

One-way ANOVA (single-factor ANOVA)

José Maurício Schneedorf Ferreira da Silva

2026-02-10

ANOVA (*Analysis of Variance*) is a widely used statistical procedure across several fields of knowledge when the objective is to assess whether or not there are significant differences among groups tested in an experiment. In this approach, comparisons are based on the measurement of error variability between groups and the variability observed within each group.

ANOVA can be conducted for different types of experimental designs, with the most common being one-way ANOVA (single criterion or factor of variation) and two-way ANOVA (two factors of variation).

The *1ANAVA1matrix* program computes the parameters and *p-value* for a one-way ANOVA, requiring only the input of a data matrix (column vectors).

1 Compressed file

1. Program;
2. Example;
3. Source code;
4. This tutorial

2 Usage and example

```
# Input:
1. Data matrix (column vector);
2. "1ANAVA1matrix"

# Output:
1. sqtr: sum of squares of treatment;
2. sqr: sum of squares of residuals;
```

```
3. qmtr: mean square of treatment;  
4. qmr: mean square of residual;  
5. F: value of Snedecor's F distribution;  
6. p: p-value;  
7. R2: coefficient of determination.
```

The compressed file includes an example of results from a randomized experiment (Vieira, 2000, p. 39).

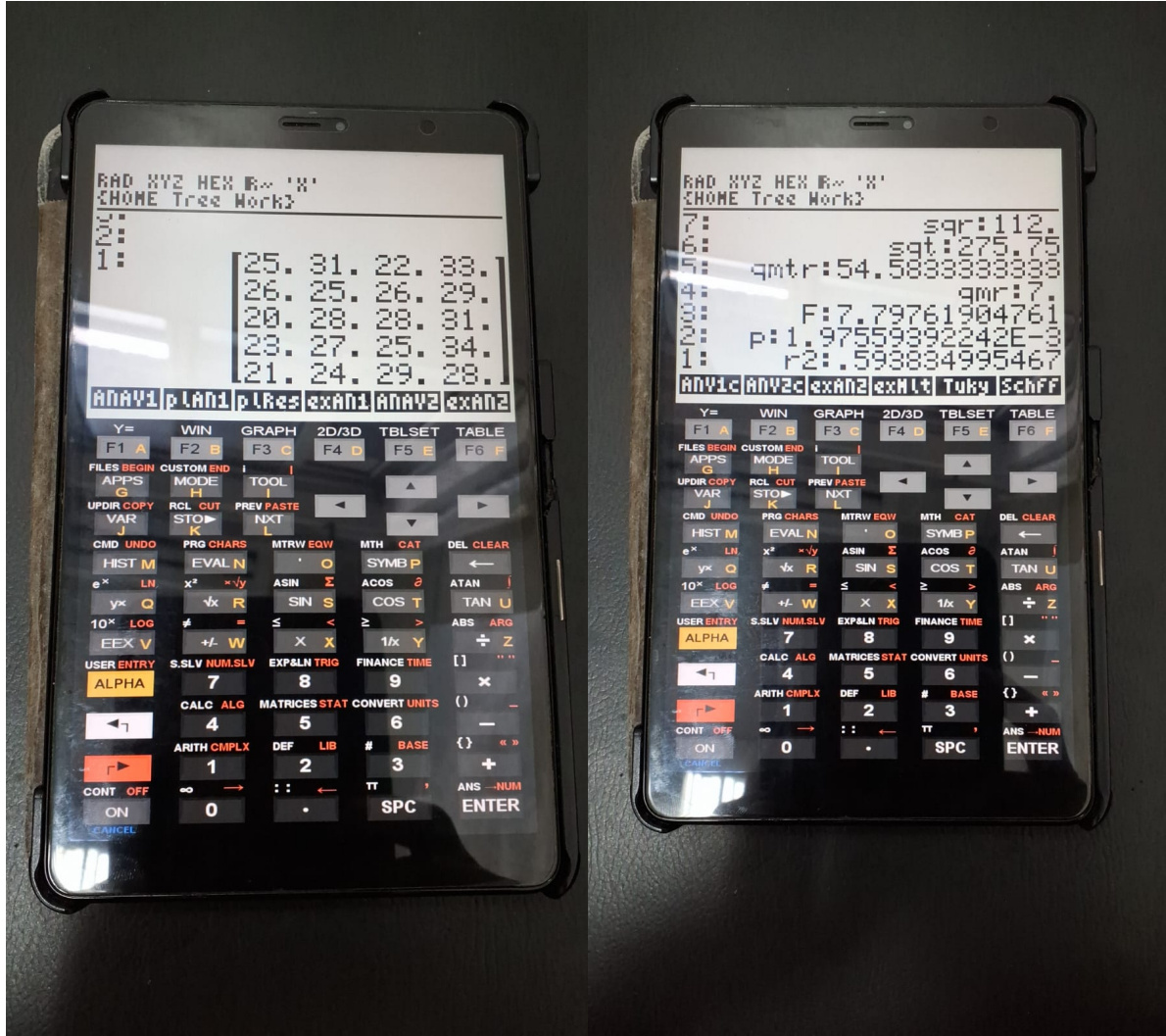
The results obtained are consistent with those reported in the reference (Vieira, 2000).

3 References:

1. Vieira, Sônia. *Analysis of Variance: ANOVA*. Atlas Publishing, 2000.

Author

José Maurício Schneedorf Ferreira da Silva
Dept. Biochemistry, Institute of Biomedical Sciences
Federal University of Alfenas - UNIFAL-MG, Brazil
Email: jose.dasilva@unifal-mg.edu.br
Lattes: <http://lattes.cnpq.br/0436922594542722>
ORCID: 0000-0002-2031-6315



(a) Insertion of data matrix.

(b) ANOVA results obtained.

Figure 1: *1ANAVA1matrix* program running on the Android version of the HP50G calculator (Go49gp), showing data input and the results for the example.