
> "Name:Suhel"
[1] "Name:Suhel"
> a=c(-3,2,6,4,0,-1,5,2,3)
> b=c(1,5,4,-3,2,6,0,-4,3)
> A=matrix(a,nrow=3,ncol=3,byrow="TRUE")
> A
     [,1] [,2] [,3]
[1,]   -3    2    6
[2,]    4    0   -1
[3,]    5    2    3
> B=matrix(b,nrow=3,ncol=3,byrow="TRUE")
> B
     [,1] [,2] [,3]
[1,]    1    5    4
[2,]   -3    2    6
[3,]    0   -4    3
> A+B
     [,1] [,2] [,3]
[1,]   -2    7   10
[2,]    1    2    5
[3,]    5   -2    6
> "product of matrices A and B:"
[1] "product of matrices A and B:"
> A%*%B
     [,1] [,2] [,3]
[1,]   -9  -35   18
[2,]    4   24   13
[3,]   -1   17   41
> "product of matrices B and A:"
[1] "product of matrices B and A:"
> B%*%A
     [,1] [,2] [,3]
[1,]   37   10   13
[2,]   47    6   -2
[3,]   -1    6   13
> "transpose of matrix A:"
[1] "transpose of matrix A:"
> t(A)
     [,1] [,2] [,3]
[1,]   -3    4    5
```

```
[2,]    2    0    2
[3,]    6   -1    3
> "transpose of matrix (A+B):"
[1] "transpose of matrix (A+B):"
> t(A+B)
     [,1] [,2] [,3]
[1,]   -2    1    5
[2,]    7    2   -2
[3,]   10    5    6
> "inverse of matrix A:"
[1] "inverse of matrix A:"
```

## PRACTIAL NO.1 (B)

**AIM:** Create matrix A and B such that $A=\begin{matrix}-3 & 2 & 6\\ 4 & 0 & -1\\ 5 & 2 & 3\end{matrix}$, $B=\begin{matrix}4\\ -6\\ 3\end{matrix}$

Also create diagonal matrix D with the enteries are -3,0,9,2.3

1) Find X such that AX=B
2) Display D
3) Calculate $D^3+D^2-2D+4I$

Where I is a square matrix.

**OUTPUT:**

```
> "Practical NO. 1B"
[1] "Practical NO. 1B"
> "Name : Suhel"
[1] "Name : Suhel"
> a=c(-3,2,6,4,0,-1,5,2,3)
> b=c(4,-6,3)
> A=matrix(a,nrow=3,ncol=3,byrow="TRUE")
> B=matrix(b,nrow=3,ncol=1,byrow="TRUE")
> X=(solve(A))%*%B
> A
     [,1] [,2] [,3]
[1,]   -3    2    6
[2,]    4    0   -1
[3,]    5    2    3
> B
     [,1]
[1,]    4
[2,]   -6
[3,]    3
> X
       [,1]
[1,]  -4.250
[2,]  28.625
[3,] -11.000
> d=c(-3,0,9,2.3)
> d
[1] -3.0  0.0  9.0  2.3
> D=diag(d)
> D
     [,1] [,2] [,3] [,4]
[1,]   -3    0    0  0.0
[2,]    0    0    0  0.0
[3,]    0    0    9  0.0
[4,]    0    0    0  2.3
> D2=D%*%D
> D2
     [,1] [,2] [,3] [,4]
[1,]    9    0    0 0.00
[2,]    0    0    0 0.00
```



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```
[3,]    0    0   81 0.00
[4,]    0    0    0 5.29
> D3=(D2)%*%D
> D3
     [,1] [,2] [,3]   [,4]
[1,]  -27    0    0  0.000
[2,]    0    0    0  0.000
[3,]    0    0  729  0.000
[4,]    0    0    0 12.167
> i=c(1,1,1,1)
> i
[1] 1 1 1 1
> I=diag(i)
> I
     [,1] [,2] [,3] [,4]
[1,]    1    0    0    0
[2,]    0    1    0    0
[3,]    0    0    1    0
[4,]    0    0    0    1
> D#
     [,1] [,2] [,3] [,4]
[1,]   -3    0    0  0.0
[2,]    0    0    0  0.0
[3,]    0    0    9  0.0
[4,]    0    0    0  2.3
> D3+D2-2*D+4*I
     [,1] [,2] [,3]   [,4]
[1,]   -8    0    0  0.000
[2,]    0    4    0  0.000
[3,]    0    0  796  0.000
[4,]    0    0    0 16.857
>
```

