

Script started on 2022-03-07 16:47:33-06:00 [TERM="xterm" TTY="/dev/pts/14" COLUMNS=

a\_vitale7@ares:~\$ pwd

/home/students/a\_vitale7

a\_vitale7@ares:~\$ cat complex\_problem.info

```
*****
*
* NAME: Antonino Vitale          CLASS: CSC122-W01
*
* Lab: What a complex problem    Level: 5
*
* Description:
*
* This program allows the user to do negation, conjugation,
* magnitude, addition, subtraction, multiplication, and division
* with complex numbers.
*
*****/
```

a\_vitale7@ares:~\$ cat complex\_problem.cpp

```
#include <iostream>
```

```
#include <sstream>
```

```
#include <iomanip>
```

```
#include <limits>
```

```
#include <cmath>
```

```
#include <math.h>
```

```
#include <time.h>
```

```
#include <cstdlib>
```

```
#include <array>
```

```
#include <vector>
```

```
#include <string>
```

```
#include <stdlib.h>
```

```
#include <cstring>
```

```
#include "complex.h"
```

```
using namespace std;
```

```
void disp_mainMenu(void);
```

```
void manual_entry(void);
```

```
void disp_manualMenu(void);
```

```
void debug(void);
```

```
int randomizer(unsigned int min, unsigned int max);
```

```
string input;
```

```
int main()
```

```
{
```

```
    bool exit_main = false;
```

```
    cout << "\n\t\tComplex number class program" << endl; //program start state
```

```
    while (!exit_main) {
```

```
        disp_mainMenu();
```

```
        cout << "\n\tChoice: ";
```

```
        cin >> input;
```

```
        cin.ignore(numeric_limits<streamsize>::max(), '\n');
```

```
        switch (tolower(input[0])) {
```

```
            case '1': {
```

```
                manual_entry();
```

```
                break;
```

```
            } case '2': {
```

```
                debug();
```

```
                break;
```

```
            } case '3': case 'e':{
```

```
                exit_main = true;
```

```
                break;
```



```

    }

    } while (manual_arrPosition < 1 || manual_arrPosition > 10);
    manual_arr[manual_arrPosition - 1].negate_numerics();
    printf("\nComplex value %i is now: ", manual_arrPosition);
    manual_arr[manual_arrPosition - 1].output();
    cout << endl;
    break;
} case '3': {
    cout << "\nWhich complex number would you like to have char
do {
    cin >> manual_arrPosition;
    cin.ignore(numeric_limits<streamsize>::max(), '\n');
    if (manual_arrPosition < 1 || manual_arrPosition >
        cout << "\nInvalid Input.";
    }
} while (manual_arrPosition < 1 || manual_arrPosition > 10);
manual_arr[manual_arrPosition - 1].conjugate_numerics();
printf("\nComplex value %i is now: ", manual_arrPosition);
manual_arr[manual_arrPosition - 1].output();
cout << endl;
break;
} case '4': {
    cout << "\nWhich complex number would you like to see the r
do {
    cin >> manual_arrPosition;
    cin.ignore(numeric_limits<streamsize>::max(), '\n');
    if (manual_arrPosition < 1 || manual_arrPosition >

```

```

        cout << "\nInvalid Input.";
    }
} while (manual_arrPosition < 1 || manual_arrPosition > 10);
printf("\nComplex value %i has a magnitude of %.3f.\n", manual_arrPosition, magnitude);
cout << endl;
break;
} case '5': {
    cout << "\nWhich complex number would you like to store the
do {
    cin >> manual_arrPosition;
    cin.ignore(numeric_limits<streamsize>::max(), '\n');
    if (manual_arrPosition < 1 || manual_arrPosition >
        cout << "\nInvalid Input.";
    }
} while (manual_arrPosition < 1 || manual_arrPosition > 10);
cout << "\nWhich complex numbers would you like to have the
do {
    cin >> manual_arrPositionOne;
    while (!isdigit(cin.peek())) {
        cin.ignore();
    }
    cin >> manual_arrPositionTwo;
    cin.ignore(numeric_limits<streamsize>::max(), '\n');
    if ((manual_arrPositionOne < 1 || manual_arrPositionTwo >
        cout << "\nInvalid Input.";
    }
} while ((manual_arrPositionOne < 1 || manual_arrPositionTwo >

