A F&B manager wants to determine whether there is any significant difference in the diameter of the cutlet between two units. A randomly selected sample of cutlets was collected from both units and measured? Analyze the data and draw inferences at 5% significance level. Please state the assumptions and tests that you carried out to check validity of the assumptions.

Minitab File : **Cutlets.mtw**

**Step 1:** Write Hypothesis

H0 : D1=D2

H1: D1 Not Equal to D2

**Step 2:** Decide the test

* As we have to compare between two means, we are using Two sample T test

**Step 3:** Calculate T statistical Value ,T Critical Value and P Value:

T Statistical Value = 0.7228

T Critical Value = 2.03

P Value = 0.47

**Step 4:** Draw Conclusion depending on values

* As P Value >0.05 , We accept Null Hypothesis and reject Alternate Hypothesis.
* T(S) < T©; This also proves same analysis

Q2: A hospital wants to determine whether there is any difference in the average Turn Around Time (TAT) of reports of the laboratories on their preferred list. They collected a random sample and recorded TAT for reports of 4 laboratories. TAT is defined as sample collected to report dispatch.

Analyze the data and determine whether there is any difference in average TAT among the different laboratories at 5% significance level.

Minitab File: LabTAT.mtw

**Step 1:** Write Hypothesis

H0 : All labs have equal TAT

H1: All labs do not have equal TAT

**Step 2:** Decide the test

* As we have more than 2 samples we use ANOVA test.

**Step 3:** Calculate T statistical Value ,T Critical Value and P Value:

stats.f\_oneway(df['Laboratory 1'],df['Laboratory 2'],df['Laboratory 3'],df['Laboratory 4'])

F\_onewayResult(statistic=118.70421654401437, pvalue=2.1156708949992414e-57)

F Statistical Value = 118.7

F Critical Value = 3.15

P Value = 2.11e-57

**Step 4:** Draw Conclusion depending on values

* As P Value <0.05 , We reject Null Hypothesis and accept Alternate Hypothesis.
* F(S) > F©; This also proves same analysis

3. Sales of products in four different regions is tabulated for males and females. Find if male-female buyer rations are similar across regions.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **East** | **West** | **North** | **South** |
| Males | 50 | 142 | 131 | 70 |
| Females | 550 | 351 | 480 | 350 |

**Step 1:** Write Hypothesis

H0 : Male-Female buyer ratios are similar across regions.

H1: Male-female buyer ratios are not similar across regions.

**Step 2:** Decide the test

* As there are four proportions, use Chi square test.

**Step 3:** Calculate Chi Square statistical Value ,Chi Square Critical Value and P Value:

# Calculating Chisquare statistical value

chisquare\_value=stats.chi2\_contingency(data)

chisquare\_value

Chi2ContingencyResult(statistic=1.595945538661058, pvalue=0.6603094907091882, dof=3, expected\_freq=array([[ 42.76531299, 146.81287862, 131.11756787, 72.30424052],

[ 442.23468701, 1518.18712138, 1355.88243213, 747.69575948]]))

##Calculating chi square critical value using chi square tables

chicrit\_val=stats.chi2.ppf(0.95,3)

chicrit\_val

Chi Square Statistical Value = 1.5959

Chi Square Critical Value = 7.81

P Value = 0.66

**Step 4:** Draw Conclusion depending on values

* As P Value >0.05 , We accept Null Hypothesis and reject Alternate Hypothesis.
* Also Chi Square Critical value > Chi square Statistical Value

4. TeleCall uses 4 centers around the globe to process customer order forms. They audit a certain % of the customer order forms. Any error in order form renders it defective and has to be reworked before processing. The manager wants to check whether the defective % varies by centre. Please analyze the data at 5% significance level and help the manager draw appropriate inferences

Minitab File: CustomerOrderForm.mtw

Step 1:

H0: Defective % varies by centre.

H1: Defective % does not vary by centre.

Step 2:

As it is four proportion test, we use Chi Square Test.

Step 3:

Calculate Chi Square statistical Value ,Chi Square Critical Value and P Value:

Chi Square Critical Value=9.34

Chi Square Statistical Value = 3.85

P Value= 0.27

Step 4:

Draw Conclusion depending on values

* As P Value >0.05 , We accept Null Hypothesis and reject Alternate Hypothesis.
* Also Chi Square Critical value > Chi square Statistical Value