II	Complete	A.Kar / 4.3.

Exam Seat No.__________

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Computer Journal

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SEMESTER II UID No. __________

Class Fy.B.Sc.CS Roll No. 1859 Year 2019-2020

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who has worked for the year 2019-2020 in the Computer Laboratory.

A. vert.

Teacher In-Charge

Head of Department

Date : 4.3.20

Examiner

Sem-II

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practical no 1.

Topic: Basic of R software.

1) R is an software for data analysis and Statical computing.

2. This software is used for effective data handling and output storage is possible.

3. It is capable for graphical display

4. It is free software.

1. $2^2 + \sqrt{25} + 35$

> 2^2 + sqrt(25) + 35

[1] 44

2. $2 \times 5 \times 3 + 62 \div 5 + \sqrt{45}$

> 2*5*3 + 62/5 + sqrt(45)

[1] 49.4.

3. $\sqrt{76 + 4 \times 2 + 9 \div 5}$

> sqrt(76+4*~~2+~~9/5

[1] 9.262829

4. 42 + |-10| + 7^2 * 3*9 $(42 + |-10| + 7^2 + 3 \times 9$

[1] 128.

019

> x = 20
> y = 30
> x + y
> [1] 50
> x^2 + y^2 $(x^2 + y^2)$
> [1] 1300
> abs(x - y) $(|x - y|)$
> [1] 10
> sqrt(y^3 - x^3) $(\sqrt{y^3 - x^3})$
> [1] 137.8405

6 c(2,3,4,5)^2
[1] 4 9 16 25

7 c(4,5,6,8)*3
[1] 12, 15, 18, 24

8 c(2,3,5,7) + c(-2,-3,-5,-4)
[1] 0 0 0 3

Q7 ~~Find the sum product~~

9. c(2,3,5,7) * c(8,9)

[1] 16 27 40 63

10

10. c(2, 3, 5, 7) ; * c(1, 2, 3)
warning msg
longer obj len is not a multiple of
shorter obj. len

11. c(1, 2, 3, 4, 5, 6) ^ c(2, 3)
[1] 1 8 9 64 25 216

12. Find the sum, add, max, min
of the value
5, 8, 6, 7, 9, 10, 15, 5

→ > x = c(5, 8, 6, 7, 9, 10, 15, 5)
> len (x)
[1] 8
> sum(x)
[1] 65
> prod (x)
[1] 113400000
> max (x)
[1] 15
> min (x)
[1] 5
> range (x)
[1] 5, 15

050

13. x (1, 2, 3, 4; 5, 6, 7, 8) matrix

> x <- matrix (nrow=4, ncol= 2,
data = c(1, 2, 3, 4, 5, 6, 7, 8)

> x	[1]	[2]
[1]	1	5
[2]	2	6
[3]	3	7
[4]	4	8

14. $x = \begin{bmatrix} 1 & 4 & 7 \\ 2 & 5 & 8 \\ 3 & 6 & 9 \end{bmatrix}$ $y = \begin{bmatrix} 2 & 4 & 10 \\ -12 & 8 & -11 \\ 10 & 6 & 12 \end{bmatrix}$

To find x+y, x*y 2x+3y

> x <- matrix (nrow; ncol=3 data = c(1,33,55,6,1

y <- matrix (nrow =3, data = c(2, -2, 10, 4, 8, 6, 10, -11, 12)

> x+y

	[1]	[2]	[3]
[1]	3	8	17
[2]	0	13	-3
[3]	13	12	21

> x*y

	[1]	[2]	[3]
[1]	2	16	70
[2]	-4	40	-88
[3]	30		

```
> 2 * + 3 * 4
[1]   8    20    44
[2]  -2    34   -17
[3]  36    30    54
```

15. a = c(2, 4, 6, 1, 3, 5, 7, 18, 16, 14, 17, 19, 3, 3, 2, 5, 0, 15, 9, 14, 18, 10, 12)

```
> len (a)
[1] 23
> b = table (a)
> transform (b)
```

a	freq
0	1
1	1
2	2
3	3
4	1
5	2
6	1
7	1
9	1
10	1
12	1
14	2
15	1
16	1
17	1
18	2
19	1

150

> breaks = seq (0, 20, 5)
d = cut (a, breaks, right = false]
t = table (d)
transform (t)

d	freq
[0, 5]	8
[5, 10)	5
[10, 15]	4
[15, 20)	6

M

Practical no 2
pdf and cdf

QI can the following be pdf

① $f(x) = \begin{cases} 2-x & ; 1 \le x \le 2 \\ 0 & o.w \end{cases}$

(ii) $f(x) = \begin{cases} 3x^2 & ; 0 < x < 1 \\ 0 & ow \end{cases}$

(iii) $f(x) = \begin{cases} \frac{3x}{2}\left(1-\frac{x}{2}\right) & ; 0 \le x \le 2 \\ 0 & o.w \end{cases}$

* Solutions:

1. $\int_1^2 (2-x)\, dx$

$\rightarrow \int_1^2 2\, dx - \int_1^2 x\, dx$

$= 2x \Big|_1^2 - \frac{x^2}{2} \Big|_1^2$

$= (4-2) - (2-0.5)$

$\neq 1$

022

2. $f(x) = \begin{cases} 3x^2 ; & 0 < x < 1 \\ 0 & 0.\omega \end{cases}$

$\int f(x)\, dx = 1$

$= \int_0^1 3x^2$

$= 3 \int_0^1 x^2$

$= 3 \left[\frac{x^3}{3}\right]_0^1$

$= \frac{3}{3}(1-0) = 1$

$\therefore$ It is a pdf

3. $f(x) = \int \frac{3x}{2}\left(1 - \frac{x}{2}\right)$

$= \int_0^2 \frac{3x}{2}\left(1 - \frac{x}{2}\right)$

$= \int_0^2 \frac{3x}{2} - \frac{3x^2}{4}$

$= \frac{3}{2}\int x - \frac{3}{4}\int x^2$

$$= \frac{3}{2}\left[\frac{x^2}{2}\right]_0^2 - \frac{3}{4}\left[\frac{x^3}{3}\right]_0^2$$

$$= \frac{3}{4}\left[x^2\right]_0^2 - \frac{1}{4}\left[x^3\right]_0^2$$

$$= \frac{3}{4}(4-0) - \frac{1}{4}[8-0]$$

$= 3-2$
$= 1$

It is an pdf.

* can the following be pmf

1.

x	1	2	3	4	5
$p(x)$	0.2	0.3	-0.1	0.5	0.1

2.

x	0	1	2	3	4	5
$p(x)$	0.1	0.3	0.2	0.2	0.1	0.1

3.

x	10	20	30	40	50
$p(x)$	0.2	0.3	0.3	0.2	0.2

1. Since the poability is negative it not pmf
2. Since $p(x) \geq 0 \ \forall x$ and $\Sigma p(x) = 1$ it is pmf.

023

2. x = c(0, 1, 2, 3, 4, 5)
prob = c(0.1, 0.3, 0.2, 0.2, 0.1, 0.1)
Sum(prob)
[1] 1

3. x = c(10, 20, 30, 40, 50)
prob = c(0.2, 0.3, 0.2, 0.2)
prob(sum)
[1] 1.2
∵ $p(x) \geq 0 \ \forall x$ and $\sum p(x) = 1$
but the value is 1.2
∴ It is not pmf.

Q3 Find $p(x \leq 2)$, $p(2 \leq x \leq 4)$, p(atleast 4)
$p(3 \leq x < 6)$

x	0	1	2	3	4	5	6
$p(x)$	0.1	0.1	0.2	0.2	0.1	0.2	0.1

$p(x \leq 2) = p(0) + p(1) + p(2) = 0.1 + 0.1 + 0.2 = 0.$
$p(2 \leq x \leq 4) = p(2) + p(3) \neq 0.2 + 0.2 = 0.4$
p(atleast 4) = p(4) + (p5) + p(6) = 0.1 + 0.2 + 0.1
= 0.4
p(at least $3 < x < 6$) = p(4) + p(5) = 0.1 + 0.2 = 0.3

Q4. Find CDF

1.

x	0	1	3	4	5	6
$p(x)$	0.1	0.2	0.2	0.1	0.2	0.1

2.

x	10	12	14	16	18
$p(x)$	0.2	0.35	0.15	0.2	0.1

\# Solutions-

1. prob = c(0.1,0.1, 0.2, 0.2, 0.1, 0.2, 0.1)
cumsum (prob)
[1] 0.1, 0.2, 0.4, 0.6, 0.7, 0.9, 1.0

$$
\begin{aligned}
F(x) &= 0 && \text{if } x < 0 \\
&= 0.1 && \text{if } 0 \le x < 1 \\
&= 0.2 && \text{if } 1 \le x < 2 \\
&= 0.4 && \text{if } 2 \le x < 3 \\
&= 0.6 && \text{if } 3 \le x < 4 \\
&= 0.7 && \text{if } 4 \le x < 5 \\
&= 0.9 && \text{if } 5 \le x < 6 \\
&= 1 && \text{if } x \geq 6
\end{aligned}
$$

2.
$$
\begin{aligned}
F(x) &= 0 && \text{if } x < 0 \\
&= 2 && \text{if } 0 \le x < 12 \\
&= 55 && \text{if } 12 \le x < 14 \\
&= 7 && \text{if } 14 \le x < 16 \\
&= .9 && \text{if } 16 < x \; 18 \\
&= 1 \\
&\;\; 2 && \text{if } 18 < x
\end{aligned}
$$

Practical 3.

Aim: To find probablity distribution and binomial distribution.