## PRACTIAL NO.2(A)

**AIM:** following data represent the marks obtained by S.Y.B.SC students.
78,56,45,82,69,54,48,39,44,90,87,73,79,54,42,38,62.

a) Create object "mks" to store those marks
   Write R-command to determine
b) The number of students
c) The range
d) Arrange marks
e) Median marks
f) Average marks taking 2 decimal places
g) Variance of marks
h) S.D of marks
i) Modal marks
j) All quartiles
k) $D_7$
l) $P_{72}$
m) Q.D
n) Overall summary

**OUTPUT:**

```
> "Practical No.2a"
[1] "Practical No.2a"
> "Name:Suhel"
[1] "Name:Suhel"
> mks=c(78,56,45,82,69,54,48,39,44,90,87,73,79,54,42,38,62)
> mks
 [1] 78 56 45 82 69 54 48 39 44 90 87 73 79 54 42 38 62
> "Number of Students"
[1] "Number of Students"
> length(mks)
[1] 17
> range(mks)
[1] 38 90
> "Average Marks"
[1] "Average Marks"
> mean(mks)
[1] 61.17647
> "median marks"
[1] "median marks"
> median(mks)
[1] 56
> "Average Marks upto 2 decimal places"
[1] "Average Marks upto 2 decimal places"
> round(mean(mks),2)
```

```
[1] 61.18
> "Variance of marks"
[1] "Variance of marks"
> var(mks)
[1] 311.9044
> "S.D of marks"
[1] "S.D of marks"
> sd=sqrt(var(mks))
> sd
[1] 17.66082
> "Modal Marks"
[1] "Modal Marks"
> t=table(mks)
> t
mks
38 39 42 44 45 48 54 56 62 69 73 78 79 82 87 90
 1  1  1  1  1  1  2  1  1  1  1  1  1  1  1  1
> mode<-which(t==max(t))
> mode
54
 7
> "All three Quartiles"
[1] "All three Quartiles"
> "First Quartile"
[1] "First Quartile"
> quantile(mks,0.25)
25%
 45
> "Second Quartile"
[1] "Second Quartile"
> quantile(mks,0.5)
50%
 56
> "Third Quartile"
[1] "Third Quartile"
> quantile(mks,0.75)
75%
 78
> "7th Decile"
[1] "7th Decile"
> quantile(mks,0.7)
70%
 74
> "72th Percentile"
[1] "72th Percentile"
> quantile(mks,0.72)
 72%
75.6
```



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```
> "Quartile Deviation"
[1] "Quartile Deviation"
> IQR(mks)
[1] 33
> summary(mks)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  38.00   45.00   56.00   61.18   78.00   90.00
>
```

## PRACTIAL NO.2 (B)

**AIM:** For the Data x:150 155 160 165 170 175
f:6 11 14 9 3 2
using R, find the following .

a) Range
b) Mean
c) Median
d) Mode
e) $Q_1$
f) $P_{67}$
g) $D_8$
h) Q.D
i) Var
j) S.D
k) Summary
l) Draw Histogram

**OUTPUT:**

