1 Purpose
nag_moment_2_landau (g01qtc) returns the value of the second moment \( \Phi_2(x) \) of the Landau density function.

2 Specification
#include <nag.h>
#include <nagg01.h>
double nag_moment_2_landau (double x)

3 Description
nag_moment_2_landau (g01qtc) evaluates an approximation to the second moment \( \Phi_2(x) \) of the Landau density function given by
\[
\Phi_2(x) = \frac{1}{\Phi(x)} \int_{-\infty}^{x} \lambda^2 \phi(\lambda) \, d\lambda,
\]
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).

To obtain the value of \( \Phi_1(x) \), nag_moment_1_landau (g01ptc) can be used.

4 References

5 Arguments
1: \( x \) – double

On entry: the argument \( x \) 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.

8 Parallelism and Performance
Not applicable.

9 Further Comments
None.
10 Example

This example evaluates $\phi_2(x)$ at $x = 0.5$, and prints the results.

10.1 Program Text

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

int main(void)
{
    /* Scalars */
    Integer exit_status = 0;
    double x, y;

    printf(" nag_moment_2_landau (g01qtc) Example Program Results\n");

    /* Skip heading in data file */
    #ifdef _WIN32
    scanf_s("%*[
    ");
    #else
    scanf("%*[\n ");
    #endif

    #ifdef _WIN32
    scanf_s("%lf%*[\n ", &x);
    #else
    scanf("%lf%*[\n ", &x);
    #endif

    /* nag_moment_2_landau (g01qtc).
    * Landau second moment function Phi_2(x) */
    y = nag_moment_2_landau(x);

    printf("\n X Y\n\n");
    printf(" %3.1f %13.4e\n", x, y);
    return exit_status;
}
```

10.2 Program Data

nag_moment_2_landau (g01qtc) Example Program Data

0.5 : Value of X

10.3 Program Results

nag_moment_2_landau (g01qtc) Example Program Results

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>9.0868e-01</td>
</tr>
</tbody>
</table>