

montecarlo

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Chapter 1

Class Index

1.1 Class List

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Chapter 2

File Index

2.1 File List

Here is a list of all files with brief descriptions:

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Chapter 3

Class Documentation

3.1 Complex Class Reference

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

Public Member Functions

- void `operator+=` (`Complex`)
- void `operator-=` (`Complex`)
- void `operator*=` (`Complex`)
- void `operator/=` (`Complex`)
- void `operator/=` (double)
- `Complex` (double, double)
- `Complex` (double)
- `Complex` ()
- void `operator=` (`Complex`)
- void `operator=` (double)
- `Complex conj` ()
- double `real` ()
- double `imag` ()
- double `abs` ()
- double `arg` ()
- double `norm` ()
- void `print` ()

Public Attributes

- double `r`
- double `i`

Friends

- double `abs` (`Complex`)
- double `arg` (`Complex`)
- `Complex conj` (`Complex`)
- double `real` (`Complex`)
- double `imag` (`Complex`)
- double `norm` (`Complex`)

- [Complex polar](#) (double, double)
- [Complex exp](#) ([Complex](#))
- [Complex log](#) ([Complex](#))
- [Complex pow](#) (double, [Complex](#))
- [Complex pow](#) ([Complex](#), double)
- [Complex root](#) ([Complex](#), double)
- [Complex pow](#) ([Complex](#), [Complex](#))
- [Complex sqrt](#) ([Complex](#))
- [Complex sin](#) ([Complex](#))
- [Complex cos](#) ([Complex](#))
- [Complex sinh](#) ([Complex](#))
- [Complex cosh](#) ([Complex](#))
- [Complex operator-](#) ([Complex](#))
- [bool operator==](#) ([Complex](#), [Complex](#))
- [bool operator!=](#) ([Complex](#), [Complex](#))
- [ostream & operator<<](#) (ostream &, [Complex](#) &)
- [istream & operator>>](#) (istream &, [Complex](#) &)
- [Complex operator+](#) ([Complex](#), [Complex](#))
- [Complex operator-](#) ([Complex](#), [Complex](#))
- [Complex operator*](#) ([Complex](#), [Complex](#))
- [Complex operator/](#) ([Complex](#), [Complex](#))
- [Complex operator/](#) ([Complex](#), double)
- [Complex operator""_i](#) (long double)
- [Complex operator""_i](#) (unsigned long long)

3.1.1 Detailed Description

Definition at line 9 of file `complex.h`.

3.1.2 Constructor & Destructor Documentation

3.1.2.1 `Complex::Complex (double _r, double _i)`

Definition at line 74 of file `complex.h`.

References `i`, and `r`.

3.1.2.2 `Complex::Complex (double _r)`

Definition at line 81 of file `complex.h`.

References `i`, and `r`.

3.1.2.3 `Complex::Complex ()`

Definition at line 88 of file `complex.h`.

References `i`, and `r`.

3.1.3 Member Function Documentation

3.1.3.1 `double Complex::abs ()`

Definition at line 256 of file `complex.h`.

References `i`, `r`, and `sqrt()`.

3.1.3.2 double Complex::arg ()

Definition at line 212 of file complex.h.

References i, and r.

3.1.3.3 Complex Complex::conj ()

Definition at line 201 of file complex.h.

References i, and r.

3.1.3.4 double Complex::imag ()

Definition at line 234 of file complex.h.

References i.

3.1.3.5 double Complex::norm ()

Definition at line 245 of file complex.h.

References i, and r.

3.1.3.6 void Complex::operator*= (Complex rhs)

Definition at line 185 of file complex.h.

3.1.3.7 void Complex::operator+= (Complex rhs)

Definition at line 175 of file complex.h.

3.1.3.8 void Complex::operator-= (Complex rhs)

Definition at line 180 of file complex.h.

3.1.3.9 void Complex::operator/= (Complex rhs)

Definition at line 190 of file complex.h.

