Assignment 18.3 : Problem Statement

Calculate F Test for given 10, 20, 30, 40, 50 and 5,10,15, 20, 25.

For 10, 20, 30, 40, 50:

Solution:

F Test is generally defined as ratio of the variances of the given two set of values. First calculate standard deviation and variation of the given set of values.

The formula used to calculate SD is, Standard Deviation Formula

$$\sigma = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})^2}$$

The standard deviation is represented by the symbol σ and variance is square of the standard deviation.

F Test Formula

$$F = \frac{\text{estimate of } \sigma^2 \text{ from means}}{\text{estimate of } \sigma^2 \text{ from individuals}}$$

$$F = \frac{\text{Variance between Treatments}}{\text{Variance within Treatments}}$$

$$F = \frac{\text{Variance of Treatments}}{\text{Variance of Error}}$$

Calculate Variance of first set

Total Inputs (N) = (10,20,30,40,50)
Total Inputs (N) = 5
Mean (x_m) = (x1+x1+x2...xn)/N
Mean (x_m) = 150/5
Mean (x_m)= 30

SD = sqrt (1/(N-1)*((x_1-x_m)^2+(x_2-x_m)^2+..+(x_n-x_m)^2))
= sqrt (1/(5-1)((10-30)^2+(20-30)^2+(30-30)^2+(40-30)^2+(50-30)^2))
= sqrt (1/4((-20)^2+(-10)^2+(0)^2+(10)^2+(20)^2))
= sqrt (1/4((400)+(100)+(0)+(100)+(400)))
= sqrt(250)
= 15.8114
Variance=SD^2
Variance=15.8114^2
Variance=250

Calculate Variance of second set

For 5, 10,15,20,25:

Total Inputs (N) = (5,10,15,20,25)

Total Inputs (N) = 5

Mean (x_m) = (x_1+x_2+x_3...x_N) / N

Mean (x_m) = 75/5

Means (x_m) = 15

SD = sqrt(1/(N-1)*((x_1-x_m)^2+(x_2-x_m)^2+..+(x_n-x_m)^2))

= qrt(1/(5-1)((5-15)^2+(10-15)^2+(15-15)^2+(20-15)^2+(25-15)^2))

= sqrt(1/4((-10)^2+(-5)^2+(0)^2+(5)^2+(10)^2))

= sqrt(1/4((100)+(25)+(0)+(25)+(100)))

= sqrt(62.5)

= 7.9057

Variance=SD^2

Variance=7.9057^2

Variance=62.5

To calculate F Test

F Test = (variance of 10, 20,30,40,50) / (variance of 5, 10, 15, 20, 25)

= 250/62.5

= 4.

The F Test value is 4.