NAME: Sejal Gurkhe

UID: 2019130017

TE Computer

Experiment 3

Aim: To Perform a One-Way ANOVA in SAS Software.

A one-way ANOVA is used to determine whether or not there is a statistically significant difference between the means of three or more independent groups.

Dataset:

Here I am creating a dataset where suppose a researcher recruits 30 students to participate in a study. The students are randomly assigned to use one of three studying methods to prepare for an exam.

The exam results for each student are shown below:

Method A	Method B	Method C
78	81	84
81	83	88
82	83	88
82	85	89
85	86	90
88	88	93
88	90	95
90	91	98

Code to create the above dataset:

```
CODE        LOG       RESULTS

  2  data my_data;
  3       input Method $ Score;
  4       datalines;
  5  A 78
  6  A 81
  7  A 82
  8  A 82
  9  A 85
 10  A 88
 11  A 88
 12  A 90
 13  B 81
 14  B 83
 15  B 83
 16  B 85
 17  B 86
 18  B 88
 19  B 90
 20  B 91
 21  C 84
 22  C 88
 23  C 88
 24  C 89
 25  C 90
 26  C 93
 27  C 95
 28  C 98
 29  ;
 30  run:
/home/u61070971/Exp3/Program.sas
```

To perform one-way ANOVA:

Next, I used **proc ANOVA** to perform the one-way ANOVA

```
 31
 32  /*perform one-way ANOVA*/
 33  proc ANOVA data=my_data;
 34  class Method;
 35  model Score = Method;
 36  means Method / tukey cldiff;
 37  run:
home/u61070971/Exp3/Program.sas
```

Interpreting the Results

The ANOVA Procedure

Class Level Information

Class	Levels	Values
Method	3	A B C

Number of Observations Read	24
Number of Observations Used	24

The ANOVA Procedure

Dependent Variable: Score

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	175.5833333	87.7916667	5.26	0.0140
Error	21	350.2500000	16.6785714		
Corrected Total	23	525.8333333			

R-Square	Coeff Var	Root MSE	Score Mean
0.333914	4.698685	4.083941	86.91667

| Source	DF	Anova SS	Mean Square	F Value	Pr > F
Method	2	175.5833333	87.7916667	5.26	0.0140

From this table we can see:

- The overall F Value: **5.26**
- The corresponding p-value: **0.0140**

one-way ANOVA uses the following null and alternative hypotheses:

- **H$_0$:** All group means are equal.
- **H$_A$:** At least one group mean is different from the rest.

Since the p-value from the ANOVA table (0.0140) is less than $\alpha = .05$, we reject the null hypothesis.

SAS also provides boxplots to visualize the distribution of exam scores for each of the three studying methods:

Distribution of Score
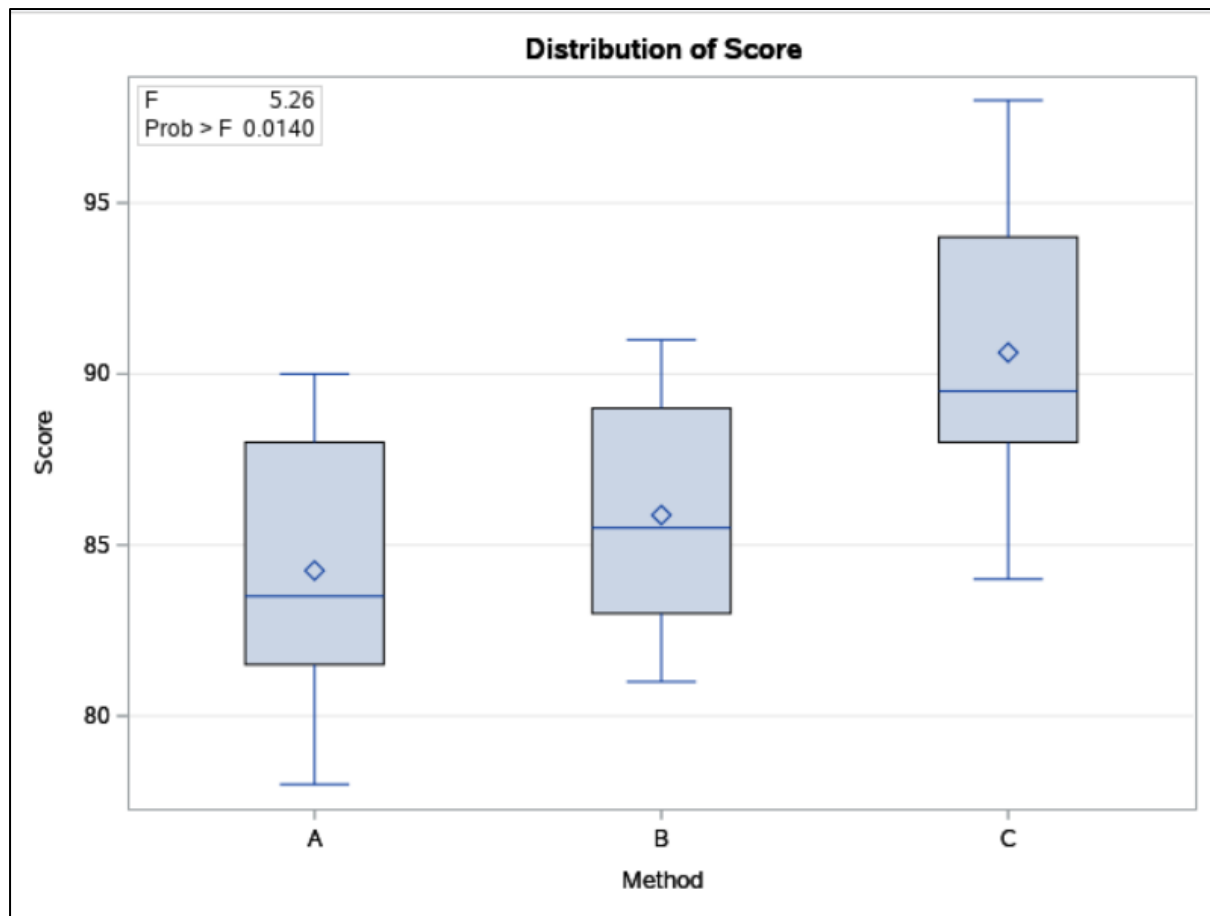
From the boxplots we can see that the exam scores tend to be higher among students who used studying method C compared to methods B and C.

Conclusion:

A one-way ANOVA was performed to compare the effect of three different studying methods on exam scores.

From the above example, from one-way ANOVA we can conclude that there was a statistically significant difference in mean exam score between at least two groups ($F(2, 21) = [5.26]$, $p = 0.014$).