Author(s) : G.A. Erskine
Submitter : K.S. Kölbig
Language : Fortran

Library: MATHLIB
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Normal Frequency Function

Function subprograms `FREQ` and `DFREQ` compute the normal frequency function

$$\mathrm{freq}(x) \;=\; \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{x} e^{-\frac{1}{2}t^2}\, dt,$$

defined for all values of the real argument x.
On CDC and Cray computers, the double-precision version `DFREQ` is not available.

Structure:

`FUNCTION` subprograms
User Entry Names: `FREQ`, `DFREQ`

Usage:

In any arithmetic expression,

`FREQ(X)` or `DFREQ(X)` has the value freq(`X`),

where `FREQ` is of type `REAL`, `DFREQ` is of type `DOUBLE PRECISION`, and `X` has the same type as the function name.

Method:

Computation by rational Chebyshev approximation for the error function, using the formula

$$\mathrm{freq}(x) \;=\; \begin{cases} \frac{1}{2} + \frac{1}{2}\,\mathrm{erf}\,(x/\sqrt{2}) & (x \geq 0), \\ \frac{1}{2}\,\mathrm{erfc}\,(|x|/\sqrt{2}) & (x < 0). \end{cases}$$

Accuracy:

`FREQ` has full single-precision accuracy (slightly less on CDC and Cray computers). `DFREQ` has an accuracy of 15 significant digits.

References:

1. W.J. Cody, Rational Chebyshev approximations for the error function, Math. Comp. **22** (1969) 631–637.

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