

NAME

dpsi – Double-precision psi(x)

SYNOPSIS

Fortran (77, 90, 95, HPF):

```
f77 [ flags ] file(s) ... -L/usr/local/lib -lgjl
```

DOUBLE PRECISION FUNCTION dpsi(x)

DOUBLE PRECISION x

C (K&R, 89, 99), C++ (98):

```
cc [ flags ] -I/usr/local/include file(s) ... -L/usr/local/lib -lgjl
```

Use

```
#include <gampsi.h>
```

to get this prototype:

```
fortran_double_precision dpsi(const fortran_double_precision * x_);
```

NB: The definition of C/C++ data types **fortran_**xxx, and the mapping of Fortran external names to C/C++ external names, is handled by the C/C++ header file. That way, the same function or subroutine name can be used in C, C++, and Fortran code, independent of compiler conventions for mangling of external names in these programming languages.

Last code modification: 03-Aug-2000

DESCRIPTION

Compute and return the value of the psi(x) function for double-precision x.

The psi(x) function is the logarithmic derivative of the Gamma(x) function:

$$\text{psi}(x) = d/dx (\text{Gamma}(x)) / \text{Gamma}(x) = d/dx (\ln \text{Gamma}(x))$$

This code correctly handles the case where x is NaN, for which psi(NaN) is a NaN, and the case where x is sufficiently large and positive, or takes one of the integer values 0, -1, -2, -3, ..., for which psi(x) = +Infinity, a special value in IEEE 754 arithmetic.

This code is derived from code given by

W. J. Cody

Algorithm 715: SPECFUN --- A Portable FORTRAN

Package of Special Function Routines and Test Drivers

ACM Trans. Math. Software 19(1) 22--32, March 1993.

but has been augmented for support of IEEE 754 arithmetic.

SEE ALSO

dgamma(3), dpsiln(3), gamma(3), psi(3), psiln(3), qgamma(3), qpsi(3), qpsiln(3).

AUTHORS

The algorithms and code are described in detail in the paper

Algorithm xxx: Quadruple-Precision Gamma(x) and psi(x) Functions for Real Arguments

in ACM Transactions on Mathematical Software, Volume ??, Number ??, Pages ???--??? and ???--???, 2001, by

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