```

```

        manual_arr[manual_arrPosition - 1].set_numerics( manual_arr[manual_arrPosition - 1].get_numerics());
        printf("\nThe sum of Complex numbers %i and %i is: ", manual_arr[manual_arrPosition-1].get_re(), manual_arr[manual_arrPosition-1].get_im());
        manual_arr[manual_arrPosition-1].output();
        printf(" and is stored in complex number %i.", manual_arrPosition);
        cout << endl;
        break;
} case '6': {
    cout << "\nWhich complex number would you like to store the sum of?";
    do {
        cin >> manual_arrPosition;
        cin.ignore(numeric_limits<streamsize>::max(), '\n');
        if (manual_arrPosition < 1 || manual_arrPosition > 10)
            cout << "\nInvalid Input.";
    }
} while (manual_arrPosition < 1 || manual_arrPosition > 10);
cout << "\nWhich complex numbers would you like to have subtracted?";
do {
    cin >> manual_arrPositionOne;
    while (!isdigit(cin.peek())) {
        cin.ignore();
    }
    cin >> manual_arrPositionTwo;
    cin.ignore(numeric_limits<streamsize>::max(), '\n');
    if ((manual_arrPositionOne < 1 || manual_arrPositionTwo > 10) || (manual_arrPositionOne > 10 || manual_arrPositionTwo < 1))
        cout << "\nInvalid Input.";
}
} while ((manual_arrPositionOne < 1 || manual_arrPositionOne > 10) || (manual_arrPositionTwo < 1 || manual_arrPositionTwo > 10));

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```

        manual_arr[manual_arrPosition - 1].set_numerics(manual_arr[manual_arrPosition - 1].get_numerics());
        printf("\nComplex numbers %i and %i subtracted is: ", manual_arr[manual_arrPosition-1].get_re(), manual_arr[manual_arrPosition-1].get_im());
        manual_arr[manual_arrPosition - 1].output();
        printf(" and is stored in complex number %i.", manual_arrPosition);
        cout << endl;
        break;
} case '7': {
    cout << "\nWhich complex number would you like to store the product of?";
    do {
        cin >> manual_arrPosition;
        cin.ignore(numeric_limits<streamsize>::max(), '\n');
        if (manual_arrPosition < 1 || manual_arrPosition > 10)
            cout << "\nInvalid Input.";
    }
} while (manual_arrPosition < 1 || manual_arrPosition > 10);
cout << "\nWhich complex numbers would you like to have multiplied?";
do {
    cin >> manual_arrPositionOne;
    while (!isdigit(cin.peek())) {
        cin.ignore();
    }
    cin >> manual_arrPositionTwo;
    cin.ignore(numeric_limits<streamsize>::max(), '\n');
    if ((manual_arrPositionOne < 1 || manual_arrPositionTwo > 10) || (manual_arrPositionOne > 10 || manual_arrPositionTwo < 1))
        cout << "\nInvalid Input.";
}
} while ((manual_arrPositionOne < 1 || manual_arrPositionOne > 10) || (manual_arrPositionTwo < 1 || manual_arrPositionTwo > 10));

```

```

        manual_arr[manual_arrPosition - 1].set_numerics(manual_arr[manual_arrPosition - 1].get_numerics());
        printf("\nComplex numbers %i and %i multiplied is: ", manual_arr[manual_arrPosition - 1].get_real(), manual_arr[manual_arrPosition - 1].get_imaginary());
        manual_arr[manual_arrPosition - 1].output();
        printf(" and is stored in complex number %i.", manual_arrPosition);
        cout << endl;
        break;
    } case '8': {
        cout << "\nWhich complex number would you like to store the result of?";
        do {
            cin >> manual_arrPosition;
            cin.ignore(numeric_limits<streamsize>::max(), '\n');
            if (manual_arrPosition < 1 || manual_arrPosition > 10)
                cout << "\nInvalid Input.";
        } while (manual_arrPosition < 1 || manual_arrPosition > 10);
        cout << "\nWhich complex number would you like to have divided by?";
        do {
            cin >> manual_arrPositionOne;
            cin.ignore(numeric_limits<streamsize>::max(), '\n');
            if (manual_arrPositionOne < 1 || manual_arrPositionOne > 10)
                cout << "\nInvalid Input.";
        } while (manual_arrPositionOne < 1 || manual_arrPositionOne > 10);
        do {
            cin >> manual_arrPositionTwo;
            cin.ignore(numeric_limits<streamsize>::max(), '\n');
            if (manual_arrPositionTwo < 1 || manual_arrPositionTwo > 10)
                cout << "\nInvalid Input.";
        } while (manual_arrPositionTwo < 1 || manual_arrPositionTwo > 10);
    }
}

