5) 15, 17, 25, 24, 20, 21, 32, 28, 12, 25, 21,
25, 26

> H_0 : population median is 20

```
> x = c(15, 17, 25...)
> x
> wilcox.test(x, alt = "less", mu = 20)
```

wilcoxon signed Rank test with continuity correction

data : x

v = 45.5, p.value = 0.9732

alternative hypothesis "true location is less than 20"

9.3.20

4) 63, 65, 60, 84, 61, 71, 38, 51, 69, 82,
63, 62, 39, 72, 65
using wilcoxon signed Rank test (hypo that
polution median is 60 against alternation
it is greater than 60. 5 % los.

Ho popution medium is 60
> x = c(63, 65, 60 ...)
> wilcox.text (x, alt = "greter", mu = 60)

wilcoxon signed ~~rona~~ rona test with continity
correction
data : x
V = 79.5 p-value = 0.04781
alternative hypothesis : true location is greater
than 60

2) x = c(612, 619, 631, 628, 643, 640, 655, 649, 670
663)

```
> x
> m = 625
[1] 625
> sp = length(x[m>m])
> sp
[1] 8
> sn = length(x(x<m))
[1] 2
> n = sp + sn
[1] 10
> pv = pbinom(sp, n, 0.5)
> pv
[1] 0.9892518
```

∴ pvalue > 0.01, we accept H_0

4) Type observation
 A 20, 23, 18, 17, 18, 22, 24
 B 19, 15, 17, 20, 16, 17
 C 21, 14, 22, 19, 20
 D 15, 14, 16, 18, 14, 16

> names (d)
[1] values "ind"
oneway test (values ind, data, d, unequal = s)
oneway analysis of means.
data : values and ind.
p = 6.5445, num. df = 3 denomdf = 20 pvalue = 0.02
anova: aov (values ~ ind data = s)
anova:
 aov (formula = value ~ ind, ~~data~~ = d)
Terms ind Residents
 sum of squares 91.4784 84.0619
 deg of freedom 3 20
∴ pvalue < 0.05 we reject H_0

5)
	I.Q	Condition
	High	100s
High	450	140
Med	330	200
Low	240	160

H_0 : c. & IQ are independent
> x : c(460, 330, 240, 140, 200, 160)
> m = 3
> n = 2
> y = matrix (x, nrow = m, ncol = n)
> y
	[,1]	[,2]
[1,]	460	140
[2,]	338	200
[3,]	240	160

> pv = chisq.test (y)
> pv
 Pearsons Chi squared test
data = y
 X squared : 39.726 . df = 2. pvalue : 2.3642e-09

∴ pvalues < 0.05 we reject H_0

3)

varieties	observations
A	50, 52
B	53, 55, 53.
C	60, 58, 57, 56
D	52, 54, 54, 53

H_0 · The means of variety are equal

> x_1 = c(50, 52)

> x_2 = c(53, 55, 53)

> x_3 = c(60, 58, 57, 56)

> x_4 = c(52, 54, 54, 53)

> d = stack (list (b1 = x_1, x_2, x_3, x_4))

names (d) → [1] 'values ind"

oneway test (variance · ind, data=d, varequal =T)

oneway analysis of mens

data: values & ind.

F = 11·735, num df : 3 denom df= 9, pvalue=0.00183

anova.

call:

aov-(formula =value-ind, data=d)

Terms

	IND	Residentials
sum of squares	71·07692	18·06667
Deg of freedom	3	9

Residential standard error · 1·420746.

estimated effects may be unbalanced.

∴ pvalue < 0·05 we reject H_0

5) $H_0 : \mu_1 = \mu_2$ against $H_0 : \mu \neq \mu_1$
> x: c(63, 63, 68, 69, 71, 71, 72)
> t test
one sample test
data: x
t: 45.94, df: 6, pvalue = 5.22 e-09
alternative hypothesis: true mean is not equation
95% confidence interval
64.66999 91.62
sample estimate
mean of x
64.142
∴ $5.322 \times 10^{-9} < 0.01$
∴ we reject hypothesis

Anova and chi-squared test

1)

		cleanliness of home clean	dirty
cleanliness of child	clean	70	50
	fairly clean	80	20
	dirty	35	45

H_0: cleanliness of child & home 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)
> pv
person's chi squared test
data: y
x: squared = 25.646 df: 2 pvalue = 2.698e-06
pvalue < 0.05 we reject H_0: c c & h are independent

```
3) >n1 = 1000
>n2 = 1500
>p1 = 0.02
>p2 = 0.01
>p = (n1*p1+n2*p2)/(n1+n2)
>p
[1] 0.014
>q = 1-p
> q
[1] 0.986
>zcal = (p1-p2)/sqrt(p* q*(1/n1+1/n2))
>zcal
[1] 2.084842
> pvalue = 2* (1-pnorm(abs(zcal)))
>pvalue
[1] 130.03708364
```