```
> "Practical No.2b"
[1] "Practical No.2b"
> "Name:Suhel"
[1] "Name:Suhel"
> x=seq(150,175,5)
> x
[1] 150 155 160 165 170 175
> f=c(6,11,14,9,3,2)
> f
[1]  6 11 14  9  3  2
> data=rep(x,f)
> data
 [1] 150 150 150 150 150 150 155 155 155 155 155 155 155 155 155 155 160 160 160 160 160
160 160 160 160 160 160 160 160 160 165 165 165 165 165 165 165
[39] 165 165 170 170 170 175 175
> "range"
[1] "range"
> range(data)
[1] 150 175
> "Median"
[1] "Median"
> median(data)
[1] 160
> "Mode"
[1] "Mode"
> t=table(data)
> t
data
```



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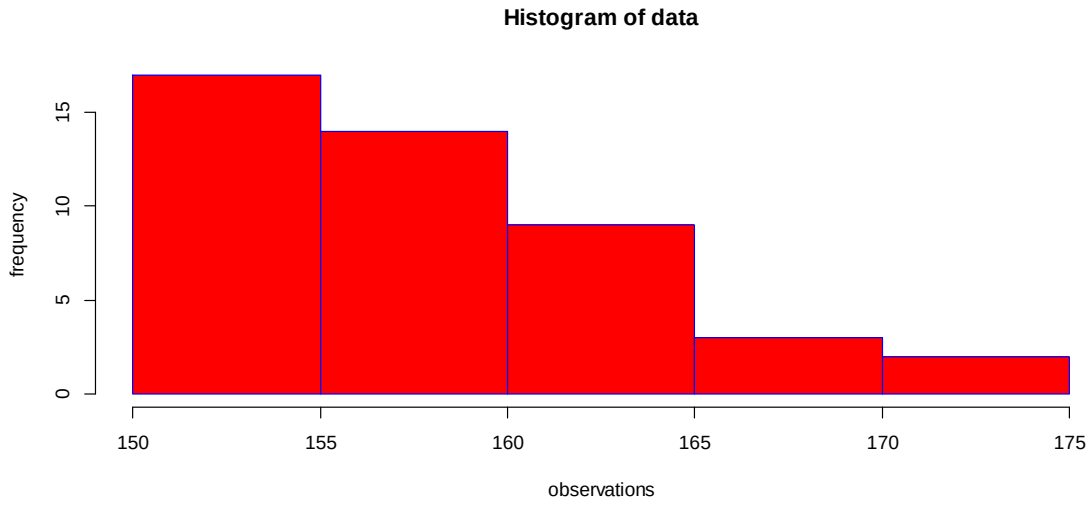
```
150 155 160 165 170 175
  6  11  14   9   3   2
> mode=which(t==max(t))
> mode
160
  3
> "1st Quartile"
[1] "1st Quartile"
> quantile(data,0.25)
25%
155
> "67th percentile"
[1] "67th percentile"
> quantile(data,0.67)
67%
160
> "8th Decile"
[1] "8th Decile"
> quantile(data,0.8)
80%
165
> "Quartile Deviation(IQR)"
[1] "Quartile Deviation(IQR)"
> IQR(data)
[1] 10
> "Variance"
[1] "Variance"
> var(data)
[1] 41.99495
> "Standard Deviation"
[1] "Standard Deviation"
> sd(data)
[1] 6.480351
> summary(data)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  150.0   155.0   160.0   159.8   165.0   175.0
> "Histogram"
[1] "Histogram"
> limits=seq(150,175,5)
> limits
[1] 150 155 160 165 170 175
> hist(data,breaks=limits,col="red",border="blue", xlab="observations",ylab="frequency")
```



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## PRACTIAL NO.2 (C)

**AIM:** For the Following Data

| Class | 0-25 | 25-50 | 50-75 | 75-100 | 100-125 |
|---|---|---|---|---|---|
| frequency | 5 | 8 | 13 | 11 | 3 |

Using R, Create object 'data' to store these data.
Write R command to find

a) Mean
b) Variance
c) S.D
d) Histogram

**OUTPUT:**