1. Find the cdf of the following pdf and draw the graph.

x	10	20	30	40	50
$p(x)$	0.15	0.25	0.3	0.2	0.1

```
> x = c(10,20,30,40,50)
> prob = (0.15, 0.25, 0.3, 0.1)
> cumsum (prob)
[1]  0.15, 0.40, 0.70, 0.90, 1.00
```

$f(x) = 0$ if $x < 10$
$= 0.15$ if $10 \leq x < 20$
$= 0.40$ if $20 \leq x < 30$
$= 0.70$ if $30 \leq x < 40$
$= 0.90$ if $40 \leq x < 50$
$= 1.00$ if $x \geq 50$

2. Binomial distribution.

1. Supose there are 12 mcq in a test each questions have 5 options and only one of them is correct, find a prob of having.

a. Five correct ans.
b. Atleast 4 correct ans.

→ It is giving that $n=12$, $p=1/5$, $q=4/5$
x: Total no of correct ans.
$x \sim B(n,p)$

```
> n=12 ; p=1/5; q=4/5 ; x=5
> dbinomial (5,12,1/5)
[1] 0.05315022
> pbinomial (4,12,1/5)
[1] 0.9,274445
```

2. There are 10 members in committee. The prob of any members attending a meeting is 0.9. find the probablity.

a. 7 members attended.
b. atleast 5 members attended
c. atleast 6 members attended

> n = 10
> p = 0.9
> q = 0.1

x - Total no of members attend.

a) > dbinom(7, 10, 0.9)
[1] 0.05739

b) 1 - pbinom(5, 10, 0.9)
[1] 0.9983651

c) pbinom(6, 10, 0.9)
[1] 0.0127952

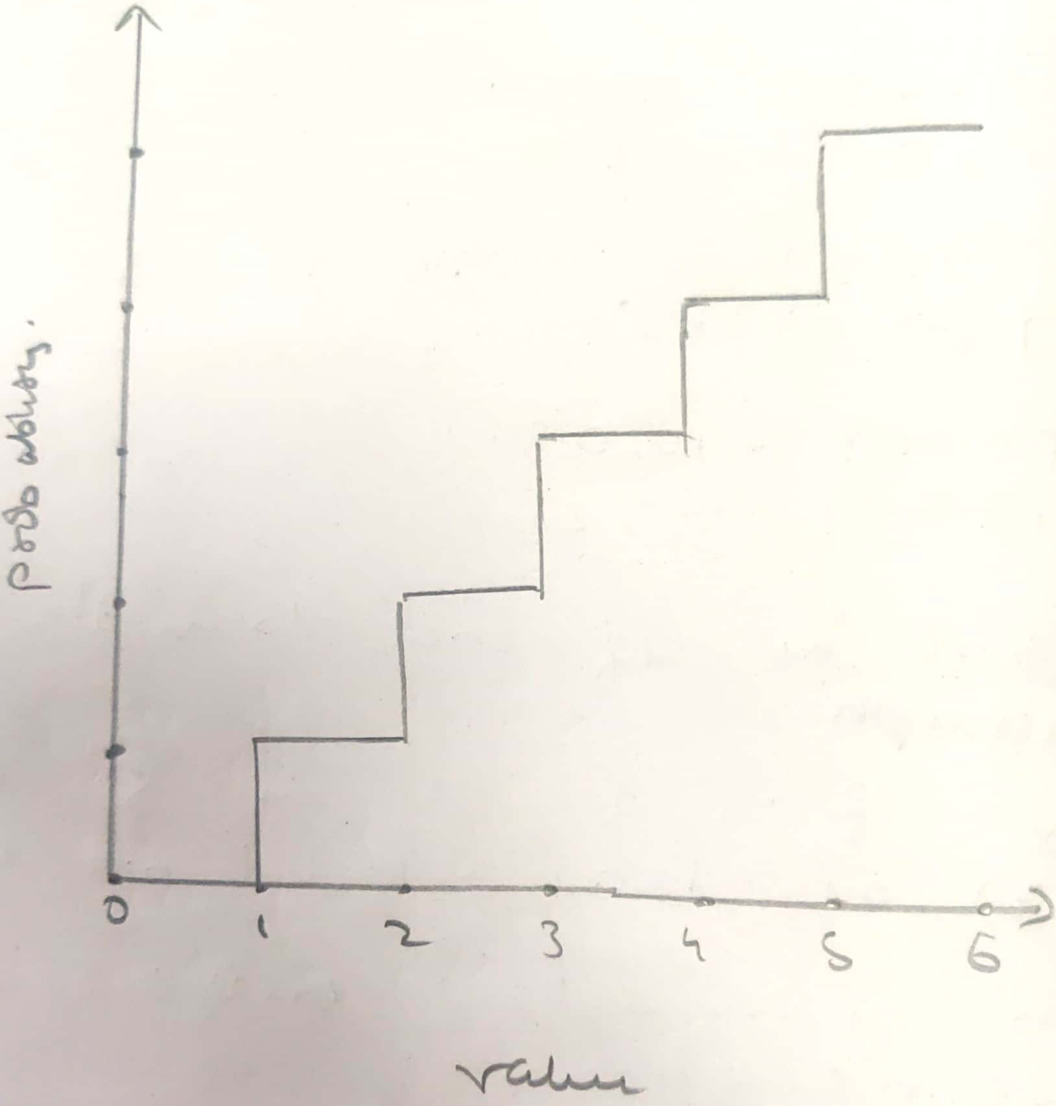
Q4. Find the cdf and draw the graph.

