**Experiment-IX**

**F-test**

**Problem 1 . The time takes by workers in performing a job by method I and method II is given below**

**Method I : 20 16 26 27 23 22**

**Method II: 27 33 42 35 32 34 38**

**Do the data show that the variances of time distribution from population from which these samples are drawn do not differ significantly?**

Solution :

since >

Or since <

where = and

=

**Aim :** To test weather the samples were drawn from same population or not

**Null Hypothesis H0:** Samples are drawn do not differ significantly

**Alternative H1:** Samples are drawn differ significantly

**Calculation and R – commands:-**

SampleA<-c(20, 16, 26, 27, 23, 22)

SampleB<-c: (27, 33, 42, 35, 32, 34, 38)

var(sampleA)

16.2667

var(sampleB)

22.28571

Since var(sampleB)> var(sampleA)

var.test(SampleB,SampleA, ratio = 1, alternative = c("two.sided"), conf.level = 0.95)

**Output:-**

F test to compare two variances

data: SampleB and SampleA

F = 1.37 , dof = 6 , dof = 5 , p-value = 0.747

alternative hypothesis: true ratio of variances is not equal to 1

95 percent confidence interval :

0.1963431 8.2031044

sample estimates:

ratio of variances :

1.370023

p-value = 0.747

p-value

0.747

alpha=0.05

alpha

0.05

if(pvalue < alpha){print("Null Hypothesis is Rejected")}else{print("Null Hypothesis is Accepted ")}

Null Hypothesis is Accepted

Or

Since p-value(0.747) > alpha(0.05) so,

H0 is Accepted

Conclusion : Null Hypothesis is Accepted i.e., samples are drawn do not differ significantly

**Problem2 :** The measure of the output of two units have given the following results. Assuming that both samples have been obtained from the normal populations at 2 % significant level, test whether the two populations have the same variance

Unit A: 25 30 14.7 13.7 14

Unit B: 14 14.5 13.7 12.7 14.1

Solution :

**Aim :** To test weather the samples were drawn from same population or not

**Null Hypothesis H0:** Samples are drawn from same-population

**Alternative H1**: Samples are drawn not from same-population

**Calculation and R – commands:-**

UnitA<-c(25, 30, 14.7, 13.7, 14)

UnitA

25, 30, 14.7, 13.7, 14

var(UnitA)

[1] 56.857

UnitB<-c(14, 14.5, 13.7, 12.7, 14.1)

UnitB

14,14.5, 13.7, 12.7, 14.1

var(UnitB)

[1] 0.46

var.test(UnitA, UnitB, ratio = 1, alternative = c("two.sided"), conf.level = 0.98)

F test to compare two variances

data: UnitA and UnitB

F = 123.6, num df = 4, denom df = 4, p-value = 0.0003844

alternative hypothesis: true ratio of variances is not equal to 1

98 percent confidence interval:

7.736245 1974.795004

sample estimates:

ratio of variances

123.6022

p-value = 0.0003844

p-value

0.0003844

alpha=0.02

alpha

0.02

if(pvalue < alpha){print("Null Hypothesis is Rejected")}else{print("Null Hypothesis is Accepted ")}

Null Hypothesis is Rejected

Or

Since p-value(0.0003844) > alpha(0.02) so, H0 is Accepted

Conclusion : Null Hypothesis is Rejected i.e., samples are not drawn from same population .