

Assignment 5.3

Problem Statement 1:

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

Degree of freedom = n-1

Variance Formula,

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

Calculate Variance of first set

set 1 = 10,20,30,40,50

n = 5

$$\begin{aligned}\text{Variance1} &= 1/(5-1) * ((10-30)^2 + (20-30)^2 + (30-30)^2 + (40-30)^2 + (50-30)^2) \\ &= 1/4 * ((-20)^2 + (-10)^2 + (0)^2 + (10)^2 + (20)^2) \\ &= 1/4 * ((400) + (100) + (0) + (100) + (400)) \\ &= 250\end{aligned}$$

Calculate Variance of second set

set2 = 5, 10,15,20,25

n = 5

$$\begin{aligned}\text{variance2} &= 1/(5-1) * ((5-15)^2 + (10-15)^2 + (15-15)^2 + (20-15)^2 + (25-15)^2) \\ &= 1/4 * ((-10)^2 + (-5)^2 + (0)^2 + (5)^2 + (10)^2) \\ &= 1/4 * ((100) + (25) + (0) + (25) + (100)) \\ &= 62.5\end{aligned}$$

Calculate F Test

$$\begin{aligned}\text{F Test} &= \text{variance1} / \text{variance2} \\ &= 250/62.5 \\ &= 4.\end{aligned}$$

The F Test value is 4.