NAME

complex − basics of complex mathematics

SYNOPSIS

#include <complex.h>

DESCRIPTION

Complex numbers are numbers of the form z = a+b*i, where a and b are real numbers and i = sqrt(−1), so that i*i = −1.

There are other ways to represent that number. The pair (a,b) of real numbers may be viewed as a point in the plane, given by X- and Y-coordinates. This same point may also be described by giving the pair of real numbers (r,phi), where r is the distance to the origin O, and phi the angle between the X-axis and the line Oz. Now z = r*exp(i*phi) = r*(cos(phi)+i*sin(phi)).

The basic operations are defined on z = a+b*i and w = c+d*i as:

addition: z+w = (a+c) + (b+d)*i

multiplication: z*w = (a*c − b*d) + (a*d + b*c)*i

division: z/w = ((a*c + b*d)/(c*c + d*d)) + ((b*c − a*d)/(c*c + d*d))*i

Nearly all math function have a complex counterpart but there are some complex-only functions.

EXAMPLE

Your C-compiler can work with complex numbers if it supports the C99 standard. Link with *−lm*. The imaginary unit is represented by I.

```
/* check that exp(i * pi) == −1 */
#include <math.h>       /* for atan */
#include <stdio.h>
#include <complex.h>

int
main(void)
{
   double pi = 4 * atan(1.0);
   double complex z = cexp(I * pi);
   printf("%f + %f * i\n", creal(z), cimag(z));
}
```

SEE ALSO

cabs(3), **carg**(3), **cexp**(3), **cimag**(3), **creal**(3)

COLOPHON

This page is part of release 3.22 of the Linux *man-pages* project. A description of the project, and information about reporting bugs, can be found at http://www.kernel.org/doc/man-pages/.