```

```

        cout << "\nInvalid Input.";
    }
} while (manual_arrPositionTwo < 1 || manual_arrPositionTwo > 10);
manual_arr[manual_arrPosition - 1].set_numerics(manual_arr[manual_arrPosition - 1].get_numerics());
printf("\nComplex numbers %i divided by complex number %i : ", manual_arr[manual_arrPosition - 1].get_real(), manual_arr[manual_arrPosition - 1].get_imaginary());
manual_arr[manual_arrPosition - 1].output();
printf(" and is stored in complex number %i.", manual_arrPosition);
cout << endl;
break;
} case '9': case 'e': {
    exit_manual = true;
    break;
} default: {
    cout << "\nInvalid Choice." << endl;
    break;
}

}

cout << "\nExiting manual input." << endl;
return;
}

void disp_mainMenu() {
    cout << "\n\t\tMain Menu" << endl;
    cout << "\n\t1) Manual entry";
    cout << "\n\t2) Quick debug";
}

```

```

        cout << "\n\t3) exit" << endl;
        return;
    }

void disp_manualMenu() {
    cout << "\n\t\tManual Menu" << endl;
    cout << "\n\t0) View complex numbers";
    cout << "\n\t1) Change a complex number";
    cout << "\n\t2) Negate a complex number";
    cout << "\n\t3) Conjugate a complex number";
    cout << "\n\t4) Magnitude of a complex number";
    cout << "\n\t5) Add complex numbers";
    cout << "\n\t6) Subtract complex numbers";
    cout << "\n\t7) Multiply complex numbers";
    cout << "\n\t8) Divide complex numbers";
    cout << "\n\t9) exit" << endl;
    return;
}

//debug is used for a quick evaluation of two complex numbers
void debug(void) {
    const int arr_size = 9;
    complex arr[arr_size];
    double a, b;

    cout << "\n\tPlease input two complex numbers formatted as such: a +bi or a -bi";
    for (int i = 0; i < 2; i++) {

```

```

        printf("\nNumeric %i: ", i);
        cin >> a;
        cin >> b;
        cin.ignore(numeric_limits<streamsize>::max(), '\n');
        arr[i].set_numerics(a, b);
    }

    cout << "\nComplex number one: ";
    arr[0].output();

    cout << "\nComplex number two: ";
    arr[1].output();

    cout << "\n\n\tdebug complex Negation";
    arr[2] = arr[0];
    arr[2].negate_numerics();
    cout << "\nComplex number one negated: ";
    arr[2].output();

    cout << "\n\n\tdebug complex conjugation";
    arr[3] = arr[0];
    arr[3].conjugate_numerics();
    cout << "\nComplex number one conjugated: ";
    arr[3].output();

    cout << "\n\n\tdebug complex magnitude";
    arr[4] = arr[0];
    arr[4].conjugate_numerics();
    cout << "\nComplex number one magnitude: ";

```

```

arr[4].output();

cout << "\n\n\tdebug complex addition";
arr[5].add_numerics(arr[0], arr[1]);
cout << "\nComplex number one added to complex number two equals: ";
arr[5].output();

cout << "\n\n\tdebug complex subtraction";
arr[6].subtract_numerics(arr[0], arr[1]);
cout << "\nComplex number one subtracted by complex number two equals: ";
arr[6].output();

cout << "\n\n\tdebug complex multiplication";
arr[7].multiply_numerics(arr[0], arr[1]);
cout << "\nComplex number one multiplied by complex number two equals: ";
arr[7].output();

cout << "\n\n\tdebug complex division";
arr[8].divide_numerics(arr[0], arr[1]);
cout << "\nComplex number one divided by complex number two equals: ";
arr[8].output();

cout << "\n\n";
return;

}

int randomizer(unsigned int min, unsigned int max) {

```

```

srand(static_cast<unsigned>(time(nullptr)));

return rand() % (max - min + 1) + min;

}

a_vitale7@ares:~$ cat complex.cpp
#include "complex.h"

#include <iostream>

#include <cmath>

using namespace std;

complex::complex(void) {
    numeric = 0.0;
    iNumeric = 0.0;
    return;
}

/*
inlined
complex::complex(const double set_numeric, const double set_iNumeric) {
    numeric = set_numeric;
    iNumeric = set_iNumeric;
    return;
}
*/

/*
removed - fixing an error?

