

**Example 1 (Testing Goodness of Fit of a Discrete Distribution):**

The results of 180 rolls of a die are given below:

X	Ox
1	28
2	36
3	36
4	30
5	27
6	23
TOTAL	180

Test if the die is fair.

Null hypothesis to be tested is

$H_0: P(X=x) = 1/6$  for  $x = 1, 2, \dots, 6$

Read the data file DIE.csv in R.

```
> d1<-read.csv("g:/Stats24x7/R/DIE.csv",header=TRUE)
> attach(d1)
> names(d1)
[1] "X" "Ox"
> chisq.test(Ox)
```

chi-square test in R assumes EQUAL Expected Frequencies hence the probability vector under null does not need to be specified.

Chi-squared test for given probabilities

OUTPUT from R.

```
data: Ox
X-squared = 4.4667, df = 5, p-value = 0.4844
```

**Example 2 (Testing Independence):**

Given the following data, test if Voting Preference is independent of Gender (see worksheet Independence of the file [chi-square tests in excel.xlsx](#)).

GENDER	Voting Preferences			Row total
	Republican	Democrat	Independent	
Male	300	150	50	500
Female	250	300	50	600
Column total	550	450	100	1100

**There are several ways to get the data table in R. One way is shown below"**

```
> row1 <- c(300, 150, 50)
> row2 <- c(250, 300, 50)
> tbl <- rbind(row1, row2)
```

```
> tbl
  [,1] [,2] [,3]
row1 300 150  50
row2 250 300  50
```

```
> chisq.test(tbl)
```

Pearson's Chi-squared test

```
data: tbl
X-squared = 45.8333, df = 2, p-value = 1.115e-10
```

**Example 3 (Testing Homogeneity of Proportions):**

In a telephone survey, respondents were asked to indicate their level of agreement with the statement “Cigarette smoking should be banned in public places”. The results are shown in the table below: SA = strongly agree, A = agree, N = neutral, D = disagree, SD = strongly disagree. Test if there is no difference in Males and Females with respect to their level of agreement on the banning of smoking in public places.

Gender	SA	A	N	D	SD	TOTAL
F	40	38	16	37	5	136
M	16	25	11	25	11	88
TOTAL	56	63	27	62	16	224

(see worksheet Homogeneity of the file [chi-square tests in excel.xlsx](#)).

The null hypothesis  $H_0$ : there is no difference in Males and Females with respect to their level of agreement on the banning of smoking in public places.

```
col1 <- c(40, 16)
col2 <- c(38, 25)
col3 <- c(16, 11)
col4 <- c(37, 25)
col5 <- c(5, 11)

tbl2 <- cbind(col1, col2, col3, col4, col5)

> tbl2
  col1 col2 col3 col4 col5
[1,]  40  38  16  37   5
[2,]  16  25  11  25  11

> chisq.test(tbl2)

Pearson's Chi-squared test

data: tbl2
X-squared = 8.5748, df = 4, p-value = 0.07265
```