

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 *cis*(*z*).

RETURN VALUES

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

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

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 **cimag**(**cexp**(*x* + *I*0*)) = 0 regardless of the value of *x*, and **cexp**() preserves this identity even if *x* is infinity or NaN. Likewise, **cexp**(-infinity + *I*y*) = 0 and **creal**(**cexp**(infinity + *I*y*)) = 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").