```

```

complex::complex(const complex& i) {
    numeric = i.numeric;
    iNumeric = i.iNumeric;
    return;
}

*/

void complex::manual_input(void) {
    cout << "\nInput a complex number: ";
    cin >> numeric;
    cin >> iNumeric;
    cin.ignore(numeric_limits<streamsize>::max(), '\n');
    cout << endl;
    return;
}

void complex::output(void) const {
    printf("%.3f ", numeric);
    (iNumeric >= 0) ? cout << "+" : cout << "-";
    printf(" %.3fi", abs(iNumeric));
    return;
}

/*
_____

|a+bi| = \/ a*a + b*b
*/

```

```

double complex::magnitude() const {
    return static_cast<double>(pow(pow(numeric, 2) * pow(iNumeric, 2), 0.5));
}

/*
//has been inlined

void complex::set_numerics(double new_numeric, double new_iNumeric) {
    numeric = new_numeric;
    iNumeric = new_iNumeric;
    return;
}

*/

/*
//has been inlined

void complex::set_numerics(const complex& a) {
    numeric = a.get_numeric();
    iNumeric = a.get_iNumeric();
    return;
}

*/

/*
-(a+bi) = (-a) + (-b)i
*/

/*
//has been inlined

```



```

void complex::negate_numerics() {
    numeric = -numeric;
    iNumeric = -iNumeric;
    return;
}

/*

_____

a+bi  = a-bi

*/

/*

//has been inlined

void complex::conjugate_numerics() {
    iNumeric = -iNumeric;
    return;
}

*/

/*

a+bi + c+di = (a+c) + (b+d)i

*/

void complex::add_numerics(const complex& a, const complex& b) {
    numeric = static_cast<double>(a.get_numeric() + b.get_numeric());
    iNumeric = static_cast<double>(a.get_iNumeric() + b.get_iNumeric());
    return;
}

```

```

//fixed add
complex complex::add(const complex& a) const {
    return complex(get_numeric() + a.get_numeric(), get_iNumeric() + a.get_iNumeric());
}

/*

a+bi - c+di = (a-c) + (b-d)i

*/

void complex::subtract_numerics(const complex& a, const complex& b) {
    numeric = static_cast<double>(a.get_numeric() - b.get_numeric());
    iNumeric = static_cast<double>(a.get_iNumeric() - b.get_iNumeric());
    return;
}

//fixed subtract
complex complex::subtract(const complex& a) const {
    return complex(get_numeric() - a.get_numeric(), get_iNumeric() - a.get_iNumeric());
}

/*

a+bi * c+di = (a*c-b*d) + (a*d+b*c)i    // i*i == -1

*/

void complex::multiply_numerics(const complex& a, const complex& b) {
    numeric = static_cast<double>(a.get_numeric() * b.get_numeric() - a.get_iNumeric() * b.get_iNumeric());
    iNumeric = static_cast<double>(a.get_numeric() * b.get_iNumeric() + a.get_iNumeric() * b.get_numeric());
    return;
}

```

```

}

//fixed multiply
complex complex::multiply(const complex& a) const {
    return complex((get_numeric() * a.get_numeric() - get_iNumeric() * a.get_iNumeric()),
                   (get_iNumeric() * a.get_numeric() + get_numeric() * a.get_iNumeric()));
}

/*
      (a*c+b*d) - (a*d-b*c)i
a+bi / c+di = -----
                c*c + d*d
*/

void complex::divide_numerics(const complex& a, const complex& b) {
    //undefined numbers are returned as zeros (up to 5 decimal postions)
    if ( static_cast<long>( 100000*(b.get_numeric()*b.get_numeric() + b.get_iNumeric()*b.get_iNumeric()) ) == 0 ) {
        numeric = 0.0;
        iNumeric = 0.0;
        return;
    }
    numeric = static_cast<double>(((a.get_numeric()*b.get_numeric()) + (a.get_iNumeric()*b.get_iNumeric())) / (b.get_numeric()*b.get_numeric() + b.get_iNumeric()*b.get_iNumeric()));
    iNumeric = static_cast<double>((-1.0 * ((a.get_numeric()*b.get_iNumeric()) - (a.get_iNumeric()*b.get_numeric())) / (b.get_numeric()*b.get_numeric() + b.get_iNumeric()*b.get_iNumeric()));
    return;
}

//fixed divide
complex complex::divide(const complex& a) const {
    return ( static_cast<long>( 100000*(a.get_numeric()*a.get_numeric() + a.get_iNumeric()*a.get_iNumeric()) ) == 0 ) ? complex(0,0) : complex(a.get_numeric()/a.get_numeric(), a.get_iNumeric()/a.get_numeric());
}