1) $H_0 : \mu_1 = \mu_2$ against $H_1 : \mu_1 \neq \mu_2$

```
>n = 400
>mx = 99
>m0 = 100
>var = 64
>sd = sqrt(var)
>zcal = (mx-m0)/(sd/sqrt(n))
>zcal
[1] -2.5
>pval = 2*(1-pnorm(abs(zcal)))
>pval
[1] 0.0124
```

∵ pvalue < 0.05, we reject H_0

The pvalue is Greater than 0.05 we accept the 886. os increase in mask at 5% level of significances.

1) >n = 100
>mx = 55
>mo = 55
>sd = 7
>zcal = (mx - mo) / (sd / sqrt(n))
>zcal
[1] - 4.285714
>pvalue = 2* (1 - pnorm (abs (zcal)))
>pvalue
[1] 1.82153e -05
Since pvalue is less than 0.05 we reject

2) >p = 0.5
>n = 700
>q = 1-p
>q
[1] 0.5
>p = 350 / 700
>zcal = (p - p) / (sqrt (p * q / n))
>zcal
[1] 0
>pvalue = 2* (1 - pnorm (abs (zcal)))
>pvalue
[1] 1

4) The weight reducing diet progm
~~After (111, 114, 107, 120, 115, 112, 112~~
After - (111, 114, 107, 120, 115, 112, 112, 120, 119, 112)
Before - (120, 125, 115, 130, 123, 119, 122, 127, 128, 118)

H₀ :
> x : c (120, 125, 115, 130, 123, 119, 122, 127, 128, 118)
> y : c (111, 114, 107, 120, 115, 112, 112, 120, 119, 112)
> t.test (x, y, pared = T, alternative : "less")

t : 17   df : 9   p-value : 1

95 - percent confidence interval
- inf 9.416556

The pvalue is greater than 0.05 we accept
H₀ 4₀
The diet program redue weight

5) > x : c (66, 67, ... 90, 92)
> y : c (64, 66 .... 95, 97)
> t log (x, y)
data : x and y
t : 0.63938   df = 17.974   p-value : 0.5304
Alternative hypothesis : True differne in mean is not equal to 0 95 percent confidence interval :
-12.853992   6.853992
Sample estimates :
mean of x   mean of y
80   83

Since pvalue is greater than 0.05 we accept x at 4% level of significance

6) x : c (71, 72 .... 75)
y : c (74, 77 .... 78)
> t.test (x, y, paired : T, 0.1 alternative : "greater")
data : x and y
t : -4.4691   df : 9,   pvalue : 0.9992
alternative hypothesis : true difference in mean is greater than 0 95 percent confidence internal :
-5.676639   Inf
Sample estimates
mean of the differences
-3.6

Q2) Two groups of 10 students scored as follows
group 1: 18, 22, 21, 17, 20, 17, 23, 20, 22, 21
group 2: 16, 20, 14, 21, 20, 18, 13, 15, 17, 21
$H_0: u_1 = u_2$
x = c(18, 22, 21, 17, 20, 17, 23, 20, 22, 21)
y = c(16, 20, 14, 21, 20, 18, 13, 15, 17, 21)
t = 2.2573, df = 16.376, p-value 0.0378
95 percent confidence interval
0.2628205 5.0371795
mean of x mean of y
20.1 17.5

The p value is greater than 0.01 we accept H_0 at 1 % level of significance

Q3) Two types of medicines are used on 5 and 7 patients for reduce thier weight

med A : (10, 12, 13, 11, 14)
med B : (8, 9, 12, 14, 15, 10, 9)

$H_0: u_1 = u_2$
> med A = c (10, 12, 13, 11, 14)
> med B = c(8, 9, 12, 14, 15, 10, 9)
> t.test (med A, med B)
t = 0.80384, df 9.7594 p-value = 0.4406

95 percent confidence interval

-1.7811 3.78117

$\because$ Th pvalue is greater than 0.05 we accept $H_0: u_1 = u_2$ at 1 % level of significance

55

>sd1 : sqrt (variance)
>sd1
[1] 2.512215
[1] 2.512215
>x2 : c (72, 76, 74, 70, 70, 78, 70, 72, 78, 79, 79, 74, 75, 78, 72, 74, 80)

