

H_0	Rejection Condition
$\mu_1 = \mu_2$	$ t \geq Tc(\alpha, v)$
$\mu_1 > \mu_2$	$t \leq Tc(\alpha, v)$
$\mu_1 < \mu_2$	$t \geq Tc(\alpha, v)$

Tc is the critical value and v is the effective number of degrees of freedom (see /DFM flag). When accounting for possibly unequal variances, v is given by

$$v = \frac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2} \right)^2}{\frac{\left(\frac{s_1^2}{n_1} \right)^2}{n_1 - 1} + \frac{\left(\frac{s_2^2}{n_2} \right)^2}{n_2 - 1}}.$$

The critical values (Tc) are computed by numerically solving for the argument at which the cumulative distribution function (CDF) equals the appropriate values for the tests. The CDF is given by

$$F(x) = \begin{cases} \frac{1}{2} betai\left(\frac{v}{2}, \frac{1}{2}, \frac{v}{v+x^2}\right) & x < 0 \\ 1 - \frac{1}{2} betai\left(\frac{v}{2}, \frac{1}{2}, \frac{v}{v+x^2}\right) & x \geq 0. \end{cases}$$

To get the critical value for the upper one-tail test we solve $F(x)=1-\alpha$. For the lower one-tail test we solve for x the equation $F(x)=\alpha$. In the two-tailed test the lower critical value is a solution for $F(x)=\alpha/2$ and the upper critical value is a solution for $F(x)=1-\alpha/2$.

The T-test assumes both samples are randomly taken from normal population distributions.

See Also

Chapter III-12, **Statistics** for a function and operation overview; **StatsStudentCDF**, **StatsStudentPDF**, and **StatsInvStudentCDF**.

References

Zar, J.H., *Biostatistical Analysis*, 4th ed., 929 pp., Prentice Hall, Englewood Cliffs, New Jersey, 1999. See in particular Section 8.1.

StatsTukeyTest

StatsTukeyTest [flags] [wave1, wave2, ... wave100]

The StatsTukeyTest operation performs multiple comparison Tukey (HSD) test and optionally the Newman-Keuls test. Output is to the M_TukeyTestResults wave in the current data folder. StatsTukeyTest usually follows **StatsANOVA1Test**.

Flags

- | | |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| /ALPH = val | Sets the significance level (default $val=0.05$). |
| /NK | Computes the Newman-Keuls test. |
| /Q | No results printed in the history area. |
| /SWN | Creates a text wave, T_TukeyDescriptors, containing wave names corresponding to each row of the comparison table (Save Wave Names). Use /T to append the text wave to the last column. |