x	0	1	2	3	4	5	6
p(x)	0.1	0.1	0.2	0.2	0.1	0.2	0.1

prob = c(0.1, 0.1, 0.2, 0.2, 0.1, 0.2, 0.1)
cumsum(prob)
[1] 0.1 0.2 0.4 0.6 0.7 0.9 1.0

$$
F(x) = \begin{cases} 0 & \text{if } x < 0 \\ 0.2 & \text{if } 0 \le x \le 1 \\ 0.4 & \text{if } 1 \le x < 2 \\ 0.6 & \text{if } 2 \le x < 3 \\ 0.7 & \text{if } 3 \le x < 4 \\ 0.9 & \text{if } 4 \le x < 5 \\ 1.0 & \text{if } 5 \le x < 6 \end{cases}
$$

graph of cdf



$f(x) = 0$ if $x < 0$
$= 0.1$ if $x \leq < 10$
$= 0.1$ if $1 \leq x < 2$
$= 0.2$ if $2 \leq x < 3$
$= 0.2$ if $3 \leq x < 4$
$= 0.1$ if $4 \leq x < 5$
$= 0.2$ if $5 \leq x < 6$
$= 1.0$ if $x \geq 6$

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Practical 4

1. Find the complete b.d when - q=5 p=0.

2. Find prob of exactly 10 success in 100 trial with p= 0.1

3. x follows B.d with n=12, p= 0.25
Find
1. $p(x=5)$
$p(x \le 5)$
$p(x > 7)$
$p(5 < x < 7$

4. The prob of salesman make a sale to customer.
is 0.15 find the prob.
1. No sale for 10 customer.
2. more than 3 sale in 20 customer.

Q.5 A student write 5mcq Each question has 4 op: - out of which 1 is correct calculate the prob for 3 correct ans.

nor

1. To find the value of x for which the prob is p command is q bino (p, n, p)
11. $p(x=x)$ = dbinom (x, n, p)
111. $p(x \leq x)$ = p binom (x, n, p)
IV. $p(x > x)$ = 1 - pbinom (x, n, p)

1. > n=5, p=0.1
> dbinom (0.5, 5, 0.1)
[1] 0.59049 0.32805 0.7290 0.00810

2. > n=100
> p= 0.1
> x = 10
> dbinom (10, 100 0.0.1)
[1] 0.1318653

3. > n = 12.
> p= 0.25
1. > x = 5
> dbinom (5, 12, 0.25)
[1] 0.1032414.

ii. n=12
```
>p=0.25
>x=5
>pbinom(5,12,0.0025)
[1] 0.9455978
```

iii
```
>n=12
>p=0.25
>x=5
>pbinom(5,12,0.0025)
```
~~[1] 0.9455978~~ [1] 0.00278151

iv.
```
>n=12
>p=0.25
>5<x<7
>dbinom(6,12,0.25)
[1] 0.04014945
```

4

i. n=10
```
>p=0.15
>x=0
>dbinom(0,10,0.15)
[1] 0.1968744
```

ii
```
>n=20
p= 0.15
```
$p(x>3)=1-p(x\leq 3)$
```
>1-pbinom(3,20,15)
[1] 0.774844
```

5. >n = 5
>x = 3
>p = 1/2 = 0.25
>1 - p(x ≤ 2)
>1 - pbinom(2, 5, 0.25)
[1] 0.103515 6

06- x follow binom distribution with n=10, p=0.4
plot the graph of pmf & cdf
> n=10
>p=0.4
>x = 0:n
> prob = dbinom(x, n, p)
> comp b= pbinom(x, n, p)
>d = data frame(x value = x, "prob" = prob)

x value	prob
0	0.0060466176
1	0.0403107840
2	0.1209323520
3	0.2508322656 0
4	0.2006581248
5	0.2006581248
6	0.0424673360
7	0.0106168326
8	0.0157228640
9	0.0005048576
10	0.0001048576

AM

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prac - 5:

1. $p(x=x) = $ dnorm (x, r, θ)
2. $p(x \le x) = $ pnorm (x, r, θ)
3. $p(x > x) = 1 - $ pnorm (x, r, θ)
4. $p(x_1 < x < x_2) = $ pnorm (x_2, r, θ)
5. $p(x \le k) = p$, qnorm (p, r, θ)
6. rnorm (n, r, θ)

To find the value of k so that qnorm

1. $x \sim N(\mu = 50, \sigma^2 = 100)$
find i) $p(x \le 40)$
ii $p(x > 55)$
iii $p(42 \le x \le 60)$
iv $p(x \le k) = 0.7$; $k = ?$