>x2
[1] 72 76, 74 70 70 78 78 72 75 79 79
74 75 78 72 74 80
>n2 = length (x2)
>n2
[1] 17
>mx2 : mean (x2)
>m2
[1] 74.58824
>variance : (n2 - n1) * var (x2) / n2
> variance
[1] 10.47751
> sd2 : sqrt (variance)
>sd2
[1] 3.6236598
> t.test (x, x2)
p-value = 0.1387
>0.05 is accepted $H_0 : \mu_1 = \mu_2$

AM

Practical-8

Small sample test

56

(Q.1) >x : c (80, 100, 110, 105, 122, 70, 120, 110, 101, 88, 83, 95, 89, 107, 125)

>length (x)
[1] 15
>t.test (x)
t : 24.029 df : 14 p value : 8.819e-13

95 percent confidence interval 91.37775 109.28892
∴ The p value is less that 0.05 we reject H_0 : μ : 100 at 5% level of significance

Scanned with CamScanner

>p1: 44/250
>p1
[1] 0.176
>p2: 30/200
>p2
[1] 0.15
>p(n1*p1+n2*p2)/n1+n2
>p
[1] 0.164444
>q:1-p
>q
[1] 0.835556
>zcal:(p1-p2)/sqrt(p*p*(1/n1+1/n2))
>zcal
[1] 0.734355
since pvalue is greater we accept H0: p1=p2

(a) >n1>400
>n2: 600
>p1: 200/600
>p2 = 340/600
>p(n1*p1+n2*p2)/(n1+n2)
>q:1-p
>zcal: (p1+p2)/sqrt(p*q*(1/n1+1/n2))
>zcal
[1] 4.724751
>pvalue: 2*[1-pnorm abs(zcal))]
>pvalue
[1] 2.303972e-06
since pvalue is accepted H0: P1=P2

(b) >x1 :c(74,77,74,73,79,76,82,72,75,78,77,78,76,76)
>x1
[1] 74,77,74 73 79 76 82 72 75 78 77 78 76 76

>n1: length (14)
>n1
[1] 14
mx1: mean(x1)
>mx1
[1] 76.21429
>variance: (n1-1)*var(x1)/n1
>variance
[1] 6.311224

>cat("z calculated is :", zcal)
>z calculated is -15.80630
>pvalue = 2* (1-pnorm (abs (zcal)))
>pvalue
[1] 0

Since we reject Ho : u1 ≠ u2

Q2) A study on noise level to hospitals is done following data is calculated sample size 84 sample mean 61.2 sd1 : 7.9 sample size 34 sample mean 59.4, sd2: 7.8 Ho : u1 = u2 against H1 : u1 ≠ u2 at 1% level of significance

>n1 : 84
>n1
[1] 84
>n2 : 34
>n2
[1] 34
>mx1 : 61.2
>mx1
[1] 61.2
>mx2 : 59.4
>mx2
[1] 59.4
sd1 : 7.9
sd1
[1] 7.8

sd2 : 7.8
[1] 7.8
>zcal : (mx1-mx2) / sqrt(sd1^2/n1)+(sd2^2/n2)
>zcal
[1] 1.13117
>cat ("z calculated is :", zcal)
>calculated is 1.13117
>pvalue = 2* (1-pnorm (abs (zcal)))
>pvalue
[1] 0.258006
since pvalue is greater than 0.01 we accept

Q.3] From each of two population of oranges the following sample are collected whether the proportion of bad oranges are equal or not

1) sample size : 250
2) sample size : 200
3) No of bad orange in 1st sample : 44
4) No of bad orange in 2nd sample : 30

Ho : P1 = P2
H1 : P1 ≠ P2

>n1 : 256
>n1
[1] 256
>n2 : 200
>n2
[1] 200

>zcal
[1] -0.6502964
>pvalue = 2* (1-pnorm (abs (zcal)))
>pvalue
[1] 0.5116234
since pvalue is more than 0.05 we accept
$H_0: u = 50$

29.01.20

Practical no-7

Large sample test

:) Two random sample of size 1000 and 2000 area drawn from two population with a standard deviation 2 and 3 respectively test the hypothesis that 2 population means are equal or not at 5% level of significant sample means are 67 and 68 respectively)

→ >n1 =1000
>n1
[1] 1000
>n2 = 2000
>n2
[1] 2000
> mx1 = 67
>mx1
>67
>mx2 = 68
>mx2
[1] 68
>sd1 = 2
>sd1
[1] 2
>sd2 = 3
>sd2
[1] 3
>zcal = (mx1-mx2)/(sqrt (sd1^2/n1)+(sd2^2/n2
>zcal
[1] -15.80684

[1] 8.333333
> cat("z calculated is :", zcal)
z calculated is : 8.333333>
> pvalue = 2* (1-pnorm(abs(zcal)))
> pvalue
[1] 0
since pvalue is less than 0.05 we reject Ho

Q.3] we want to test the hypothesis Ho: P=0.2 against H1: P≠0.2 p = population proportion. A sample of 400 is selected and the sample proportion is calculated 0.125 test the hypothesis at 1% level of significance.