```

```

}

a_vitale7@ares:~$ cat complex.h
#ifndef COMPLEX_CLASS_HEADER
#define COMPLEX_CLASS_HEADER

class complex
{
public:
    double numeric = 0.0;
    double iNumeric = 0.0;

    complex(void); //default constructor
    complex(const double set_numeric, const double set_iNumeric) { numeric = set_numeric; iNumeric = set_iNumeric; }
    //complex(const complex& i); //constructor
    ~complex() {} //destructor?

    void manual_input(void); //input
    void output(void) const; //output

    double get_numeric(void) const { return numeric; }; //accessor
    double get_iNumeric(void) const { return iNumeric; }; //accessor
    double magnitude(void) const; // accessor

    void set_numerics(const double new_numeric, const double new_iNumeric) { numeric = new_numeric; iNumeric = new_iNumeric; }
    void set_numeric(const double a) { numeric = static_cast<double>(a); }
    void set_iNumeric(const double a) { iNumeric = static_cast<double>(a); }
    void negate_numerics(void) { numeric = -numeric; iNumeric = -iNumeric; return; }
    void conjugate_numerics(void) { iNumeric = -iNumeric; return; }; // mutator
    complex add(const complex& a) const; //mutator
    void add_numerics(const complex& a, const complex& b); // mutator
}

```

```

complex subtract(const complex& a) const; //mutator
void subtract_numerics(const complex& a, const complex& b); // mutator
complex multiply(const complex& a) const; //mutator
void multiply_numerics(const complex& a, const complex& b); // mutator
complex divide(const complex& a) const; //mutator
void divide_numerics(const complex& a, const complex& b); // mutator
};

#endif

a_vitale7@ares:~$ cat compCPP complex_problem.cpp complex.cpp complex.h
complex.cpp...
complex_problem.cpp***

a_vitale7@ares:~$ ./complex_problem.out

Complex number class program

Main Menu

1) Manual entry
2) Quick debug
3) exit

Choice: 2

Please input two complex numbers formatted as such: a +bi or a -bi
Numeric 0: 2 +2i
Numeric 1: -2 -2i

Complex number one: 2.000 + 2.000i
Complex number two: -2.000 - 2.000i

debug complex Negation
Complex number one negated: -2.000 - 2.000i

debug complex conjugation
Complex number one conjugated: 2.000 - 2.000i

debug complex magnitude
Complex number one magnitude: 2.000 - 2.000i

debug complex addition
Complex number one added to complex number two equals: 0.000 + 0.000i

debug complex subtraction

```

```

Complex number one subtracted by complex number two equals: 4.000 + 4.000i

debug complex multiplication
Complex number one multiplied by complex number two equals: 0.000 - 8.000i

debug complex division
Complex number one divided by complex number two equals: -1.000 + 0.000i

Main Menu

1) Manual entry
2) Quick debug
3) exit

Choice: 2

Please input two complex numbers formatted as such: a +bi or a -bi
Numeric 0: 4+4i
Numeric 1: 4+4i

Complex number one: 4.000 + 4.000i
Complex number two: 4.000 + 4.000i

debug complex Negation
Complex number one negated: -4.000 - 4.000i

debug complex conjugation
Complex number one conjugated: 4.000 - 4.000i

debug complex magnitude
Complex number one magnitude: 4.000 - 4.000i

debug complex addition
Complex number one added to complex number two equals: 8.000 + 8.000i

debug complex subtraction
Complex number one subtracted by complex number two equals: 0.000 + 0.000i

debug complex multiplication
Complex number one multiplied by complex number two equals: 0.000 + 32.000i

debug complex division
Complex number one divided by complex number two equals: 1.000 + 0.000i

Main Menu

1) Manual entry
2) Quick debug
3) exit

Choice: e