3.1.3.10 void Complex::operator/= (double rhs)

Definition at line 195 of file complex.h.

3.1.3.11 void Complex::operator= (Complex rhs)

Definition at line 148 of file complex.h.

References i, i, r, and r.

3.1.3.12 void Complex::operator= (double *r*)

Definition at line 142 of file complex.h.

References *i*, and *r*.

3.1.3.13 void Complex::print ()

Definition at line 333 of file complex.h.

References *i*, and *r*.

3.1.3.14 double Complex::real ()

Definition at line 223 of file complex.h.

References *r*.

3.1.4 Friends And Related Function Documentation

3.1.4.1 double abs (Complex *rhs*) [friend]

Definition at line 260 of file complex.h.

Referenced by `abs()`, `log()`, and `operator/()`.

3.1.4.2 double arg (Complex *rhs*) [friend]

Definition at line 217 of file complex.h.

Referenced by `arg()`, and `log()`.

3.1.4.3 Complex conj (Complex *rhs*) [friend]

Definition at line 206 of file complex.h.

Referenced by `operator/()`.

3.1.4.4 Complex cos (Complex *rhs*) [friend]

Definition at line 327 of file complex.h.

3.1.4.5 Complex cosh (Complex *rhs*) [friend]

Definition at line 317 of file complex.h.

3.1.4.6 Complex exp (Complex *rhs*) [friend]

Definition at line 273 of file complex.h.

3.1.4.7 double imag (Complex *rhs*) [friend]

Definition at line 239 of file complex.h.

3.1.4.8 Complex log (Complex rhs) [friend]

Definition at line 279 of file complex.h.

3.1.4.9 double norm (Complex rhs) [friend]

Definition at line 250 of file complex.h.

Referenced by norm().

3.1.4.10 bool operator!= (Complex a, Complex b) [friend]

Definition at line 167 of file complex.h.

3.1.4.11 Complex operator""i (long double i) [friend]

Definition at line 94 of file complex.h.

3.1.4.12 Complex operator""i (unsigned long long i) [friend]

Definition at line 98 of file complex.h.

3.1.4.13 Complex operator* (Complex a, Complex b) [friend]

Definition at line 123 of file complex.h.

3.1.4.14 Complex operator+ (Complex a, Complex b) [friend]

Definition at line 111 of file complex.h.

3.1.4.15 Complex operator- (Complex rhs) [friend]

Definition at line 154 of file complex.h.

3.1.4.16 Complex operator- (Complex a, Complex b) [friend]

Definition at line 117 of file complex.h.

3.1.4.17 Complex operator/ (Complex a, Complex b) [friend]

Definition at line 129 of file complex.h.

3.1.4.18 Complex operator/ (Complex a, double b) [friend]

Definition at line 136 of file complex.h.

3.1.4.19 ostream& operator<< (ostream & os, Complex & c) [friend]

Definition at line 343 of file complex.h.

3.1.4.20 `bool operator==(Complex a, Complex b) [friend]`

Definition at line 159 of file complex.h.

3.1.4.21 `istream& operator>>(istream &is, Complex &c) [friend]`

Definition at line 353 of file complex.h.

3.1.4.22 `Complex polar(double r, double t) [friend]`

Definition at line 267 of file complex.h.

3.1.4.23 `Complex pow(double a, Complex b) [friend]`

Definition at line 285 of file complex.h.

3.1.4.24 `Complex pow(Complex a, double b) [friend]`

Definition at line 290 of file complex.h.

3.1.4.25 `Complex pow(Complex a, Complex b) [friend]`

Definition at line 295 of file complex.h.

3.1.4.26 `double real(Complex rhs) [friend]`

Definition at line 228 of file complex.h.

3.1.4.27 `Complex root(Complex a, double b) [friend]`

Definition at line 306 of file complex.h.

3.1.4.28 `Complex sin(Complex rhs) [friend]`

Definition at line 322 of file complex.h.

3.1.4.29 `Complex sinh(Complex rhs) [friend]`

Definition at line 312 of file complex.h.