2. $x \sim N(\mu = 100; \sigma^2 = 36)$
1. $p(x \le 110)$
2. $p(x \le 95)$
3. $p(x > 115)$
4. $p(95 \le x \le 105)$
5. $p(x \le k) = 0.4$; $k = ?$

~~ottt~~

1

```
>a=pnorm(40,50,10)
>cat("p(x<=40) is=",a)
p(x≤40) is =0.1586553>

>b=1-pnorm(55,50,10)
>cat("p(x>55) is =",b)
p((x>55)is=0.308375>

>c=pnorm(60,50,10)-pnorm(42,50,10)
>c
[1] 0.6294893

>d=qnorm(0.7,50,10)
>cat("p(x<=k)=0.7,k is =",d)
p(x<=k)=0.7,k is = 55.24401>
```

2,

```
a= pnom(1,10, 100, 6
>cat("p(x ≤110)",a)
p(x≤110) =0.9522096

ii) b =pnorm(95,100,6)
>cat("p(x≤95)=",b)
p(x≤95)=0.2023283

iii) >c =1-pnorm(115,100,6)
>cat("p(x>115)",c)
p(x>115)=0.00620965
```

032

4. >a = pnorm(105, 100, 6) - pnorm(95, 100, 6)
>cat ("p(95 ≤ x ≤ 105) = " a)
p(95 ≤ x < 105) = 0.5953432

5. >c = qnorm (0.4, 100, 6)
> cat ("p (x ≤ k) = 0.4; k = " c)
p(x ≤ k) = 0.4, k = 98.47992

3. n = 10, μ = 60 . σ = 5

x = rnorm(10, 60, 5)

x

[1] 60.67, 65.53, 59.98, 57.31, 64.67
57.29, 53.63, 52.41 56.50 56.91

> am = mean(x)
am
[1] 58.49

> me = median(x)
me
[1] 57.30

> variance (n-1) * var(x) / n
variance
[1] 16.500

sd = sqrt(variance)
sd
[1] 4.06203

3.* Generate 10 random numbers from a normal distribution with mean = 60 S.D = 5 also calculate the sample mean medians and S.D, variance

4. Draw the graph of standard normal distribution.

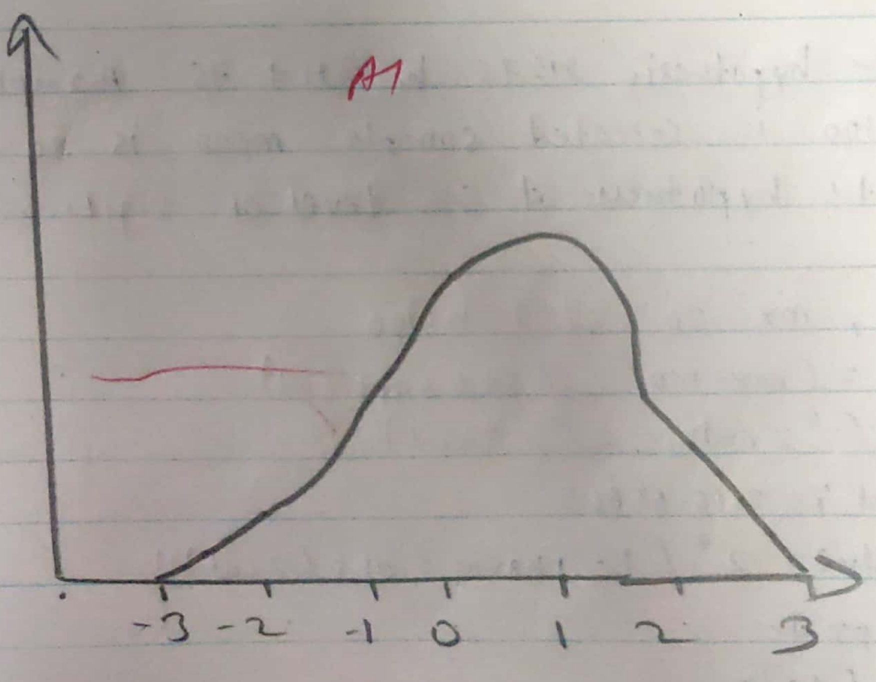
3* n = 10, μ = 60, σ = 5

x = seq (-3, 3, by = 0.1)

> y = dnorm (x)

> plot (x, y, xlab = "x value", ylab, "prob",

main = "std normal graph")



3

practical no-6

Topic: z distribution.

1. Test the hypothesis (H0) u=10 against H1. A sample of size four hundred be selected which gives a mean 10.2 std deviation of 2.25 test the hypothesis at 5% of significant.

→ zcal = (mx-mo)/(sd/(sqrt(n)))
>cat ("zcal is =", zcal)
zcal is 1.77778
pval = 2* (1-pnorm (abs (zcal)))
>pval:
[1] 0.07544036
Since 0.0751 more than 0.05 ∴ we will accept.