```
> "Practical No.2c"
[1] "Practical No.2c"
> "Name:Suhel"
[1] "Name:Suhel"
> l=seq(0,100,25)
> l
[1]   0  25  50  75 100
> u=seq(25,125,25)
> u
[1]  25  50  75 100 125
> f=c(5,8,13,11,3)
> f
[1]  5  8 13 11  3
> x=(l+u)/2
> x
[1]  12.5  37.5  62.5  87.5 112.5
> data=rep(x,f)
> data
 [1]  12.5  12.5  12.5  12.5  12.5  37.5  37.5  37.5  37.5  37.5  37.5  37.5
[13]  37.5  62.5  62.5  62.5  62.5  62.5  62.5  62.5  62.5  62.5  62.5  62.5
[25]  62.5  62.5  87.5  87.5  87.5  87.5  87.5  87.5  87.5  87.5  87.5  87.5
[37]  87.5 112.5 112.5 112.5
> "Mean"
[1] "Mean"
> mean(data)
[1] 61.875
> "Variance"
[1] "Variance"
> var(data)
[1] 816.9071
> "Standard Deviation"
[1] "Standard Deviation"
> sd(data)
[1] 28.58159
> "Histogram"
```



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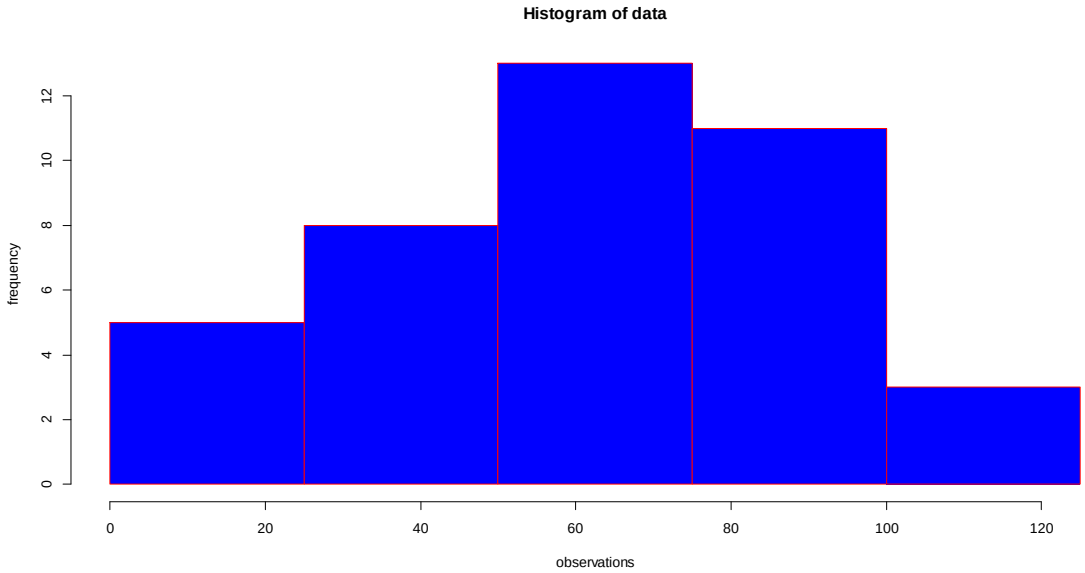
```
[1] "Histogram"
> limits=seq(0,125,25)
> limits
[1]   0  25  50  75 100 125
> hist(data,breaks=limits,col="blue",border="red",xlab="observations",ylab="frequency")
>
```



## PRACTIAL NO.3 (A)

**AIM:** Prepare an excel file for the data.

| SR No. | name | Physics | Chemistry | Maths |
|---|---|---|---|---|
| 1 | Sonam | 45 | 85 | 52 |
| 2 | Suhel | 54 | 25 | 25 |
| 3 | Deepti | 87 | 25 | 87 |
| 4 | Shweta | 52 | 14 | 74 |
| 5 | Nikita | 25 | 65 | 74 |
| 6 | Bhavna | 25 | 48 | 78 |
| 7 | Akshada | 98 | 22 | 74 |
| 8 | Shreya | 68 | 97 | 25 |
| 9 | Akansha | 74 | 25 | 87 |
| 10 | Pooja | 60 | 50 | 72 |

Using R import the data Excel and perform the following functions:

a) Mean marks of Physics
b) Mean marks of Maths
c) Median of Chemistry
d) $D_4$ for maths
e) IQR of Chemistry
f) S.D for all subjects.

**OUTPUT:**

```
> "Practical No.3"
[1] "Practical No.3"
> "Name:Suhel"
[1] "Name:Suhel"
> data=read.table(file.choose("Suhel.csv"),header=TRUE,sep=",")
> data
   Sr.no   Name Physics Chemistry Maths
1      1  Sonam     45       85    52
2      2  Suhel     54       25    25
3      3 Deepti     87       25    87
4      4  Shweta     52       14    74
5      5 Nikita     25       65    74
6      6 Bhavna     25       48    78
7      7 Akshada     98       22    74
8      8  Shreya     68       97    25
9      9  Akansha   74       25    87
10    10  Pooja     60       50    72
> mean(data$Physics)
[1] 58.8
> median(data$Chemistry)
[1] 36.5
> quantile(data$Maths,0.4)
 40%
```



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```
73.2
> IQR(data$Chemistry)
[1] 36.25
> sd(data$Physics)
[1] 24.02221
> sd(data$Maths)
[1] 23.08824
> sd(data$Chemistry)
[1] 28.72165
```

## PRACTIAL NO.4

**AIM:** Create an object ‘x’ & ‘y’ in R for the data

| | | | | | | |
|---|---|---|---|---|---|---|
| X | 2 | 4 | 6 | 4 | 5 | 3 |
| Y | 18 | 14 | 4 | 6 | 6 | 12 |

Find the following

a) Coefficient of correlation
b) Regression equation y on x. hence find ‘y’ where x=10
c) Regression equation x on y. hence find ‘x’ where y=8
d) Create an object ‘z’
   Z: 39,40,43,47,46,38
e) Regression equation z on x and y
f) Draw scatter diagram of data x & y.