3.1.4.30 `Complex sqrt(Complex rhs) [friend]`

Definition at line 301 of file complex.h.

3.1.5 Member Data Documentation**3.1.5.1** `double Complex::i`

Definition at line 13 of file complex.h.

Referenced by `conj()`, `exp()`, `imag()`, `operator*()`, `operator+()`, `operator-()`, `operator/()`, `operator<<()`, `operator=()`, `operator==()`, and `operator>>()`.

3.1.5.2 double Complex::r

Definition at line 12 of file `complex.h`.

Referenced by `conj()`, `exp()`, `operator*()`, `operator+()`, `operator-()`, `operator/()`, `operator<<()`, `operator=()`, `operator==()`, `operator>>()`, and `real()`.

The documentation for this class was generated from the following file:

- `include/complex.h`

3.2 montecarlo Class Reference

Public Member Functions

- void `Pi_Estamtion` (int)

Public Attributes

- int `Number_of_point`
- int `Count_inCircle` = 0
- vector< `Complex` > `simple_point`
- vector< double > `pi_Approx`
- vector< bool > `inCircle`

3.2.1 Detailed Description

Definition at line 12 of file `main.cpp`.

3.2.2 Member Function Documentation

3.2.2.1 void montecarlo::Pi_Estamtion (int *Number_of_point*)

Definition at line 23 of file `main.cpp`.

References `abs()`, and `i`.

Referenced by `main()`.

3.2.3 Member Data Documentation

3.2.3.1 int montecarlo::Count_inCircle = 0

Definition at line 16 of file `main.cpp`.

3.2.3.2 vector<bool> montecarlo::inCircle

Definition at line 19 of file `main.cpp`.

3.2.3.3 `int montecarlo::Number_of_point`

Definition at line 15 of file main.cpp.

3.2.3.4 `vector<double> montecarlo::pi_Approx`

Definition at line 18 of file main.cpp.

3.2.3.5 `vector<Complex> montecarlo::simple_point`

Definition at line 17 of file main.cpp.

The documentation for this class was generated from the following file:

- [src/main.cpp](#)

Chapter 4

File Documentation

4.1 include/complex.h File Reference

```
#include <iostream>
#include <cmath>
#include <string>
```

Classes

- class [Complex](#)

Functions

- [Complex operator""_i](#) (long double _i)
- [Complex operator""_i](#) (unsigned long long _i)
- [Complex operator+](#) ([Complex](#) a, [Complex](#) b)
- [Complex operator-](#) ([Complex](#) a, [Complex](#) b)
- [Complex operator*](#) ([Complex](#) a, [Complex](#) b)
- [Complex operator/](#) ([Complex](#) a, [Complex](#) b)
- [Complex operator/](#) ([Complex](#) a, double b)
- [Complex operator-](#) ([Complex](#) rhs)
- bool [operator==](#) ([Complex](#) a, [Complex](#) b)
- bool [operator!=](#) ([Complex](#) a, [Complex](#) b)
- [Complex conj](#) ([Complex](#) rhs)
- double [arg](#) ([Complex](#) rhs)
- double [real](#) ([Complex](#) rhs)
- double [imag](#) ([Complex](#) rhs)
- double [norm](#) ([Complex](#) rhs)
- double [abs](#) ([Complex](#) rhs)
- [Complex polar](#) (double r, double t)
- [Complex exp](#) ([Complex](#) rhs)
- [Complex log](#) ([Complex](#) rhs)
- [Complex pow](#) (double a, [Complex](#) b)
- [Complex pow](#) ([Complex](#) a, double b)
- [Complex pow](#) ([Complex](#) a, [Complex](#) b)
- [Complex sqrt](#) ([Complex](#) rhs)
- [Complex root](#) ([Complex](#) a, double b)
- [Complex sinh](#) ([Complex](#) rhs)

- [Complex cosh](#) ([Complex](#) rhs)
- [Complex sin](#) ([Complex](#) rhs)
- [Complex cos](#) ([Complex](#) rhs)
- ostream & [operator<<](#) (ostream &os, [Complex](#) &c)
- istream & [operator>>](#) (istream &is, [Complex](#) &c)

4.1.1 Function Documentation

4.1.1.1 double abs ([Complex](#) rhs)

Definition at line 260 of file complex.h.

