

NAME

cacosh, cacoshf, cacoshl – complex arc hyperbolic cosine

LIBRARY

Math library (*libm*, *-lm*)

SYNOPSIS

```
#include <complex.h>
```

```
double complex cacosh(double complex z);
```

```
float complex cacoshf(float complex z);
```

```
long double complex cacoshl(long double complex z);
```

DESCRIPTION

These functions calculate the complex arc hyperbolic cosine of z . If $y = \text{cacosh}(z)$, then $z = \text{ccosh}(y)$. The imaginary part of y is chosen in the interval $[-\pi, \pi]$. The real part of y is chosen nonnegative.

One has:

$$\text{cacosh}(z) = 2 * \log(\text{csqrt}((z + 1) / 2) + \text{csqrt}((z - 1) / 2))$$

ATTRIBUTES

For an explanation of the terms used in this section, see [attributes\(7\)](#).

Interface	Attribute	Value
<code>cacosh()</code> , <code>cacoshf()</code> , <code>cacoshl()</code>	Thread safety	MT-Safe

STANDARDS

C11, POSIX.1-2008.

HISTORY

C99, POSIX.1-2001. glibc 2.1.

EXAMPLES

```
/* Link with "-lm" */

#include <complex.h>
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>

int
main(int argc, char *argv[])
{
    double complex z, c, f;

    if (argc != 3) {
        fprintf(stderr, "Usage: %s <real> <imag>\n", argv[0]);
        exit(EXIT_FAILURE);
    }

    z = atof(argv[1]) + atof(argv[2]) * I;

    c = cacosh(z);
    printf("cacosh() = %6.3f %6.3f*i\n", creal(c), cimag(c));

    f = 2 * clog(csqrt((z + 1)/2) + csqrt((z - 1)/2));
    printf("formula = %6.3f %6.3f*i\n", creal(f), cimag(f));

    exit(EXIT_SUCCESS);
}
```

SEE ALSO**acosh(3), cabs(3), ccosh(3), cimag(3), complex(7)**