The total sample size is N=500.N=500. Therefore, the total degrees of freedom are:

$$df_{total}=500-1=499$$

df
total

=500−1=499

The between-groups degrees of freedom are $df_{between}=5-1=4$,

df
between

=5−1=4, and the within-groups degrees of freedom are:

$$df_{within}=df_{total}-df_{between}=499-4=495$$

df
within

=df
total

−df
between

=499−4=495

$\displaystyle\sum_{i,j}X_{ij}=499712$

$\sum_{i,j}$

X
ij

=499712

$\displaystyle\sum_{i,j}X_{ij}^2=499691630$

$\sum_{i,j}$

X_{ij}^2

=499691630

SS_{total}=\displaystyle\sum_{i,j}X_{ij}^2-\dfrac{1}{N}(\displaystyle\sum_{i,j}X_{ij})^2=267464.11
2SS
total

=
i,j
∑

X
ij
2

−
N
1

(
i,j
∑

X
ij

)
2
=267464.112
SS_{within}=266084.42SS
within

=266084.42
SS_{between}=1379.692SS
between

=1379.692
MS_{between}=\dfrac{SS_{between}}{df_{between}}=\dfrac{1379.692}{4}=344.923MS
between

=
df
between

SS

between

=
4
1379.692

=344.923
MS_{within}=\dfrac{SS_{within}}{df_{within}}=\dfrac{266084.42}{495}=537.544MS
within

=
df
within

SS
within

=
495
266084.42

=537.544
F=\dfrac{MS_{between}}{MS_{within}}=\dfrac{344.923}{537.544}=0.642F=
MS
within

MS
between

=
537.544
344.923

=0.642
The following null and alternative hypotheses need to be tested:

H_0: \mu_1=\mu_2=\mu_3=\mu_4=\mu_5H
0

:μ
1

=μ
2

=μ
3

=μ
4

=μ
5

H_1:H
1

: Not all means are equal.

The above hypotheses will be tested using an F-ratio for a One-Way ANOVA.

Based on the information provided, the significance level is \alpha=0.05,α=0.05, and the degrees of freedom are df_1=4df
1

=4 and df_2=4,df
2

=4, therefore, the rejection region for this F-test is R=\{F:F>F_c=2.39\}.R={F:F>F
c

=2.39}.

Test Statistics

F=\dfrac{MS_{between}}{MS_{within}}=\dfrac{344.923}{537.544}=0.642F=
MS
within

MS
between

=
537.544
344.923

=0.642
Since it is observed that F=0.642<2.39=F_c,F=0.642<2.39=F
c

, it is then concluded that the null hypothesis is not rejected. Therefore, there is not enough evidence to claim that not all 5 population means are equal, at the \alpha=0.05α=0.05 significance level.

Using the P-value approach: The p-value is p=0.633,p=0.633, and since p=0.633\geq0.05,p=0.633≥0.05,

it is concluded that the null hypothesis is not rejected. Therefore, there is not enough evidence to claim that not all 5 population means are equal, at the \alpha=0.05α=0.05 significance level.