NAG 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

```c
#include <nag.h>
#include <nagg01.h>
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 Kölbig and Schorr (1984).

4 References


5 Arguments

1:  x  – double

   On entry: the argument $\lambda$ of the function.

6 Error Indicators and Warnings

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 Parallelism and Performance

Not applicable.

9 Further Comments

None.
10 Example

This example evaluates \( \Phi(\lambda) \) at \( \lambda = 0.5 \), and prints the results.

10.1 Program Text

```c
#include <stdio.h>
#include <nag.h>
#include <nag_stdlib.h>
#include <nag_g01.h>

int main(void)
{
    /* Scalars */
    double x, y;
    Integer exit_status = 0;
    printf(" nag_prob_landau (g01etc) Example Program Results\n");
    /* Skip heading in data file */
    #ifdef _WIN32
        scanf_s("%*
");
    #else
        scanf("%*
");
    #endif
    #ifdef _WIN32
        scanf_s("%lf%*
", &x);
    #else
        scanf("%lf%*
", &x);
    #endif
    /* nag_prob_landau (g01etc).
    * Landau distribution function Phi(lambda )
    */
    y = nag_prob_landau(x);
    printf("\n X Y\n
%3.1f %13.4e
");
    return exit_status;
}
```

10.2 Program Data

```
nag_prob_landau (g01etc) Example Program Data
0.5 : Value of X
```

10.3 Program Results

```
nag_prob_landau (g01etc) Example Program Results

 X   Y
0.5 3.7328e-01
```