

Multiple Comparisons by the Student–Newman–Keuls Test

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The Student–Newman–Keuls (*SNK*) test is a *post-hoc* procedure similar to Tukey’s test, based on the same studentized range distribution. However, it is more conservative in detecting statistically significant differences (i.e., it rejects the null hypothesis less frequently).

1 Equation:

$$dm = q_{\alpha,k,gl} \sqrt{\frac{qmr}{r}}$$

Where

dm = critical difference

gl = degrees of freedom of the sample ($n - k$);

k = number of groups;

r = number of observations per group;

qmr = mean square of residuals;

q = studentized range statistic (critical q value).

The SNK procedure differs from Tukey’s test by applying an ordered ranking of the group means (ascending order in the present program) and performing specific pairwise comparisons according to that ranking. As with Tukey’s test (and other *post-hoc* procedures), SNK is performed after an ANOVA.

2 Files:

1. Program
2. one-way ANOVA
3. Critical q table (HP50 and PDF)
4. Source code
5. This tutorial

3 Usage and example

```
# Input:
1. Enter the data matrix (column vectors);
2. Run the program "1ANAVA1matrix" from the main page ("hp50");
3. Run the program "SNK1matrix".

# Output:
1. "qcrit5%" - critical value of the q distribution;
2. "dm" - minimum significant difference;
3. Matrix containing comparison values for each pair of groups.
```

Pairs are considered significantly different when:

$$\Delta AB > dm$$

The results match those reported in the reference source, considering the ranking of treatments (Vieira, 2016).

4 References:

1. Vieira, Sônia. 2016. [Blospot](#). Accessed Feb 12, 2026.



Figure 1: *SNK1matrix* program running on the Android version of the HP50G calculator (Go49gp), showing data input, ANOVA output, SNK results, and the pairwise comparison worksheet. The matrix contains columns for A , B , values of ΔAB , and corresponding comparison thresholds.

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