1 Program p2t

1.1 Purpose

Calculation of tail probabilities for various probability distributions.

1.2 Note

This program has been superseded by program cdf.

1.3 Usage

Usage #1: p2t p dof

p	=	double sided tail probability for t-distribution
dof	=	number of degrees of freedom to use
OUTPUT	=	t value that matches the input p

Usage #2: p2t p N L M

p	=	double sided tail probability of beta distribution
N	=	number of measured data points
L	=	number of nuisance parameters (orts)
M	=	number of fit parameters
OUTPUT	=	threshold for correlation coefficient

Usage #3: p2t p

p	=	one sided tail probability of Gaussian distribution
OUTPUT	=	z value for which P(x>z) = p

Usage #4: p2t p dof N

p	=	double sided tail probability for distribution of the mean of N iid zero-mean t-variables
dof	=	number of degrees of freedom of each t-variable
N	=	number of t variables averaged
OUTPUT	=	threshold for the t average statistic

> **N.B.:** The method used for this calculation is the Cornish-Fisher expansion in N, and is only an approximation. This also requires dof > 6, and the results will be less accurate as dof approaches 6 from above!

1.4 Examples

Example 1.

To calculate the t value which corresponds to a double sided tail probability of 0.05, when there are 10 degrees of freedom, the command is:

p2t .05 10

and the computer response is:

p=0.05 dof=10 t=2.22814

Thus, t=2.22814 yields a double sided tail probability of 0.05, when there are 10 df.

Example 2.

To find the z-value for which the one sided tail probability of the Gaussian distribution is 0.05, use the following command line:

p2t .05

to which the computer responds with:

p=0.05 z=1.64485

Therefore, under the Gaussian distribution, $P(x > 1.64485) = 0.05$.