2. Test the hypothesis u=75 h1 : u ≠ 75. A sample of size 100 is selected sample mean is 80 with sd=3 Test the hypothesis at 5% Level of sigificant

Soln: m0=75, mx= 80 sd=3 n=100
>zcal = (mx-mo) (sd / sqrt (n))
> cat ("zcal is =", zcal)
zcal is = 16.66667
> pvalue = 2* (1- pnorm (abs (zcal))).
> pvalue
[1] 0.

3. Test the hypothesis (H0): $\mu = 25$ against $H_1 : \mu \neq 25$ at 5% Level of Significant. The following sample of 30 is select.

20	24	27	35	30	46	26	27	10	20	30	37	35
21	22	23	24	25	28	27	28	29	30	39	39	27
15	19	22	20	18								

Sol^n.
```
>x = c( 20,24,27----18)
>n = Length (x)
> mx = mean(x)
[1] 26.06667
> Variance = (n-1) var ( x)/n
> Variance
[1] 52.99556
> sd = sqrt (Variance)
> sd
[1] 7.279805
> z cal = (m-25) / sd / sqrt (n))).
> cat (" z cal is = ", z cal )
z cal is = 0.8025454
> pvalve = 2* (1-pnorm (abs (zcal)))
> pvalve
[1] 0.4222375
```

034

034

4. Exp has show that 20% students of a city are smoking a sample of four hundred students drawn out of whom are 50 smoking test the hypothesis the exp

p= 0.2

q=1-p

P=50/400

P

[0.125

n= 400

zcal =(P-p)/(sqrt(p* q/n))

cat ("zcal is", zcal)

zcal is -3.75

pval =2* (1-pnorm(abs(zcal))

pvalue

[1] 0.001768346

5. Test the hypothesis Ho: p=0.5 against H1: p≠0.5 A Sample of 200 is selected and the sample porport is cal p=0.56 test the hypo 1% level of significance.

n= 200
p=0.56
P= 0.5
Q= 1-P
zcal =(p-P)/(Sqrt(P* Q/n))
Cat("zcal is", zcal)
zcal is 1.697056
pvalue = 2*(1-pnorm(abs(zcal)))
>pvalue
[1] 0.0896 8602

AY

Practical no 7.

Topic: Large Sample Test.

Q1. A Study of noise level into hospital is calculate the below test by the

	Hos A	Hos B
no of Sample		
obs	84	34
mean	61	59
S.D	7	8

z = (mx-my)/sqrt((sdx^2/n1)+(sdy^2/n2))
z z
[1] 1.2736
> cat ("z calculated is =", z)
z calculated is = 1.2736
pvalue = 2*(1-pnorm(abs(z)))
pvalue.
[1] 0.0455026
> since pvalue < 0.05, we reject at 5% level of significant

Q3. In a fy class 20% of a random sample of 400 students had defective eyesight. in sy class, 15.5% percent of 500 sample had the same defect is the difference of proportion is same? 036

→ Ho the proportion of population is equal

$n1 = 400$

$n2 = 500$

$p1 = 0.2$

$p2 = 0.155$

$p = (n1 * p1 + n2 * p2 / (n1 + n2)$

$p = 0.175$

$q = 1 - p$

$q = 0.825$

$z = (p1 - p2) / sqrt(p * q * (1/n1 + 1/n2)$

$z = 1.765$

036

4. From each of the box of the apples a sample size of 200 is collected It is found that there are 44 bad apples in the first sample and 30 bad apples in second sample test the hypothesis that two boxes are equivalent in terms of number of bad apples

→ $n1 = 200$

$n2 = 200$

$p1 = 44/200$

$p2 = 30/200$

$p = (n1 * p1 + n2 * p2)/(n1 + n2)$

$q = 1 - p$

$p = 0.185$

$q = 0.815$

$z = (p1 - p2)/ sqrt(p * q * (1/n1 + 1/n2))$

2. Two random sample of size 1000 and 2000 are drawn from two population with a mean of 67.5 and 68 respectively and with S.D of 2.5, Test the hypothesis that the mean of two population are equal.

→ n1 = 1000
n2 = 2000
sdx = 2.5
sdy = 2.5
mx = 67.5
my = 68
y = (mx1-my2)/sqrt((sdx^2/n1)+(sdy^2/n2))
y
[1] -5.163978
> cat ("y calculated is=",y)
y calculated is= -5.1639
pvalue
[1] 0.04550026
pvalue = 2* (1-pnorm(abs-(2)))
pvalue = 2* (1-pnorm(abs(y)))
pvalue
[1] 2.41564e-07

5. In ma class out of a sample of 60, mean height is ~~$~~63.5 inch with a s.d 2.5 in a m.com class out of 50 students mean height is 69.5 inches with s.d of 2.5 test the hypothesis that mean of m.com and ma class is same.

→ n1 = 60.0
n2 = 50.0
sd = 2.5
sdx = 2.5
sdy = 2.5
mx = 63.5
my = 69.5
y = (mx - my)/sqrt((sdx^2/n1) + (sdy^2/n2))
y = -12.2
> cat ("y calculated is:", y)
y calculated is -12.53>
pvalue = 2* (1-pnorm(abs(y))).
> pvalue
[1] 0

AM

Practical no- 8.

