



In many situations we want to know whether we can conclude that a series of events is random an important example is the sample of data available for some statistical analysis. A basic assumption underline procedure for statistical inference is that the inference is based on a random sample. If the randomness of the sample is suspect we want to have some way of <sup>deciding</sup> whether the sample is random before we proceed for analysis.

Run:

Procedure for investigating randomness based on the number and nature of the runs present in the data of interest.

A Run is defined as:

"A sequence of like event, items or symbols that is preceded by an event, item or symbol of a different type. The number of events or symbols in a <sup>run</sup> run is referred to as its length. We <sup>without</sup> doubt the randomness of a series when there appear to be either too many or too few runs. ~~without~~

Assumptions:-

The data available for analysis consist of a sequence of observations recorded in order of their occurrence with we can categorize it to two mutually exclusive types

Let  $n =$  the total sample size

$n_1 =$  the number of observation of one type

$n_2 =$  the number of observations of the other type

## Test - statistics:-

number of runs denoted by  $R$

## Example:-

⇒ Following data shows the departure from normal of daily temperature we wish to know whether we may conclude that the pattern of departure above and below normal is the result of a non-random process?

Data: 12, 13, 12, 11, 5, 2, -1, 2, -1, 3, 2, -6, -7,  
-7, -12, -9, 6, 7, 10, 6, 1, 1, 3, 7, -2, -6, -6, -5, -2, -1

$H_0$ : The pattern of departure is the result of a random process

$H_1$ : The pattern " " " " is the result of non-random process

$x =$  no. of runs  $= 8$   
 $n = 30$

$n_1 = 17$  +ve signs

$n_2 = 13$  (observations with -ve signs)

## Decision

if  $t$  is less than or equal to the lower critical value we reject the null hypothesis of random process

Tabulated value = 10

$\chi < \text{Lower critical value}$

$8 < 10$

reject our null hypothesis and conclude that the pattern of departure is the result of a non random process

2/2/18

Home Assignment Tuesday

Question #1

FFFMFFM MM FFFFFFFM

$4 = \text{tabulated value}$  (lower critical value)

Test the null hypothesis that the sequence is Random.

$H_0$ : Sequence is random  $H_1$ : Sequence is not random

$\chi = 6$

$n = 16$

$n_1 = 12$  (no. of females)

$n_2 = 5$  (no. of males)

Critical value = 00.4

$\chi < \text{lower critical value}$

$6 < 4$

accept our null hypothesis and conclude that the pattern of departure is + sequence is random