→ > P = 0.2
> Q = 1-P
> p = 0.125
> n = 400
> zcal = (p-P)/sqrt(P* Q/n)
> zcal
[1] -3.75
> pvalue = 2* (1-pnorm(abs(zcal)))
> pvalue
[1] 0.0001768346

Since pvalue is less than 0.05 we reject Ho

Q.4] In a big city 325 men out of 600 men where found to be self employed. They this information support the conclusion that exactly that half of the men are self-employed

→ > P = 0.5
> n = 600
> p = 325/600
> Q = 1-P
> Zcal = (p-P)/sqrt(P* Q/n))
> Zcal
[1] 2.041241
> pvalue = 2* (1-pnorm(abs(zcal)))
> pvalue
[1] 0.04121683
since pvalue is less than 0.05 we reject Ho.

Q.5] Test the hypothesis of Ho: 0=50 against H1: 0≠50
A sample of 30 is collected.
50, 49, 52, 44, 45, 48, 46, 45, 49, 45, 40, 47, 55, 54, 46, 58, 48, 44, 59, 60, 61, 41, 52, 44, 55, 56, 46, 45, 48, 49.

→ m_0 = 50
> x = c(50, 49, 52, ... 48, 49)
> n = length(x) > n [1] 30
> m_x = mean(x) > m_x [1] 49.3333
> variance = (n-1)* var(x)/n [1] 30.45556
> sd = sqrt(variance) > sd [1] 5.563772.
> zcal = (m_x - m_0) / sd/(sqrt(n))

Q.5) X ~ N(50, 100)
Find: i) P(X≤60) ii) P(X>65) iii) P(45≤X≤60)

> Pnorm(60, 50, 10)
[1] 0.8413447
> pnorm(60, 50, 10) - pnorm(45, 50, 10)
[1] 0.5328072
> 1-pnorm(65, 50, 10)
[1] 0.0668072

Practical no:- 6

Q.1) Test the hypothesis H0 : u = 20 against H1 : u ≠ 20
A sample of size 400 with selective and sample mean is 20.2 and a standard deviation 2.25 Test that 5% level of significance

→ > m0 = 20
> mx = 20.2
> sd = 2.25
> n = 400
> zcal = (mx - m0) / (sd / sqrt(n))
> zcal
[1] 1.777778
> cat ("z calculator is=", zcal)
> calculated is = 1.777778 >
> pvalue
[1] 0.07544056
since pvalue is more than 0.05 we accept H0: u = 20

Q.2) we want to test the hypothesis H0: u = 250 against H0: u ≠ 250
a sample of size 100 has a mean of 275 and sd as 30.
Test the hypothesis at 5% level of significance.

→ > m0 = 250
> mx = 275
> sd = 30
> n = 100
> zcal = (mx - m0) / sd - sqrt (n))
> zcal

>K : qnorm (0.4, 10, 2)
>K
[1] 9.493306

Q.2 X ~ N (100, 36)
i) P(X ≤ 110) ii) P(X > 105) iii) P(X ≤ 92)
iv) P(95 ≤ X ≤ 110) v) P(X < K) = 0.9

>a : pnorm (110, 100, 6)
>a
[1] 0.9522096
>b : 1 - pnorm (105, 100, 6)
>b
[1] 0.2023284
>c : pnorm (92, 100, 6)
>c
[1] 0.09121122
>d : pnorm (110, 100, 6) - pnorm (95, 100, 6)
>d
[1] 0.7498813
>K : qnorm (0.9, 100, 6)
>K
[1] 107.6893

Q3] Generate 10 random sample and find sample mean, median, variance and standard deviation
>x : rnorm (10, 10, 3)
>x
[1] 13.937393 12.040522 11.512806 9.774476
8.884007 8.433805 15.813018 14.174675
6.495235 9.305191
> am : mean (x)
[1] 10.73711
> me : median (x)
[1] 10.64364
>n : 10
[1] 10
>var = (n-1)* var(x) / n
>var
[1] 9.995247
>sd : sqrt (var)
>sd
[1] 3.161526

Q.4] plot the standard curve
>x : seq (-3, 3, by = 0.1)
>x
>y : dnorm (x)
>y
>plot (x, y, xlab = "x values", ylab : "probability",
main : "standard normal curve