Topic: Small sample test.

1. The 10 flower are selected and the height are found to be 63, 63, 68, 69, 71, 71, 72, · cms, Test the hypothesis that the mean height is 66 cm or not at 1% in test.

→ Ho:
mean = 66 cm
> x = c(63, 63, 68, 69, 71, 71, 72)
> t-test (x)
one sample t.test
data x
t = 47.94, df = 6, pvalue: 5.522e-09
alternative hypothesis true mean is not equal to 0
95% confiden interval
64.66479. 71.60292
Sample estimates:
mean of x
68.14286
∴ pvalue < 0.01 we reject the Ho of 1% level of significant

039

2. Two random sample were drawn from two different population
Sample1: 8, 10, 12, 11, 16, 15, 18, 7
Sample2: 20, 15, 18, 9, 8, 10, 11, 12
Test the hypothesis that there is no difference between the two population mean at 5% LOS

→ ho: There is no diff in population mean.
welch two sample test
data: x ang y
t= -0.36247, df= 13.837, p-value= 0.7225
alternative hypothesis: true difference in means is not equal to 0 95
percent confidence interval:
-5.192719 3.692719
Sample estimates:
mean of x ang mean of y
12.125 12.875

Pvalue > 0.05 we accept the Ho of S level of significant

3. Following are the weights of 10 people before and after the diet program. test the hypothesis that diet program is effective or not

before (kgs): (100, 125, 95, 96, 98, 112, 115, 104, 109, 110)

after (kgs): (95, 80, 95, 98, 90, 100, 110, 85, 100, 101)

ho: The diet program is not effective

→ paired t-test

data after and before

t = -2.6089, df = 9, p-value = ~~0.01416~~ 0.9858

alternative hypothesis: true difference in mean is less than 0 95 percent confidence interval:

- ~~Inf -18.22917~~ 18.72908

Sample estimates:

mean of the difference:

.11

∴ pvalue is greater than 0.005 we accept the 5% level of significant.

4. The mark's before and after a training program are given bellow.

before : (20, 25, 32, 28, 27, 36, 35, 25)

after : (30, 35, 32, 37, 37, 40, 40, 23)

Test the hypothis that the training programing is effective or not

→ ho: The training program is not effective

paired test

data. a, and b

t = -3.3859, df = 7, p-value = 0.9942

alternative hypothesis: true diff in mean is greater than 0 95 % confidence interval:

-8.967399 Inf

Sample estimates:

mean of difference

-5.175

pvalue > 0.05 we accept the 5% level of significance.

5. Two random sample were drawn from two normal population and the values are
A - 66, 67, 75, 76, 82, 84, 88, 90, 92
B - 64, 66, 74, 78, 82, 85, 87, 92, 93, 95, 97
test weather the population have same variance at 5% level of significance.

→ ho: The variance of two population are equal:
data : a and b
F = 0.7686, num df = 8, denom = df = 10, p-value = 0.63
alternate hypothesis : the ratio of variance is not equal to 1 95 % confidence interval
0.18383662 : 3.036093

Sample estimates :
ratio of variance
0.7568567

P value of < 0.05 we accept the 5% level of signifient.

6. The arithmetic mean of a sample of 100 ob is 52 if sd is 7 test hypothesis that the population mean is 55 or not at 5% los.

→ ho: population mean is 55
n=100
mx=52
mo=55
sd=7
zcal=(mx-mo)/(sd/sqrt(n))
cat("zcal is=", zcal)
zcal is=na > zcal (mx-mo / (sd/sqrt(n)))
cat("zcal is:" zcal)
zcal is :-4.28714 > pval=2*(1-pnorm(abs(zcal)))

>pval
[1] 1.82153e-05

pval is <0.05 we reject the 5% level of significant

AM 12.7.7°

Practical-9

Chi Square distribution and ANOVA

1. Use the following data to test weather the cleanly ness home depends upon the child condition or not

cond of Home

cond of child		clean	dirty
	clean	70	50
	fairly cl	80	20
	dirty	35	45

→ Ho condition of home and the child are independent

x = c(70, 80, 35, 50, 20, 45)
m = 3
n = 2
y = matrix (x, nrow = m, ncol = n)
y.