**OUTPUT:**

```
> "Practical No.4"
[1] "Practical No.4"
> "Name:Suhel"
[1] "Name:Suhel"
> x=c(2,4,6,4,5,3)
> x
[1] 2 4 6 4 5 3
> y=c(18,14,4,6,6,12)
> y
[1] 18 14  4  6  6 12
> "Coefficient of Correlation"
[1] "Coefficient of Correlation"
> r=cor(x,y,method="pearson")
> r
[1] -0.8720816
> R=cor(x,y,method="spearman")
> R
[1] -0.8676471
> "Regression Equation y on x"
[1] "Regression Equation y on x"
> f=lm(y~x)
> f

Call:
lm(formula = y ~ x)

Coefficients:
(Intercept)          x
     23.6        -3.4
> fitted.values(f)
```



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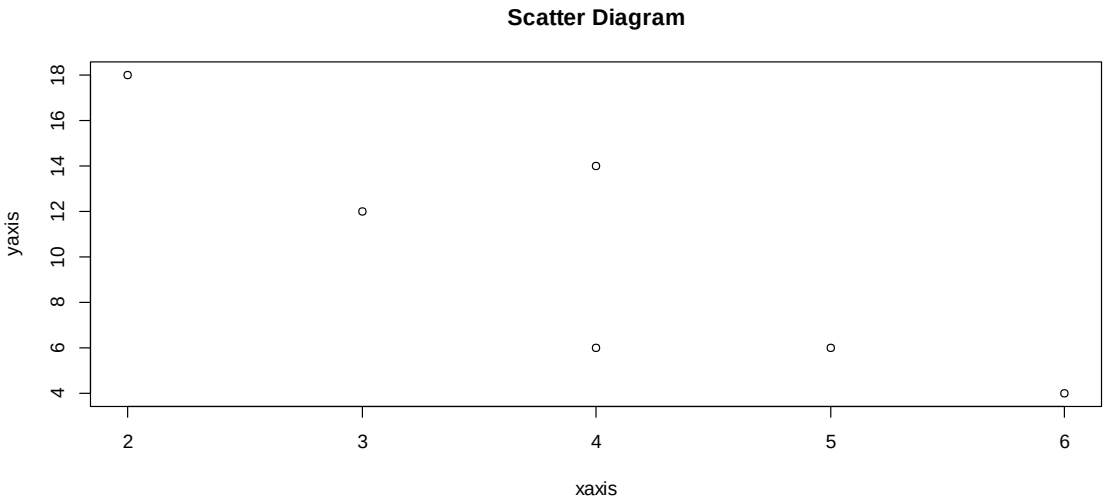
```
  1   2   3   4   5   6
16.8 10.0  3.2 10.0  6.6 13.4
> predict(f,data.frame(x=10))
   1
-10.4
> "Regression Equation x on y"
[1] "Regression Equation x on y"
> f1=lm(x~y)
> fitted.values(f1)
     1       2       3       4       5       6
2.210526 3.105263 5.342105 4.894737 4.894737 3.552632
> predict(f1,data.frame(y=8))
     1
4.447368
> z=c(39,40,43,47,46,38)
> z
[1] 39 40 43 47 46 38
> "Regression Equation z on x&y"
[1] "Regression Equation z on x&y"
> f2=lm(z~x+y)
> f2

Call:
lm(formula = z ~ x + y)

Coefficients:
(Intercept)          x          y
   53.6612     -0.9780     -0.7582

> fitted.values(f2)
     1       2       3       4       5       6
38.05678 39.13370 44.76007 45.19963 44.22161 41.62821
> plot(x,y,xlab="xaxis",ylab="yaxis",main="Scatter Diagram")
```



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## PRACTIAL NO.5

**AIM:** Using R, Find the trend line for the data. Hence find sales. For the year. 2008

| Year | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|---|---|
| sales | 40 | 48 | 65 | 72 | 70 | 62 | 81 |