Practical no-4

$P(X=x) = \binom{n}{x} p^x q^{n-x}$

$n=8$, $p=0.6$, $q=0.4 \rightarrow$ given

1. $P(x=7) = \binom{8}{7}(0.6)^7$

$^8C_7 \times 0.2799 \times 0.4$

$= 8 \times 0.2799 \times 0.4$

$= 0.08957$

2. $P(X \leq 3) = P(0) + P(1) + P(2) + P(3)$

$= {}^8C_0 (0.6)^0 (0.4)^8 + {}^8C_1 (0.6)^1 (0.4)^{8-1} + {}^8C_2 (0.6)^2$

$(0.4)^6 + {}^8C_3 (0.6)^3 (0.4)^5$

$= 0.1736704$

3. $P(x = 2 \text{ or } 3) = P(2) + P(3)$

$= 0.04128768 + 0.12386304$

$= 0.161515012$

Normal Distribution

$X \sim N(\mu, \sigma^2)$

1. $P(X=x) =$ dnorm (x, μ, σ)
2. $P(X \leq x) =$ pnorm (x, μ, σ)
3. $P(X > x) = 1 -$ pnorm (x, μ, σ)
4. To find the value of k, so that $P(X \leq k) = p$
qnorm (p, μ, σ)
5. To generate a random sample of size n, rnorm (n, μ, σ)

1. A random variable X follows normal distribution with $\mu = 10$, $\sigma = 2$, find:
i) $P(x \leq 7)$ ii) $P(x > 12)$ iii) $P(5 \leq X \leq 12)$
iv) $P(x < k) = 0.4$

```
> P1 = pnorm (7, 10, 2)
> P1
[1] 0.0668072
> P2 = 1 - pnorm (12, 10, 2)
> P2
[1] 0.1586553
> P3 = pnorm (12, 10, 2) - pnorm (5, 10, 2)
> P3
[1] 0.8351351
```

Find c.d.f of following pmf draw the graph of pdf

x	1	2	3	4
p(x)	0.4	0.3	0.2	0.1

⇒ x = c(1, 2, 3, 4)
prob = c(0.4, 0.3, 0.2, 0.1)
> a = cumsum (prob)
> a
[1] 0.4 0.7 0.9 1.0
plot (x, a, "s")

x	0	2	4	6	8
p(x)	0.2	0.3	0.2	0.2	0.1

→
x = c(0, 2, 4, 6, 8)
> prob = c (0.2, 0.3, 0.2, 0.2, 0.1)
> a = cumsum (prob)
> a
[1] 0.2 0.5 0.7 0.9 1.0
plot (x, a, 's')

here is second condition does not satisfy
∴ It is not pmf

Q.2 following is a pmf of x find mean & variable

x	1	2	3	4	5
p(x)	0.1	0.15	0.2	0.3	0.25

x	p(x)	x p(x)	x^2 p(x)
1	0.1	0.1	0.1
2	0.15	0.3	0.6
3	0.2	0.6	1.8
4	0.3	1.2	4.8
5	0.25	1.25	6.25
		3.45	13.55

Mean = $E(x) = \Sigma x\,p(x) = 3.45$

variance $= V(x) = \Sigma x^2 p(x) - [E(x)]^2$

$= 13.55 - 11.9025$

$= 1.6475$

```
→ > x = c(1,2,3,4,5)
> prob = c(0.1, 0.15, 0.2, 0.3, 0.25)
> a = x * prob
> a
[1] 0.1  0.3  0.6  1.2  1.25
> sum(a)
[1] 3.45
> mean = sum(a)
[1] 3.45
```

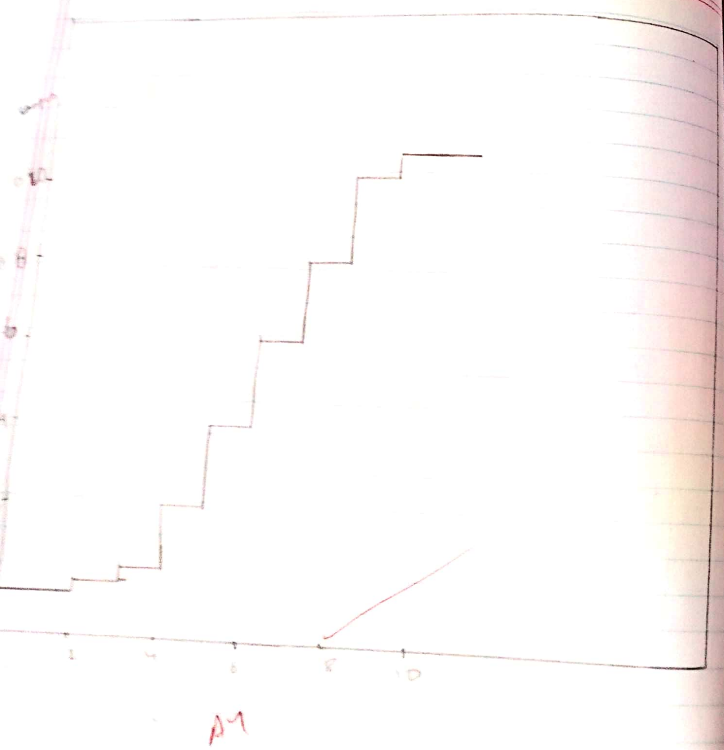


```
b = (x^2) * prob
> b
[1] 0.16   0.60   1.80   4.80   6.25
> sum(b)
[1] 13.55
> var = sum(b - mean^2
> var
[1] 1.6475
```

