

```
In [17]: import scipy.stats as stats
import statsmodels.api as sm
import numpy as np
import pandas as pd
import warnings
from PIL import ImageGrab
import matplotlib.pyplot as plt
import seaborn as sns
```

```
In [18]: centers = pd.read_csv('Customer+OrderForm.csv')
centers.head(10)
```

```
Out[18]:
```

	Phillippines	Indonesia	Malta	India
0	Error Free	Error Free	Defective	Error Free
1	Error Free	Error Free	Error Free	Defective
2	Error Free	Defective	Defective	Error Free
3	Error Free	Error Free	Error Free	Error Free
4	Error Free	Error Free	Defective	Error Free
5	Error Free	Error Free	Error Free	Error Free
6	Error Free	Defective	Error Free	Error Free
7	Error Free	Error Free	Error Free	Error Free
8	Error Free	Error Free	Error Free	Error Free
9	Error Free	Error Free	Error Free	Error Free

```
In [8]: centers.describe()
```

```
Out[8]:
```

	Phillippines	Indonesia	Malta	India
count	300	300	300	300
unique	2	2	2	2
top	Error Free	Error Free	Error Free	Error Free
freq	271	267	269	280

```
In [10]: centers.isnull().sum()
```

```
Out[10]: Phillipines    0
Indonesia    0
Malta        0
India        0
dtype: int64
```

```
In [11]: value_counts(), '\n', centers['Indonesia'].value_counts(), '\n', centers['Malta'].value_counts(), '\n', centers['India'].value_counts())
```

```
Error Free    271
Defective     29
Name: Phillipines, dtype: int64
Error Free    267
Defective     33
Name: Indonesia, dtype: int64
Error Free    269
Defective     31
Name: Malta, dtype: int64
Error Free    280
Defective     20
Name: India, dtype: int64
```

```
In [12]: contingency_table = [[271,267,269,280],
                             [29,33,31,20]]
print(contingency_table)
```

```
[[271, 267, 269, 280], [29, 33, 31, 20]]
```

```
In [13]: stat, p, df, exp = stats.chi2_contingency(contingency_table)
print("Statistics = ",stat,"\n", 'P_Value = ', p, '\n', 'degree of freedom = ', df, '\n', 'Expected Values = ', exp)
```

```
Statistics = 3.858960685820355
P_Value = 0.2771020991233135
degree of freedom = 3
Expected Values = [[271.75 271.75 271.75 271.75]
 [ 28.25  28.25  28.25  28.25]]
```

```
In [14]: observed = np.array([271, 267, 269, 280, 29, 33, 31, 20])
         expected = np.array([271.75, 271.75, 271.75, 271.75, 28.25, 28.25, 28.25, 28.25])
```

```
In [15]: test_statistic, p_value = stats.chisquare(observed, expected, ddof = df)
         print("Test Statistic = ",test_statistic,'\n', 'p_value =',p_value)
```

```
Test Statistic = 3.858960685820355
p_value = 0.4254298144535761
```

```
In [16]: alpha = 0.05
         print('Significnace=%.3f, p=%.3f' % (alpha, p_value))
         if p_value <= alpha:
             print('We reject Null Hypothesis there is a significance difference between TAT of reports of the laboratories')
         else:
             print('We fail to reject Null hypothesis')
```

```
Significnace=0.050, p=0.425
We fail to reject Null hypothesis
```

```
In [ ]:
```