Run Test

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- Arrival of customers at a branch of hospital/bank.
- The officer wants to know whether the gender of arriving customers is random or not

MM FFF MMM FFF M F MMMM FF

- A run is defined as a sequence which consists of repeated occurrence of a particular symbol in it or no other symbol on either side.
- Objective: To test the randomness of occurrence of runs at a given α

- n_1=Frequency of M=10
- n_2=Frequency of F=9
- number of runs=r=8

- Small Sample: n_1 and n_2 are ≤ 20
- Large sample: n_1 or n_2 or both larger than 20
- H_0: The occurrence of runs in the given stream of symbols is random
- H_1: The occurrence of runs in the given stream of symbols is not random

- If r is less than or equal to lower critical value or greater than or equal to larger critical value, we reject H_0.
- CHECK THE ABOVE EXAMPLE!!!

PROBLEM 1

- The items inspected at a final inspection station of a production line are classified into good (G) and bad(B) as shown below
  GG BB GGG B GGGG B GGGG B
  Verify whether the results of inspection is random at a significance level 0.05.

PROBLEM 2

- The gender of arrival of applicants at a passport office is summarized below in termsof M (male) and F(female). Verify whteher the gender of arriving applicants is random at $\alpha = .05$.
  MMM FF , MM FFF MMM FF MMMM

LARGE SAMPLE RUN TEST

$$\mu = E(r) = 1 + \frac{2n_1 n_2}{n_1 + n_2}$$

$$\sigma^2 = V(r) = \frac{2n_1 n_2(2n_1 n_2 - n_1 - n_2)}{(n_1 + n_2)^2(n_1 + n_2 - 1)}$$

$$Z = \frac{r - \mu}{\sigma}$$

follows standard Normal distribution

PROBLEM 3

The marketing manager of a company is keen in analysing the outcomes of different quotations submitted to its customers. The outcome is either winning (W) or losing (L) the order. The sequence of outcomes of 40 different quotations are as listed below. Check whether the events of winning or losing are random at $\alpha = 0.05$.

WW LL WWWWW LL WWW L
WWW LL WW LL WW LLL W LL WWW LL WW