Q.3 following is a pmf of x and find mean, variance (x)

x	5	10	15	20	25
P(x)	0.1	0.3	0.2	0.25	0.15

```
→ > x = c(5,10,15,20,25)
> prob = c(0.1, 0.3, 0.2, 0.25, 0.15)
a = x * prob
> a
[1] 0.50   3.00   3.00   5.00   3.75
> sum(a)
[1] 15.25
mean = sum(a)
[1] 15.25
> b = (x^2) * prob
> b
[1] 2.50   30.00   45.00   100.00   93.75
sum(b)
[1] 271.25
> var = sum(b) - mean^2
> var
[1] 38.6875
```



Practical no : 3

Q. check the following are pmf (probability mass function) or not :

1)

x	1	2	3	4	5
$p(x)$	0.2	0.5	-0.5	0.4	0.4

→ since the probability is negative
∴ It is not a pmf.

2)

x	10	20	30	40	50
$P(x)$	0.3	0.2	0.3	0.1	0.1

→ The condition for pmf is :

1. $0 \le p(x) \le 1$ - (1)
2. $\sum P(x) = 1$ - (2)

```
> prob = c (0.3, 0.2, 0.3, 0.1, 0.1)
> sum(prob)
[1] 1
```

since both the conditions are satisfied it is a pmf

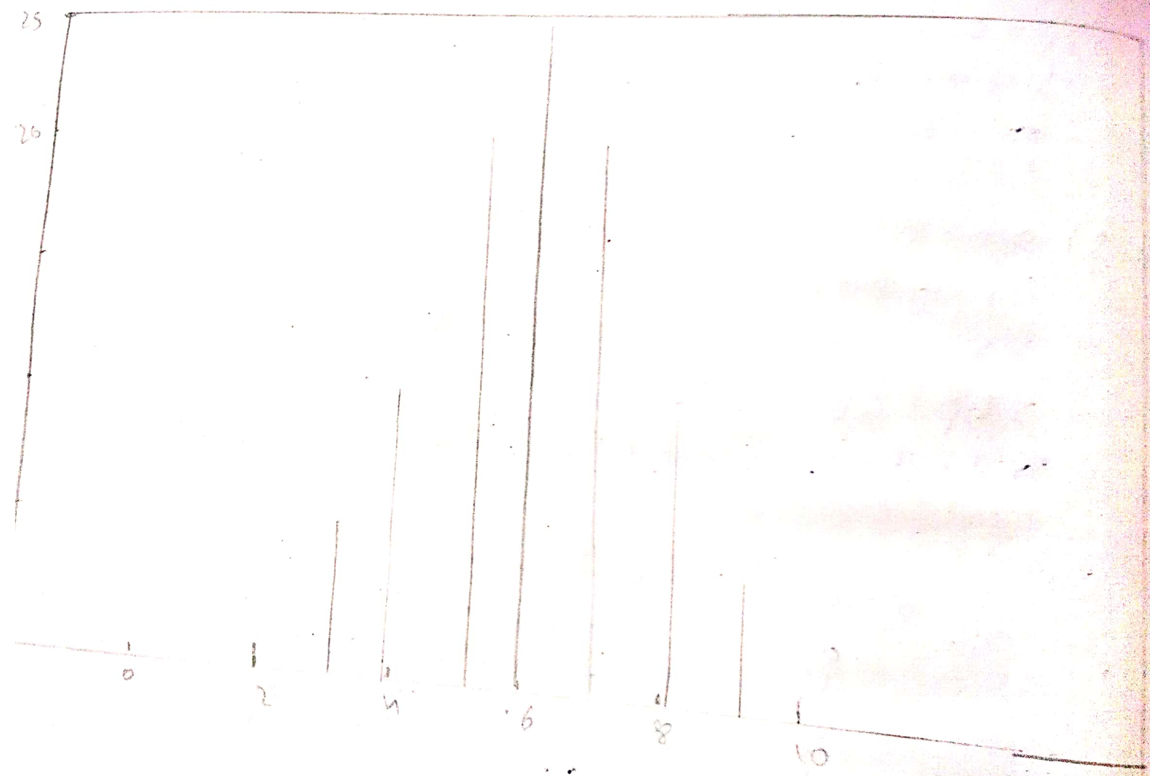
x	0	1	2	3	4
$P(x)$	0.4	0.2	0.3	0.2	0.1

→ The condition to check pmf are

1. $0 \le p(x) \le 1$
2. $\sum P(x) = 1$

```
> prob = c(0.4, 0.2, 0.3, 0.2, 0.11)
> sum(prob)
[1] 1.2 .
```

```
>plot (x, bp, "h")
>cp = pbinom (x, n, p)
>plot (x, cp, "s")
```



Scanned with CamScanner

PA.

Q3) > n: 5
> p: 0.1
> dbinom (0,n,p)
[1] 0.59049
> dbinom (1,n,p)
[1] 0.32805
> dbinom (2,n,p)
[1] 0.0729
> dbinom (3,n,p)
[1] 0.0081
> dbinom (4,n,p)
[1] 0.00045
> dbinom (5,n,p)
[1] 1e-05

Q4) n: 100
> p: 0.1
> dbinom (10,n,p)
[1] 0.131865

5) > n: 12
> p: 0.25
> pbinom (5, n, p)
[1] 0.9455978
> 1-pbinom (7,n,p)
[1] 0.00278151
> dbinom (6,n,p)
[1] 0.04014945

> dbinom (10, 10, 0.6)
[1] 0.006046618
> E = n * p
> E
[1] 6
> V = n * p * q
> V
[1] 2.4

Q.2] Suppose there are 12 MCQ in a English question paper each questions have five answers only one of them is correct. 1) answer 2) Atleast 3 correct answers

Q.3] Find the complete binomial distribution when n = 5, and p = 0.1

