

In [1]:

```
path= "C:/Users/admin/Documents/Book10.xlsx"
import pandas as pd
amul=pd.read_excel(path)
print(amul)
import pandas as pd
import scipy.stats as stats
data = [['vanilla', 'childrens'] for i in range(20)] + \
        [['vanilla', 'teens'] for i in range(15)] + \
        [['vanilla', 'adults'] for i in range(30)] + \
        [['chocolate', 'childrens'] for i in range(30)] + \
        [['chocolate', 'teens'] for i in range(25)] + \
        [['chocolate', 'adults'] for i in range(25)] + \
        [['strawbery', 'childrens'] for i in range(15)] + \
        [['strawbery', 'teens'] for i in range(10)] + \
        [['strawbery', 'adults'] for i in range(10)] + \
        [['pista', 'childrens'] for i in range(10)] + \
        [['pista', 'teens'] for i in range(25)] + \
        [['pista', 'adults'] for i in range(15)]
df = pd.DataFrame(data, columns = ['flavours', 'audience'])
data_crosstab = pd.crosstab(df['flavours'],
                             df['audience'],
                             margins=True, margins_name="Total")

alpha = 0.05
chi_square = 0
rows = df['flavours'].unique()
columns = df['audience'].unique()
for i in columns:
    for j in rows:
        O = data_crosstab[i][j]
        E = data_crosstab[i]['Total'] * data_crosstab['Total'][j] / data_crosstab['Total']['Total']
        chi_square += (O-E)**2/E
p_value = 1 - stats.chi2.cdf(chi_square, (len(rows)-1)*(len(columns)-1))
conclusion = "Failed to reject the null hypothesis."
if p_value <= alpha:
    conclusion = "Null Hypothesis is rejected."
    print("chisquare-score is:", chi_square, " and p value is:", p_value)
    print(conclusion)
```

	Unnamed: 0	Unnamed: 1	Unnamed: 2	observed	Unnamed: 4	Unnamed: 5	Unnamed: 6	\
0	NaN	childrens	teens	adults	total	NaN	NaN	
1	vanilla	20	15	30	65	NaN	vanilla	
2	chocolate	30	25	25	80	NaN	chocolate	
3	strawbery	15	10	10	35	NaN	strawbery	
4	pista	10	25	15	50	NaN	pista	
5	total	75	75	80	230	NaN	total	

	Unnamed: 7	Unnamed: 8	expected	Unnamed: 10
0	childrens	teens	adults	total
1	21.195652	21.195652	22.608696	65
2	26.086957	26.086957	27.826087	80
3	11.413043	11.413043	12.173913	35
4	16.304348	16.304348	17.391304	50
5	75	75	80	230

chisquare-score is: 95.8717280982906 and p value is: 1.1102230246251565e-16
Null Hypothesis is rejected.

In []: