**Hypothesis Testing Exercise**

1. 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**

Answer:

**Given data:**

Significance level 5%

**Business problem/Action**: Whether to buy a new machine or not?

Y1= Length of cutlet in first unit

Y2=Length of cutlet in second unit

X=2 samples=Discrete

**A.Normality Test:**

**Hypothesis Formulation**

Ho: No action, If Y1 & Y2 is normal

Ha: Take action, if Y1 & Y2 are not normal

* checking p-value,P-0.2866
* checking p-value ,P-0.6869
* Both data are assume to be a normal as P-high, Null fly(P>0.05),i.e.(0.28>0.05),(0.68>0.05)
* **External Conditions:** as external conditions are different. We will go with variance test (two different units sample)

**B.Variance Test:**

**Hypothesis Formulation**

H0: Variance are equal(Var of Y1=Var of Y2)

Ha: Variance are not equal(Var of Y1!=Var of Y2)

* #checking P value
* P-0.3136,(P>0.05)
* Variance are assume to be equal as P-high, Null-fly(p value>0.05)
* i.e.0.3136>0.05 fail to reject null hypothesis.

**Two sample t-test for equal variance:**

**Hypothesis Formulation**

* H0:do not take action when diameter of Y1= diameter of Y2
* Ha: Take action when diameter of Y1!= diameter of Y2
* p-value = 0.4722,(P>0.05)

p-value> 0.05 i.e.(0.47>0.05)

p-high,null-fly fail to reject null hypothesis

**Conclusion for the problem statement:**

Diameter of Y1 and diameter of Y2 are same, So that No need to buy new machine.

**Hypothesis Testing Exercise-3**

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

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

**Answer:**

**Data Collection:**

X = Discrete variable (East, west, north,south)

Y = Discrete

Both variable data type are discrete and more than 2 variables are given in dataset

So that we proceed with **Chi-Square test**

**Hypothesis Formulation**

H0: sales ratio across different region is male =female

Ha: sales ratio across different region is male! =female

**Chi-square Test**

* #H0 : Proportion of male and female are same (Null Hypothesis)
* #Ha : proportion of male and female are not same(Alternative Hypothesis)
* Chisq #p-value=0.6603
* P>0.05,#p-high,Null-fly,fail to reject null hypothesis
* **Conclusion for the problem statement:**

For given data sales ratio is similar for male and female in across different region