Q.4) Find the probability of exactly 10 successes out of 100 trials with p = 0.1

Q.5] X follows binomial distribution with n = 12 and p = 0.25 find
1) p(X ≤ 5) 2) P(X > 7) 3) P(5 < X < 7)

Q.6] There are 10 members in a committee probability of any member attending a meeting is 0.9 what is the probability that 7 or more members will be present in a ~~meeting~~

Q.7) A salesman has a 20% probability of making a sell to a customer on a typical day the number of sales he will move with 85% probability

Q.8] For n = 10 and p = 0.6 find the binomial probability and plot the graphs of pmf and cdf

Note:
1) $p(X = x)$ = dbinom(x, n, p)
2) probability of atmost x values
$P(X \le x)$ = pbinom (x, n, p)
3) probability of atleast x values.
$p(X > x)$ = 1 - pbinom (x, n, p)
4) If x is unknown and the probility is given as p
to find x
qbinom (p, n, p)

Answers

Q.2) n = 12
> p = 1/5
> dbinom (4, n, p)
[1] 0.1328756
> pbinom (4, n, p)
[1] 0.9274445
> 1 - pbinom (2, n, p)
[1] 0.4416543

```
> y*3
      [,1]  [,2]  [,3]
[1,]   15    33    27
[2,]   12    36    21
[3,]   15    24    12

> x*y
      [,1]  [,2]  [,3]
[1,]   24    77    36
[2,]   20    96    0
[3,]   30    72    8
```

AM

Practical no: 2

Binomial Distribution:

n: Total no of trails

p: p(success)

q: p(failure)

x: No of successes out of n.

$p(x) = {}^nC_x p^x \cdot q^{n-x}$

$E(x) = np$ $\quad v(x) = npq$

Q1 Toss a coin 10 times with p(H) = 0.6 let x be the no of heads. Find the probability of

① 7 heads ② 4 heads ③ Almost 4 heads ④ Atleast six heads ⑤ No heads ⑥ All heads

Also find exception and variance

```
> n=10
>p=0.6
>q=0.4
> dbinom (7,10, 0.6)
[1] 0.2149908
> dbinom [4, 10, 0.6]
[1] 0.114767
> pbinom (4,10, 0.6)
[1] 0.1662386
>1-pbinom (6,10,0.6)
[1] 0.3822806
> dbinom (0, 10, 0.6)
[1] 0.0001048576
```

```
> sqrt(y)
[1] 11.18034
> sqrt(8)
[1] 2.925632
```

