

# Computing the exact distribution of selected test statistics in multivariate analysis

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## Abstract

As suggested in [1] and [2], the exact null and/or null-distribution of the most common likelihood ratio based test statistics in multivariate analysis can be expressed by their characteristic functions. Typically, such distributions are approximated by the standard asymptotic chi-square approximation. The small sample approximations based on first moments/cumulants include the Edgeworth or Gram-Charlier expansions about the known distribution. In specific situations the more sophisticated approximations can be used, such as the near-exact distributions suggested by Carlos A. Coelho and his co-authors. For most applications, the method based on numerical inversion of the characteristic functions is sufficient. Applicability of such approach is illustrated and compared by computing the exact null and non-null distributions of selected test statistics used in multivariate hypothesis testing, [3].

## Keywords

Characteristic function, Numerical inversion, Exact distribution.

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## References

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