References [Complex::abs](#).

Referenced by [operator<<\(\)](#), and [montecarlo::Pi_Estamtion\(\)](#).

4.1.1.2 double arg ([Complex](#) rhs)

Definition at line 217 of file complex.h.

References [Complex::arg](#).

4.1.1.3 [Complex](#) conj ([Complex](#) rhs)

Definition at line 206 of file complex.h.

References [Complex::i](#), and [Complex::r](#).

4.1.1.4 [Complex](#) cos ([Complex](#) rhs)

Definition at line 327 of file complex.h.

References [cosh\(\)](#).

Referenced by [exp\(\)](#), and [polar\(\)](#).

4.1.1.5 [Complex](#) cosh ([Complex](#) rhs)

Definition at line 317 of file complex.h.

References [exp\(\)](#).

Referenced by [cos\(\)](#).

4.1.1.6 [Complex](#) exp ([Complex](#) rhs)

Definition at line 273 of file complex.h.

References [cos\(\)](#), [Complex::i](#), [Complex::r](#), and [sin\(\)](#).

Referenced by [cosh\(\)](#), [pow\(\)](#), and [sinh\(\)](#).

4.1.1.7 double imag ([Complex](#) rhs)

Definition at line 239 of file complex.h.

References [Complex::i](#).

4.1.1.8 **Complex log (Complex rhs)**

Definition at line 279 of file complex.h.

References `Complex::abs`, and `Complex::arg`.

Referenced by `pow()`.

4.1.1.9 **double norm (Complex rhs)**

Definition at line 250 of file complex.h.

References `Complex::norm`.

4.1.1.10 **bool operator!= (Complex a, Complex b)**

Definition at line 167 of file complex.h.

4.1.1.11 **Complex operator""_i (long double _i)**

Definition at line 94 of file complex.h.

4.1.1.12 **Complex operator""_i (unsigned long long _i)**

Definition at line 98 of file complex.h.

4.1.1.13 **Complex operator* (Complex a, Complex b)**

Definition at line 123 of file complex.h.

References `Complex::i`, and `Complex::r`.

4.1.1.14 **Complex operator+ (Complex a, Complex b)**

Definition at line 111 of file complex.h.

References `Complex::i`, and `Complex::r`.

4.1.1.15 **Complex operator- (Complex a, Complex b)**

Definition at line 117 of file complex.h.

References `Complex::i`, and `Complex::r`.

4.1.1.16 **Complex operator- (Complex rhs)**

Definition at line 154 of file complex.h.

References `Complex::i`, and `Complex::r`.

4.1.1.17 **Complex operator/ (Complex a, Complex b)**

Definition at line 129 of file complex.h.

References `Complex::abs`, and `Complex::conj`.

4.1.1.18 **Complex operator/ (Complex *a*, double *b*)**

Definition at line 136 of file complex.h.

References Complex::i, and Complex::r.

4.1.1.19 **ostream& operator<< (ostream & *os*, Complex & *c*)**

Definition at line 343 of file complex.h.

References abs(), Complex::i, and Complex::r.

4.1.1.20 **bool operator== (Complex *a*, Complex *b*)**

Definition at line 159 of file complex.h.

References Complex::i, and Complex::r.

4.1.1.21 **istream& operator>> (istream & *is*, Complex & *c*)**

Definition at line 353 of file complex.h.

References Complex::i, and Complex::r.

4.1.1.22 **Complex polar (double *r*, double *t*)**

Definition at line 267 of file complex.h.

References cos(), and sin().

4.1.1.23 **Complex pow (double *a*, Complex *b*)**

Definition at line 285 of file complex.h.