**OUTPUT:**

```
> "Practical No.5"
[1] "Practical No.5"
> "Name:Suhel"
[1] "Name:Suhel"
> year=c(2001,2002,2003,2004,2005,2006,2007)
> year
[1] 2001 2002 2003 2004 2005 2006 2007
> sales=c(40,48,65,72,70,62,81)
> sales
[1] 40 48 65 72 70 62 81
> x=year-2004
> x
[1] -3 -2 -1  0  1  2  3
> n=length(year)
> n
[1] 7
> a=(sum(sales))/n
> b=(sum(x*sales)/sum(x^2))
> a
[1] 62.57143
> b
[1] 5.571429
> "Sales for the Year 2008"
[1] "Sales for the Year 2008"
> a+b*4
[1] 84.85714
>
```

## PRACTIAL NO.6

**AIM:** Using R,

a) X~B(n=5,p=$\frac{1}{4}$).Find p(x),p(x=4),p(x≤3)and p(x≥2)

b) Suppose there are 12 multiple choice questions in English class quiz. Each question has five possible answer, and only one of them is correct. Find the probability of having
   i) Exactly 4 correct answers.
   ii) 4 or less correct answer.
   iii) More than 6 correct answer.

**OUTPUT:**

```
> "Practical No.6A"
[1] "Practical No.6A"
> "Name:Suhel"
[1] "Name:Suhel"
x=0:5
> x
[1] 0 1 2 3 4 5
> dbinom(x,5,0.25)
[1] 0.2373046875 0.3955078125 0.2636718750 0.0878906250 0.0146484375
[6] 0.0009765625
> "probablity that x=4"
[1] "probablity that x=4"
> dbinom(4,5,0.25)
[1] 0.01464844
> "probablity x is less than or equal to 3"
[1] "probablity x is less than or equal to 3"
> pbinom(3,5,0.25)
[1] 0.984375
> "probablity x is greater than or equal to 2"
[1] "probablity x is greater than or equal to 2"
> 1-pbinom(1,5,0.25)
[1] 0.3671875
> "Part b"
[1] "Part b"
> x=0:12
> x
 [1]  0  1  2  3  4  5  6  7  8  9 10 11 12
> round(dbinom(x,12,0.2),4)
 [1] 0.0687 0.2062 0.2835 0.2362 0.1329 0.0532 0.0155 0.0033 0.0005 0.0001
[11] 0.0000 0.0000 0.0000
> "probablity that exactly 4 correct answer"
[1] "probablity that exactly 4 correct answer"
```



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```
> dbinom(4,12,0.2)
[1] 0.1328756
> "probablity that 4 or less correct answer"
[1] "probablity that 4 or less correct answer"
> pbinom(4,12,0.2)
[1] 0.9274445
> "probablity that more than 6 correct answer"
[1] "probablity that more than 6 correct answer"
> 1-pbinom(6,12,0.2)
[1] 0.003903132
>
```

## PRACTIAL NO.6B

**AIM:** Using R,

a) X~N(15,4).Find p(z≤1.96),p(z≤1.645),p(z≥1.96)

b) X~N(μ=20, $\sigma$=3),Find p(x≤18),p(x≥25)

i) Exactly 4 correct answers.

ii) 4 or less correct answer.

iii) More than 6 correct answer.

**OUTPUT:**

```
> "Practical No.6B"
[1] "Practical No.6B"
> "Name:Suhel"
[1] "Name:Suhel"
> "Normal Distribution Mean=15,S.D=4"
[1] "Normal Distribution Mean=15,S.D=4"
> "Probablity z<=1.96"
[1] "Probablity z<=1.96"
> pnorm(1.96)
[1] 0.9750021
> "Probablity z<=1.645"
[1] "Probablity z<=1.645"
> pnorm(1.645)
[1] 0.9500151
> "Probablity z>=1.96"
[1] "Probablity z>=1.96"
> 1-pnorm(1.96)
[1] 0.0249979
> "Normal Distribution Mean=20,S.D=3"
[1] "Normal Distribution Mean=20,S.D=3"
> "Probablity x<=18"
[1] "Probablity x<=18"
> pnorm(18,20,3)
[1] 0.2524925
> "Probablity x>=25"
[1] "Probablity x>=25"
> 1-pnorm(25,20,3)
[1] 0.04779035
>
```