NASA TECH BRIEF

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Computer Program Determines

Exact Two-Sided Tolerance Limits for Normal Distributions

To meet the need for obtaining the exact statistical tolerance limits for the two-sided case in which, with given probability, the proportion between the limits is at least a specified number, a computer program has been designed which makes this determination by numerical integration.

The program is limited to situations in which the underlying probability distribution for the population sampled is the normal distribution with unknown mean and variance.

Given the limits, L and U, the program evaluates the exact probability that they will include at least a proportion, p, of the population for a given value of the tolerance factor, k. Newton–Raphson iteration is used to converge on the value of k associated with the desired probability, γ.

For each desired probability, the program generates a table of k's associated with the varying values of p and sample size.

Notes:

1. This program is written in Fortran H for use on the IBM 360 computer.

2. This program can be used by mathematicians and statisticians who are interested in generating exact two-sided tolerance limits for normal distributions. Accuracy for small sample sizes is greater than that attained through the approximate formulas of Wald and Wolfowitz.

3. Inquiries concerning this program may be made to:
   COSMIC
   Computer Center
   University of Georgia
   Athens, Georgia 30601
   Reference: B68-10158

Patent status:

No patent action is contemplated by NASA.

Source: S. R. Webb and H. A. Friedman
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