1. Y – Diameter of cutlet

X – Number of units

Y is continuous and X is discrete

1. **Normality Test**

Unit A

Ho : Data is Normal

Ha : Data is not Normal

Here alpha = 0.05

So, now conducting the shapiro.test for testing the normality of data sets

shapiro.test(cutlet$Unit.A)

P = 0.32

P>0.05 => p high Ho fly => So unit A data is Normal

Unit B

Ho : Data is Normal

Ha : Data is not Normal

shapiro.test(cutlet$Unit.B)

P = 0.52

p>0.05 => p high Ho fly => So Unit B data is also Normal

Now, the external conditions are not same for both the units so going for the variance test and checking whether both the variances are equal or not

1. **Variance test**

Ho : variance of unit A = variance of unit B

Ha: variance of unit A != variance of unit B

Using var.test() for the variance test

var.test(cutlet$Unit.A,cutlet$Unit.B)

P = 0.3136

P>0.05 => p high Ho fly => This means the variances of both the data sets are equal

Now since the variances are equal, we will go for two sample-t for equal variances

1. **2 sample-t test for equal variance**

Ho : No there is not a significance difference between the diameters

Ha : yes, there is significant difference between the diameters

t.test(cutlet$Unit.A,cutlet$Unit.B,alternative = "two.sided",conf.level = 0.95, correct = TRUE)

p = 0.4723

p>0.05 => p high Ho fly => this means there is no significant difference the diameters of cutlets from both the units.

1. Y – average Turn Around Time (TAT)

X – 4 laboratories

Y is continuous and X is discrete

1. **Normality Test**

Ho : Data are normal

Ha: Data are not Normal

Applying shapiro.test to data of all the 4 laboratories and finding their p values

P1 = 0.5508, p2= 0.8637, p3= 0.4205, p4 = 0.6619

All p > 0.05 => p high Ho fly => data is normal

Now going for the variance test, but since there are 4 variables, and variance test cannot accept the four variables at a time so stacking the data and distributing it into columns as values and index

stack\_labtat = stack(labtat)

1. **Levene’s test**

After the stacking of data, since the variables are discrete and continuous, so going for the levene’s test since variance test can only take the discrete variables

Ho : Variances are equal

Ha : Variances are not equal

leveneTest(stack\_labtat$values, stack\_labtat$ind)

p = 0.0516

p>0.05 => p high Ho fly => variances are equal

Since variances are equal, so now going for the one way ANOVA test

1. **ANOVA test**

Ho: There is no difference in average TAT among the different laboratories

Ha: There is difference between in average TAT among the different laboratories

Anova\_results = aov(values~ind, data = stack\_labtat)

summary(Anova\_results)

p = 2e-16

p<0.05 => p low Ho go => There is difference between the average TAT among the different laboratories

1. Y – Male-Female buyer ratio

X – Four different regions

Y and X are both discrete variable

Ho: All proportions are equal

Ha: Not all proportions are equal

1. Y – Order form is defective or error free

X – 4 centres

Y & X both are discrete variable

Since the number of independent variable are greater than 2 so going for chi squared test

Ho : The defects made are equal by each centre

Ha : At least defect of one centre varies from the other centre

cof = read.csv("CostomerOrderForm.csv")

class(cof)

View(cof)

stacked\_cof = stack(cof)

table\_cof = table(stacked\_cof$values,stacked\_cof$ind)

View(table\_cof)

chisq.test(table\_cof)

1. **Chi squared test**

P = 0.2771

P>0.05 => p high Ho fly => The defects made are equal by each centre

4b) Y – Male Female ratio

X- Weekdays and weekends (2 discrete variables)