nag_erf (s15aec)

1. Purpose

nag_erf (s15aec) returns the value of the error function, $\mathrm{erf}\, x$.

2. Specification

```
#include <nag.h>
#include <nags.h>

double nag_erf(double x)
```

3. Description

The function evaluates

$$\mathrm{erf}\, x = \frac{2}{\sqrt{\pi}} \int_0^x e^{-t^2} dt.$$

The approximation is based on Chebyshev expansions.

4. Parameters

x
Input: the argument x of the function.

5. Error Indications and Warnings

None.

6. Further Comments

6.1. Accuracy

On a machine with approximately 11 significant figures the function agrees with available tables to 10 figures and consistency checking with nag_erfc (s15adc) of the relation $\mathrm{erf}\, x + \mathrm{erfc}\, x = 1.0$ shows errors in at worst the 11th figure.

6.2. References

Abramowitz M and Stegun I A (1968) *Handbook of Mathematical Functions* Dover Publications, New York ch 7.1 p 297.

7. See Also

nag_erfc (s15adc)

8. Example

The following program reads values of the argument x from a file, evaluates the function at each value of x and prints the results.

8.1. Program Text

```
/* nag_erf(s15aec) Example Program
 *
 * Copyright 1990 Numerical Algorithms Group.
 *
 * Mark 1, 1990.
 */

#include <nag.h>
#include <stdio.h>
```

```
#include <nag_stdlib.h>
#include <nags.h>

main()
{
  double x, y;

  /* Skip heading in data file */
  Vscanf("%*[^\n]");
  Vprintf("s15aec Example Program Results\n");
  Vprintf("     x           y\n");
  while (scanf("%lf", &x) != EOF)
    {
      y = s15aec(x);
      Vprintf("%12.3e%12.3e\n", x, y);
    }
  exit(EXIT_SUCCESS);
}
```

8.2. Program Data

```
s15aec Example Program Data
            -6.0
            -4.5
            -1.0
             1.0
             4.5
             6.0
```

8.3. Program Results

```
s15aec Example Program Results
     x           y
  -6.000e+00  -1.000e+00
  -4.500e+00  -1.000e+00
  -1.000e+00  -8.427e-01
   1.000e+00   8.427e-01
   4.500e+00   1.000e+00
   6.000e+00   1.000e+00
```