**Purpose**
nag_prob_der_landau (g01rtc) returns the value of the derivative \( \phi'(\lambda) \) of the Landau density function.

**Specification**

```c
double nag_prob_der_landau (double x)
```

**Description**
nag_prob_der_landau (g01rtc) evaluates an approximation to the derivative \( \phi'(\lambda) \) of the Landau density function given by

\[
\phi'(\lambda) = \frac{d\phi(\lambda)}{d\lambda},
\]

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

To obtain the value of \( \phi(\lambda) \), nag_prob_density_landau (g01mtc) can be used.

**References**


**Parameters**

1: \( x \) – double

*Input*

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

**Error Indicators and Warnings**

None.

**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.

**Further Comments**

None.

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

/* nag_prob_der_landau (g01rtc) 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(" g01rtc Example Program Results\n");

  /* Skip heading in data file */
  Vscanf("%*[\n] ");

  Vscanf("%lf%*[\n] ", &x);
  y = g01rtc(x);

  Vprintf(" X Y
0.5 \ -3.6034e-02
return exit_status;
}

9.2 Program Data

g01rtc Example Program Data

0.5 : Value of X

9.3 Program Results

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>-3.6034e-02</td>
</tr>
</tbody>
</table>
