NAG Toolbox

nag_stat_inv_cdf_landau (g01ft)

1 Purpose

nag_stat_inv_cdf_landau (g01ft) returns the value of the inverse $\Phi^{-1}(x)$ of the Landau distribution function.

2 Syntax

```
[result, ifail] = nag_stat_inv_cdf_landau(x)
[result, ifail] = g01ft(x)
```

3 Description

nag_stat_inv_cdf_landau (g01ft) evaluates an approximation to the inverse $\Phi^{-1}(x)$ of the Landau distribution function given by

$$\Psi(x) = \Phi^{-1}(x)$$

(where $\Phi(\lambda)$ is described in nag_stat_prob_landau (g01et) and nag_stat_pdf_landau (g01mt)), using either linear or quadratic interpolation or rational approximations which mimic the asymptotic behaviour. Further details can be found in KÎlbig and Schorr (1984).

It can also be used to generate Landau distributed random numbers in the range $0 < x < 1$.

4 References

KÎlbig K S and Schorr B (1984) A program package for the Landau distribution *Comp. Phys. Comm.* **31** 97–111

5 Parameters

5.1 Compulsory Input Parameters

1: **x** – REAL (KIND=nag_wp)

The argument x of the function.

Constraint: $0.0 < \mathbf{x} < 1.0$.

5.2 Optional Input Parameters

None.

5.3 Output Parameters

1: **result**

The result of the function.

2: **ifail** – INTEGER

ifail $= 0$ unless the function detects an error (see Section 5).

6 Error Indicators and Warnings

Errors or warnings detected by the function:

ifail $= 1$

On entry, $\mathbf{x} \leq 0.0$,
or $\mathbf{x} \geq 1.0$.

ifail $= -99$

An unexpected error has been triggered by this routine. Please contact NAG.

ifail $= -399$

Your licence key may have expired or may not have been installed correctly.

ifail $= -999$

Dynamic memory allocation failed.

7 Accuracy

At least $5 - 6$ significant digits are correct. Such accuracy is normally considered to be adequate for applications in large scale Monte–Carlo simulations.

8 Further Comments

None.

9 Example

This example evaluates $\Phi^{-1}(x)$ at $x = 0.5$, and prints the results.

9.1 Program Text

```
function g01ft_example

fprintf('g01ft example results\n\n');

x = 0.5;
[psix, ifail] = g01ft(x);

fprintf('Psi(%5.1f) = %7.4f\n', x, psix)
```

9.2 Program Results

```
g01ft example results

Psi(  0.5) =  1.3558
```