

## nag\_erf (s15aec)

### 1. Purpose

**nag\_erf (s15aec)** returns the value of the error function,  $\text{erf } x$ .

### 2. Specification

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

double nag_erf(double x)
```

### 3. Description

The function evaluates

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

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  $\text{erf } x + \text{erfc } x = 1.0$  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
```

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