

NAME

cexp, **cexpf**, **cexpl** - complex exponential functions

LIBRARY

Math Library (libm, -lm)

SYNOPSIS

#include <complex.h>

double complex

cexp(*double complex z*);

float complex

cexpf(*float complex z*);

long double complex

cexpl(*long double complex z*);

DESCRIPTION

The **cexp**(), **cexpf**(), and **cexpl**() functions compute the complex exponential of z , also known as $\text{cis}(z)$.

RETURN VALUES

For real numbers x and y , **cexp**() behaves according to Euler's formula:

$$\mathbf{cexp}(x + I*y) = (\mathbf{e}^{**x} * \cos(y)) + (\mathbf{I} * \mathbf{e}^{**x} * \sin(y))$$

Generally speaking, infinities, zeroes and NaNs are handled as would be expected from this identity given the usual rules of floating-point arithmetic. However, care is taken to avoid generating NaNs when they are not deserved. For example, mathematically we expect that $\mathbf{cimag}(\mathbf{cexp}(x + I*0)) = 0$ regardless of the value of x , and **cexp**() preserves this identity even if x is infinity or NaN. Likewise, $\mathbf{cexp}(-\text{infinity} + I*y) = 0$ and $\mathbf{creal}(\mathbf{cexp}(\text{infinity} + I*y)) = \text{infinity}$ for any y (even though the latter property is only mathematically true for representable y .) If y is not finite, the sign of the result is indeterminate.

SEE ALSO

complex(3), exp(3), math(3)

STANDARDS

The **cexp**(), **cexpf**(), and **cexpl**() functions conform to ISO/IEC 9899:1999 ("ISO C99").