UNIT-3

N-P. Test or Methods:

It doesn't make any assumptions regarding the form of population.

Some of the assumptions associated are

1) Sample observations are dependent
2) Variable under study is continous
3) population density function is continous
4) Lower order moments exists

Sign-test: It is based on direction ('+' and '-')

Critical value for two-sided alternative

$$\boxed{K = \frac{n-1}{2} - (0.98)\sqrt{n}}$$

2 Types: 1) One sample sign test
2) Paired sample sign test

One Sample Sign Test:

→ We have to replace, the sample values greater(+) smaller (-).

→ If sample value equal put (0)

Paired Sample Sign Test:

→ Same we have to replace the signs.

→ If the values are repeated discard

$$\boxed{Z = \frac{x - np}{\sqrt{npq}}}$$

MANN-WHITNEX U-Test:

→ With this we can test the Null hypothesis $\mu_1 = \mu_2$

→ $$\boxed{U_1 = n_1 n_2 + \frac{n_1(n_1+1)}{2} - R_1 \qquad U_2 = n_1 n_2 + \frac{n_2(n_2+1)}{2} - R_2}$$

→ n_1, n_2 → size of samples

R_1, R_2 → Ranks of sums

→ If U is smaller than critical value

$$\boxed{Z = \frac{U - \frac{n_1 n_2}{2}}{\sqrt{\frac{n_1 n_2 (n_1 + n_2 - 1)}{12}}}}$$

One Sample Run Test:

→ Run Means success of identical letters proceeded by different letters or no letters at all.

ex: A A A B B B B C C C D D D D K K N N N

→ Mean of the sampling distribution

Test statistic:

$$\boxed{\mu = \frac{2 n_1 n_2}{n_1 + n_2} + 1}$$

$$Z = \frac{\gamma - \mu_\gamma}{\sigma_\gamma}$$

Standard error:

$$\boxed{\sigma_1 = \sqrt{\frac{2 n_1 n_2 (2 n_1 n_2 - n_1 - n_2)}{(n_1 + n_2)^2 (n_1 + n_2 - 1)}}}$$

→ If the S.D of 'r' is close to nominal distribution or either n_1 or n_2 is larger than 20 then.

Test statistic : $\boxed{Z = \frac{r - \mu_r}{\sigma_r}}$

$r \rightarrow$ No. of runs (W_1 W A_2 A_3)

Kruskal - Wallis Test:

If ANOVA is failed to meet the assumptions needed for analysis then this is an alternative technique. It is also called "H-test".

H - statistic : $H = \frac{12}{N(N+1)} \left[\frac{R_1^2}{n_1} + \frac{R_2^2}{n_2} + \dots + \frac{R_k^2}{n_k} \right] - 3(N+1)$

$n_1\ n_2 \rightarrow$ no. of samples

$R_1\ R_2 \rightarrow$ Rank of sums

→ For small samples:

χ^2 with $\boxed{(k-1)\ d.f}$

$K \rightarrow$ Methods

KOLMOGOROV SMIRNOV Test:

→ It is a non-parametric test of the equality of continous.

→ Testing is done whether it has significant difference b/w an observed frequency distribution and a theoretical frequency distribution.

→ Arrange values in ascending order

→ place a 'i' according to the placements

$$\boxed{D^{+} = \max_{1 \leq i \leq N} \left\{ \frac{i}{N} - R_i \right\}}$$

$$\boxed{D^{-} = \max_{1 \leq i \leq N} \left\{ R_i - \left(\frac{i-1}{N} \right) \right\}}$$

$N \longrightarrow$ sample size

$R_i \longrightarrow$ observed frequency probabilities in ascending order.

→ $D = \max [D^{+}, D^{-}]$

→ D_α for a given L.O.S α from standard K-S table.

→ $D < D_\alpha$ (accept) hypothesis