NAG C Library Function Document

nag_prob_landau (g01etc)

1 Purpose

nag_prob_landau (g01etc) returns the value of the Landau distribution function \( \Phi(\lambda) \).

2 Specification

double nag_prob_landau (double x)

3 Description

nag_prob_landau (g01etc) evaluates an approximation to the Landau distribution function \( \Phi(\lambda) \) given by

\[
\Phi(\lambda) = \int_{-\infty}^{\lambda} \phi(\lambda')d\lambda',
\]

where \( \phi(\lambda) \) is described in nag_prob_density_landau (g01mtc), using piecewise approximation by rational functions. Further details can be found in Kölblig and Schorr (1984).

4 References


5 Parameters

1:  x – double

   On entry: the argument \( \lambda \) of the function.

6 Error Indicators and Warnings

None.

7 Accuracy

At least 7 significant digits are usually correct, but occasionally only 6. Such accuracy is normally considered to be adequate for applications in experimental physics.

Because of the asymptotic behaviour of \( \Phi(\lambda) \), which is of the order of \( \exp[-\exp(-\lambda)] \), underflow may occur on some machines when \( \lambda \) is moderately large and negative.

8 Further Comments

None.

9 Example

The example program evaluates \( \Phi(\lambda) \) at \( \lambda = 0.5 \), and prints the results.
9.1 Program Text

/* nag_prob_landau (g01etc) Example Program. 
 * Copyright 2002 Numerical Algorithms Group. 
 * Mark 7, 2002. 
 */

#include <stdio.h>
#include <nag.h>
#include <nag_stdlib.h>
#include <nagg01.h>

int main(void)
{
    /* Scalars */
    double x, y;
    Integer exit_status;
    exit_status = 0;
    Vprintf(" g01etc Example Program Results\n");

    /* Skip heading in data file */
    Vscanf("%*[\n ] ");
    Vscanf("%lf%*[\n ] ", &x);
    y = g01etc(x);
    Vprintf("\n X Y\n\n");
    Vprintf(" %3.1f %12.4e\n", x, y);
    return exit_status;
}

9.2 Program Data

g01etc Example Program Data
0.5 : Value of X

9.3 Program Results

g01etc Example Program Results

 X       Y
0.5 3.7328e-01