	[,1]	[,2]
[1,]	70	50
[2,]	80	20
[3,]	35	45

pv = chisq.test (y)
data : y
x-squared = 25.646, df: 2, pvalue: 2.698e-06

→ Since p-value is less than 0.05 we ~~accept~~ reject ho at 5 % los (level of significant)

2. The table below show's a relation between the performance of mathematics and computer of CS students

		maths Hg	mg	Lg
	Hg	56	71	12
comp	mg	47	163	38
	Lg	14	42	85

→ Ho performance between maths and comp are independent.

x=c(56,47,14,71,163,42,12,38,85)
m=3
n=3
y=matrix(x, nrow=m, ncol=n)
y:

	[,1]	[,2]	[,3]
[1,]	56	71	12
[2,]	47	163	38
[3,]	14	42	85

pv=chisq.test(y)
pv=
data: y
x-squared = 145.78, df=4, p-value < 2.2e-16

3. perform anova for the following data

→ varieties　　　Obs

A　　50, 52,

B　　53, 55, 53

C　　60, 58, 57, 56

D　　52, 54, 54, 55

→ H_0 The means of variety A, B, C, D are equal.

x1 = c(50, 52)
x2 = c(53, 55, 53)
x3 = c(60, 58, 57, 56)
x4 = c(52, 54, 54, 55)

d = stack (list (b1 = x1) b2 = x2, b3 = x3, b4 = x4)

> names(d)

[1] "values" "ind"

> oneway.test (values ~ ind, data = d, var.equal = T)

One way analysis of means

data: values and ind

F = 11.735, num df = 3, denom = 9, p-value = 0.00183

>anova = aov(values ~ind , data = d)

>anova

call:

aov(formula = values ~ind ; data = d)

Terms :

	Ind	Residuals
Sum of Square	71.06410	18.16667
deg. of freedom	3	9

Residual standard error : 1.42746

Estimate effects may be unbalanced

-> summary (anova)

	DF	Sum Sq	mean Sq	F values	Pr(>F)
InD	3	71.06	23.688	11.73	0.00183 **
Residual	9	18.17	2.019		

Since p-value is less than 0.05 so we reject ho at 5% Los

4. perform anova

tyres	obs
A	6, 7, 8
B	4, 6, 5
C	8, 6, 10
D	6, 9, 9

→ Ho The mean of tyres A, B, C, D equal

x1 = c(6, 7, 8)

x2 = c(4, 6, 5)

x3 = c(8, 6, 10)

x4 = c(6, 9, 9)

d = Stack (list (b1 = x1), (b2 = x2, b3 = x3, b4 = x4))

> name (d)

[1]

"value" "ind"

F)

* > one way.test (values ~ ind, data = d, var.equal T)

One way analysis of mean

data values and ind

F = 2.667, num, df = 3, denomdf = 8, p-value = 0.118

> anova = aov(values ~ ind, data)

> Summary

	df	Sum Sq	Mean Sq	F value	Pr(>F)
ind	3	18	6.00	2.667	0.119
residuals	8	18	2.25		

- The type of data excel is full and save desktop as file name and type → csv (ms.dos)

→ open r software and type x = read.csv(" ")

→ click properties and copy the location. paste on the x = read.csv(" ___ ") replace it with \ to /

→ add file name at location i.e. file(name) then type x

Practical no-10

* non- parametric test.

1. following are the amounts of sulpher oxide emmited by a factory
(17, 15, 20, 29, 19, 18, 22, 25, 27, 9, 24, 20, 17, 6, 24, 14, 15, 23, 24, 26)
apply sign test, to test the hypothesis that the population median is 21.5 against the alternative it is less than 21.5

→ H_0 population median equal to 21.5
H_1 it is less than 21.5
x = c(17, 15, 20, 29, 19, 18, 22, 25, 27, 9, 24, 20, 17, 6, 24, 14, 15, 23, 24, 26)

* note
1. If the alternative is greater than median
pv = pbinom(sn, n, 0.5)

2. For the observation 12, 19, 31, 28, 43, 40, 55, 49, 70, 63,
apply sign test, to test population median is 25, against the alternative, with the alternative it is more than 25

→ x=c(12,19, 31, 28, 43, 40, 55, 49, 70, 63)
m=25
sp= length(x[x>m])
sp
[1] 8
sn= length(x[x<m])
sn
2
n=sp+sn
n
10
pv= pbinom(sn, n, 0.5)
>pv
[1] 0.0546875

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3. For the following (60, 65, 63, 89, 61, 71, 58, 49, 66) test the hypothesis using wilcoxon sign rank test for testing the hypothesis the median is 60 aganist is greater

→ Ho: The median is 60
H_1 : it is greater than 60

x = c(60, 65, 63, 89, 61, 71, 58, 49, 66)
pv = pbinom(Sp, n, 0.5)
pv = 0.411
wilcox.test(x, alter = "greater", mu = 60)

wilcoxon signed rank test with continuity correction.

data : x
v = 27.5, p-value = 0.1035
alternative hypothesis : true location which is greater than 60.

* note:
If the alternative is less
wilcox.test(x, alter = "less", mu = 60)

If alter is not equal to
alter = 2 sided

4. Using wilcox test the hypothesis the median is 12 against the alternative is less than 12

12, 13, 10, 20, 15, 5, 1, 7, 6, 11, 9, 20

```
x = c(12, 13, 10, 20, 15, 5, 1, 7, 6, 11, 9, 20)
wilcox.test(x, alter = "less", mu = 12)
```

data: x
V = 25, p-value 0.2521

alternative hypothesis: true location is less than 12