@ Find sum, product, square root, maximum & minimum values in the following

```
-> x = c(2,8,9,11,10,7,6)^2
> x
[1] 4 64 81 121 100 49 36
> sum(x)
[1] 455
prod(x)
[1] 44259 89718400
> max(x)
[1] 121
> min(x)
[1] 4
```

matrix

$$\begin{bmatrix} 1 & 5 \\ 2 & 6 \\ 3 & 7 \\ 4 & 8 \end{bmatrix}$$

```
-> >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
```


@ $x = \begin{bmatrix} 4 & 7 & 8 \\ 5 & 8 & 0 \\ 6 & 4 & 2 \end{bmatrix}$ $y = \begin{bmatrix} 6 & 11 & 9 \\ 4 & 12 & 7 \\ 5 & 8 & 4 \end{bmatrix}$

a) x+y b) x*2 c) y*3 d) x*y

```
-> x <- matrix(nrow=3, ncol=3, data=c(4,5,6,7,8,9,0,2))
   y <- matrix(nrow=3, ncol=3, data=c(6,4,5,11,12,8,9,7,4))
>x
      [,1] [,2] [,3]
[1,]    4    7    8
[2,]    5    8    0
[3,]    6    9    2
>y
      [,1] [,2] [,3]
[1,]    6   11    9
[2,]    4   12    7
[3,]    5    8    4
> x+y
      [,1] [,2] [,3]
[1,]   10   18   13
[2,]    9   20    7
[3,]   11   17    6
> x * 2
      [,1] [,2] [,3]
[1,]    8   14    8
[2,]   10   16    0
[3,]   12   18    4
```

>sqrt (x+y ^ 2)
[1] 27.35613
>round (sqrt (x + y^2))
[1] 27

• vector : A vector is R software is denoted by the syntax (c)

1) c(2, 3, 5, 7) ^2
> x : c (2, 3, 5, 7)
> x ^ 2
[1] 4 9 25 49

2) c(2, 3, 5, 7) ^ c(2, 3)
> a : c (2, 3, 5, 7)
> b : c(2, 3)
> a ^ b
[1] 4 27 25 49

3) c(2, 3, 5, 7, 9, 11) ^ c (2, 3)
> a : c (2, 3, 5, 7, 9, 11)
> b : c (2, 3)
> a ^ b
[1] 4 27 25 343 81 1331

4) c(1, 2, 3, 4, 5, 6) ^ c (2, 3, 4)
> a : c (1, 2, 3, 4, 5, 6)
> b : c (2, 3, 4)
> a ^ b
[1] 1 8 81 16 125 1296

5) c(2, 5, 7, 9, 11) x 3
> a : c (2, 5, 7, 9, 11)
a * 3
[1] 6 15 21 27

or c(2, 3, 5, 7) * 3
[1] 6 15 21 27

6) c(2, 3, 5, 7) x c(-2, -3, -5, -7)
> c(2, 3, 5, 7) * (-2, -3, -5, -7)
[1] -4 -9 -25 -49

7) c(5, 6, 7, 8) +10
> c (5, 6, 7, 8) +10
[1] 15, 16, 17, 18

8) c(5, 6, 7, 8) + c (-2, -3, -1, 0)
> c (5, 6, 7, 8) + c(-2, -3, -1, 0)
[1] 3 0 3 6 8

9) c(2, 3, 5, 7) ÷ 2
> c(2, 3, 5, 7) / 2
[1] 1.0 1.5 2.5 3.5

sum, product:

Q. Find the sum, product, square root, for the following values 4, 9, 2, 5, 7, 8, 13, 6, 15, 12, 10, 9, 8, 13, 14
x = c (4, 9, 2 ..... 14)
> length (x)
[1] 15
> y : sum(x)
> y
[1] 125
> b : prod(x)
> b
[1] 8.559323e +12

Practical no - 1

Basics of R software :

1) R is a software for data analysis and statistical computing
2) It is a software by which effective data handling and outcome storage is possible
3) It is capable of graphical display.
4) It's a free software

1) $2^2 + 1 - 5 | + 4 \times 5 + 6 \div 5$

```
> 2^2 + abs(-5) + 4 * 5 + 6/5
[1] 30.2
```

2) $x = 20$, $y = 2x$, $z = x + y$, $\sqrt{z}$

```
>x = 20
>y = 2 * x
>z = x + y
>sqrt (z)
[1] 7.7459
```

3) $x = 10$, $y = 15$, $z = 5$

a) $x + y + z$ b) xyz c) $\sqrt{xyz}$ d) round ($\sqrt{xyz}$)

→

```
x = 10
y = 15
z = 5
> x + y + z
[1] 30
> x * y * z
[1] 750
```

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