```
-> 1] >x = c(70,80,35,50,20,45)
   >m = 3
   >n = 2
   >y = matrix(x, nrow = m, ncol = n)
   >y = now

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

   >pv = chisq.test(y)
   >pv
```

Pearson's chi-squared test

data : y

X-squared = 25.646, df = 2, p-value = 2.698e-01

∴ p-value is less than 0.05, we reject the Hypothesis.

```
-> 2] >x = c(70,35,46,37)
   >m = 2
   >n = 2
   >y = matrix(x, nrow = m, ncol = n)
   >y

        [,1]  [,2]
   [1,]  70    46
   [2,]  35    37

   >pv = chisq.test(y)
   >pv
```


Aim :- chisquare Tests & ANOVA

Q1) Use the following data test wether the condition of the home & the child are independent or not.

condition of home

	Clean	Dirty
child condition clean ~~Fairly~~ clean	70	50
Fairly clean	80	20
Dirty	35	45

Q2) Test the hypothesis that vaccine & disease are independent or not.

		Vaccine	
		Affected	Not Affected
Disease	Affected	70	46
	Not Affected	35	37

Q3] Perform a ANOVA for the following data

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

Pearson's Chi-squared test with Yates' continuity correction

data : y

X - Squared = 2.0275 , df = 1 , p-value = 0.1545

p-value is greater than 0.05, we accept the Hypothesis

3] H_0 : means are equal for A , B , C , D

```
> 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 df = 9 , p-value = 0.00183

∴ p-value is less than 0.05 , we reject Hypothesis

```
> anova = aov (value ~ ind , data = d)
> summary (anova)
```

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
ind	3	71 . 06	23 . 688	11.73	0.00183 **
Residuals	9	18 . 17	2.019		

-- -

Signif . codes : 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ''

→ H_0: Average life of A B C D are Equal

```
> x1 = c(20, 23, 18, 17, 18, 22, 24)
> x2 = c(19, 15, 17, 20, 16, 17)
> x3 = c(21, 19, 22, 17, 20)
> x4 = c(15, 14, 16, 18, 14, 16)
> 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 = 6.88445, num df = 3, denom df = 20, p-value = 0.002349
```

∴ p-value is less than 0.05, we reject the hypothesis.

Q5) Following data gives life of tyres of 4 brands

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

AM
20.2.2

27-1-24 TT Practical - 10

Aim : Non - Parametric Distribution

Q1) Following are the amounts of Sulphur oxide emitted by the industries in 20 days. Apply sign test to test the Hypothesis that the population median is 21.5 at 5%. level of significance

D = 17, 15, 20, 29, 19, 18, 22, 25, 27, 09, 12, 20, 12, 06, 24, 14, 15, 23, 24, 26

H_0 : Population median in 21.5

```
> x = c (D)
> me = 21.5
> sp = length (x [x > me])
> sn = length (x [x < me])
> n = sp + sn
> pvalue = pbinom (sp, n, 0.5)
> pvalue
[1] 0.2517223
```

∴ Pvalue is greater than 0.05 we accept the Hypothesis at 5%. level of significance

Q2) Following is the data of 10 observation applying sign test the Hypothesis that the population median is 625 against the Hypothesis is more than 625

values : 612, 619, 651, 623, 643, 640, 655, 649, 78, 670, 663

H_0 : Population median is 625 against H_1 > 625

```
> x = c (value)
> me = 625
> sp = length (x [x > me])
> sn = length (x [x < me])
> n = sp + sn
> pvalue = pbinom (sn, n, 0.5)
> pvalue
[1] 0.0546875
```

∴ Pvalue is greater than 0.05 we accept the Hypothesis at 5%. level of significance.

Q3) Following are the values of a sample test the Hypothesis that the population median is 60 against the alternative is more than 60

values : 63, 65, 60, 89, 61, 71, 58, 51, 69, 62, 63, 39, 72, 69, 48, 66, 72, 73, 87, 69

H_0 : Population median is 60

H_1 : Population median > 60

```
> x = c ( values)
```

> wilcox.test (x, alter = " greater" , mu = 60)

Wilcoxon signed rank test with continuity correction

data : x

V = 145 , pvalue = 0.02298

alternative hypothesis : true location is greater than 60

∴ pvalue is less than 0.05 than we reject the hypothesis at 5% level of significance

Note : If the alternative is less than alter = " less"

If the alternative not equal alter = " two sided"

4) using wilcoxon signed Rank Test population median is 12 or less than 12.

Data : 15, 17, 24, 25, 20, 21, 32, 28, 12, 25, 24, 26

H_0 : population me = 12

H_1 : population me < 12

> x = c (data)

> wilcox.test (x, alter = " less" , mu = 12)

Wilcoxon signed Rank Test with continuity correction

Data : x

V = 66 pvalue = 0.9986

∴ pvalue is greater than 0.05 we accept H_0.

5) The weight of student before and after they stop walking are given below. Using WSRT test that there is no significant change

Before	After
65	72
75	74
75	72
62	66
72	73

H_0 : before & after there is no change

H_1 : before & after there is change

> x = c (65 , 75 , 75 , 62 , 72)

> y = c (72 , 74 , 72 , 66 , 73)

> d = x - y

> wilcox.test (d, alter = " two sided" , mu = 0)

Wilcoxon Signed Rank Test

Data : d

V = 4.5 pvalue = 0.4982

∴ pvalue is greater than 0.05 we accept H_0.