

Multiple Comparisons by Fisher's LSD Test

José Maurício Schneedorf Ferreira da Silva

2026-02-13

Fisher's LSD (*Least Significant Difference*) test is a *post-hoc* procedure for multiple comparisons of paired treatment means based on Student's t distribution. A pairwise absolute difference between treatments is considered significant whenever it exceeds the critical LSD value (called *DMS* in Portuguese).

1 Equation:

$$LSD = t_{(\alpha, df)} \sqrt{\frac{2 \cdot qmr}{r}}$$

Where

- LSD = least significant difference (minimum significant difference);
- k = number of groups (with degrees of freedom for treatments ($df_{\{tr\}} = k - 1$));
- r = number of observations per group;
- qmr = residual mean square;
- t = critical value from Student's t distribution.

2 Files:

1. Program
2. one-way ANAVA
3. Source code
4. This tutorial

3 Usage and example

```
# Input:
1. Data matrix containing the dataset;
2. Run the program "1ANAVA1matrix" from the main page ("hp50");
3. Run the program "Fish1matrix".

# Output:
1. "lsd" - least significant difference value;
2. Matrix containing comparison values for each pair of groups.
```

Pairwise comparisons are automated in the program. Pairs are considered significantly different when:

$$\Delta AB > LSD$$

The results are identical to those reported in the reference source (Vieira, 2000, p. 69).

4 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 Alenas - UNIFAL-MG, Brazil
Email: jose.dasilva@unifal-mg.edu.br

Site: <https://bioquanti.netlify.app>
Lattes: <http://lattes.cnpq.br/0436922594542722>
ORCID: 0000-0002-2031-6315

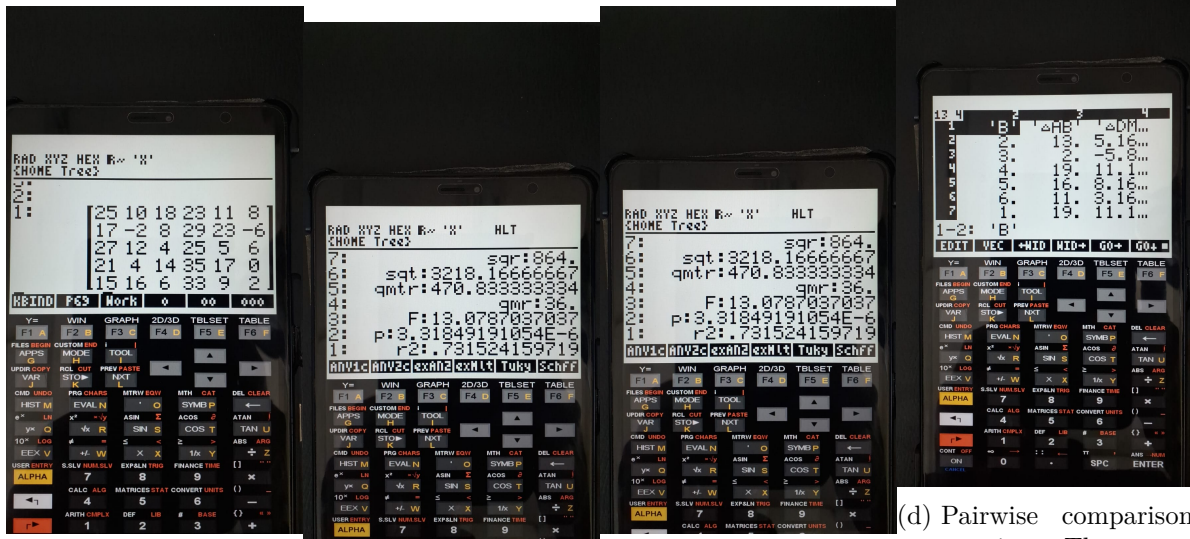


Figure 1: *Fish1matrix* program running on the Android version of the HP50G calculator (Go49gp), showing data input, ANOVA output, Fisher's LSD results, and the pairwise comparison worksheet. The matrix contains columns A , B , values of ΔAB , and the corresponding LSD thresholds.