References exp(), and log().

Referenced by root(), and sqrt().

4.1.1.24 **Complex pow (Complex *a*, double *b*)**

Definition at line 290 of file complex.h.

References exp(), and log().

4.1.1.25 **Complex pow (Complex *a*, Complex *b*)**

Definition at line 295 of file complex.h.

References exp(), and log().

4.1.1.26 **double real (Complex *rhs*)**

Definition at line 228 of file complex.h.

References Complex::r.

4.1.1.27 Complex root (Complex *a*, double *b*)

Definition at line 306 of file complex.h.

References pow().

4.1.1.28 Complex sin (Complex *rhs*)

Definition at line 322 of file complex.h.

References sinh().

Referenced by exp(), and polar().

4.1.1.29 Complex sinh (Complex *rhs*)

Definition at line 312 of file complex.h.

References exp().

Referenced by sin().

4.1.1.30 Complex sqrt (Complex *rhs*)

Definition at line 301 of file complex.h.

References pow().

Referenced by Complex::abs().

4.2 plot/Plot.m File Reference**Functions**

- `figure` (1)
- `plot` (1:N, x(3,:))
- `title` ('pi estimate against number of rain drops')
- `xlabel` ('Number of rain drops')
- `figure` (2)
- `if` (x(4, i)==1) `plot`(x(1
- `x` (2, i)
- `else` `plot` (x(1, i), x(2, i),'.')
- `end` `title` ([int2str(i),'drops ', int2str(x(5, i)),'landed in circle, estimating pi as ', num2str(x(3, i))])
- `F` (i)
- `end` `movie2avi` (F,'Pi_Estimation.avi','compression','None','fps', 50)

Variables

- `close` `all`
- `x` = load('Pi_Approx.txt')
- `N` = length(x)
- `hold` on for `i`
- `r`

4.2.1 Function Documentation

4.2.1.1 `F (i)`

4.2.1.2 `figure (1)`

4.2.1.3 `figure (2)`

4.2.1.4 `if (x(4,i) == 1)`

4.2.1.5 `end movie2avi (F , 'Pi_Estimation.avi' , 'compression' , 'None' , 'fps' , 50)`

4.2.1.6 `plot (1:N , x(3,:))`

4.2.1.7 `else plot (x(1,i) , x(2,i) , '')`

4.2.1.8 `title ('pi estimate against number of rain drops')`

4.2.1.9 `end title ()`

4.2.1.10 `x (2 , i)`

4.2.1.11 `xlabel ('Number of rain drops')`

4.2.2 Variable Documentation

4.2.2.1 `clear all`

Definition at line 1 of file Plot.m.

4.2.2.2 `i`

Initial value:

```
1:N
    figure(2)
```

Definition at line 12 of file Plot.m.

Referenced by `Complex::abs()`, `Complex::arg()`, `Complex::Complex()`, `Complex::conj()`, `Complex::imag()`, `Complex::norm()`, `Complex::operator=()`, `montecarlo::Pi_Estamtion()`, and `Complex::print()`.

4.2.2.3 `N = length(x)`

Definition at line 4 of file Plot.m.

4.2.2.4 `r`

Definition at line 15 of file Plot.m.

Referenced by `Complex::abs()`, `Complex::arg()`, `Complex::Complex()`, `Complex::conj()`, `Complex::norm()`, `Complex::operator=()`, `Complex::print()`, and `Complex::real()`.

4.2.2.5 `x = load('Pi_Approx.txt')`

Definition at line 3 of file Plot.m.

4.3 src/main.cpp File Reference

```
#include <iostream>
#include <random>
#include <vector>
#include <cmath>
#include <fstream>
#include "complex.h"
```

Classes

- class [montecarlo](#)

Functions

- int [main](#) ()

4.3.1 Function Documentation

4.3.1.1 int main ()

Definition at line 43 of file main.cpp.

References [montecarlo::Pi_Estamtion\(\)](#).

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