```

```
Exiting program.
a_vitale7@ares:~$ ./complex_problem.out

Complex number class program

Main Menu

1) Manual entry
2) Quick debug
3) exit

Choice: 1

Manual complex number editor

Manual Menu

0) View complex numbers
1) Change a complex number
2) Negate a complex number
3) Conjugate a complex number
4) Magnitude of a complex number
5) Add complex numbers
6) Subtract complex numbers
7) Multiply complex numbers
8) Divide complex numbers
9) exit

Choice: 0

Complex number 1: 0.000 + 0.000i
Complex number 2: 0.000 + 0.000i
Complex number 3: 0.000 + 0.000i
Complex number 4: 0.000 + 0.000i
Complex number 5: 0.000 + 0.000i
Complex number 6: 0.000 + 0.000i
Complex number 7: 0.000 + 0.000i
Complex number 8: 0.000 + 0.000i
Complex number 9: 0.000 + 0.000i
Complex number 10: 0.000 + 0.000i

Manual Menu

0) View complex numbers
1) Change a complex number
2) Negate a complex number
3) Conjugate a complex number
4) Magnitude of a complex number
5) Add complex numbers
6) Subtract complex numbers
7) Multiply complex numbers
8) Divide complex numbers
9) exit
```

```
Choice: 1

Which complex number would you like to have changed? 1

Complex value 1 (Format as a+bi): 2+2i

Manual Menu

0) View complex numbers
1) Change a complex number
2) Negate a complex number
3) Conjugate a complex number
4) Magnitude of a complex number
5) Add complex numbers
6) Subtract complex numbers
7) Multiply complex numbers
8) Divide complex numbers
9) exit

Choice: 4

Which complex number would you like to see the magnitude of? 1

Complex value 1 has a magnitude of 4.000.

Manual Menu

0) View complex numbers
1) Change a complex number
2) Negate a complex number
3) Conjugate a complex number
4) Magnitude of a complex number
5) Add complex numbers
6) Subtract complex numbers
7) Multiply complex numbers
8) Divide complex numbers
9) exit

Choice: 1

Which complex number would you like to have changed? 2

Complex value 2 (Format as a+bi): -2-2i

Manual Menu

0) View complex numbers
1) Change a complex number
2) Negate a complex number
3) Conjugate a complex number
4) Magnitude of a complex number
5) Add complex numbers
```

- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 0

Complex number 1: 2.000 + 2.000i  
Complex number 2: -2.000 - 2.000i  
Complex number 3: 0.000 + 0.000i  
Complex number 4: 0.000 + 0.000i  
Complex number 5: 0.000 + 0.000i  
Complex number 6: 0.000 + 0.000i  
Complex number 7: 0.000 + 0.000i  
Complex number 8: 0.000 + 0.000i  
Complex number 9: 0.000 + 0.000i  
Complex number 10: 0.000 + 0.000i

#### Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 3

Which complex number would you like to have changed? 2

Complex value 2 is now: -2.000 + 2.000i

#### Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 1

Which complex number would you like to have changed? 3

Complex value 3 (Format as a+bi): -2.5+2.5i

#### Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 0

Complex number 1: 2.000 + 2.000i  
Complex number 2: -2.000 + 2.000i  
Complex number 3: -2.500 + 2.500i  
Complex number 4: 0.000 + 0.000i  
Complex number 5: 0.000 + 0.000i  
Complex number 6: 0.000 + 0.000i  
Complex number 7: 0.000 + 0.000i  
Complex number 8: 0.000 + 0.000i  
Complex number 9: 0.000 + 0.000i  
Complex number 10: 0.000 + 0.000i

#### Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 2

Which complex number would you like to have changed? 2

Complex value 2 is now: 2.000 - 2.000i

#### Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number

- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 4

Which complex number would you like to see the magnitude of? 3

Complex value 3 has a magnitude of 6.250.

#### Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 5

Which complex number would you like to store this new value in? 4

Which complex numbers would you like to have the sum of? 1 and 2

The sum of Complex numbers 1 and 2 is:  $4.000 + 0.000i$  and is stored in complex numl

#### Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 6

Which complex number would you like to store this new value in? 5

Which complex numbers would you like to have subtracted? 1 and 2

Complex numbers 1 and 2 subtracted is:  $0.000 + 4.000i$  and is stored in complex numl

#### Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 7

Which complex number would you like to store this new value in? 6

Which complex numbers would you like to have multiplied? 1 and 2

Complex numbers 1 and 2 multiplied is:  $8.000 + 0.000i$  and is stored in complex numl

#### Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 8

Which complex number would you like to store this new value in? 7

Which complex number would you like to have divided? 1 and 2

Complex numbers 1 divided by complex number 2 is:  $0.000 + 0.000i$  and is stored in c

#### Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers

- 8) Divide complex numbers
- 9) exit

Choice: 1

Which complex number would you like to have changed? 1

Complex value 1 (Format as a+bi): 900+400i

#### Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 0

Complex number 1: 900.000 + 400.000i  
Complex number 2: 2.000 - 2.000i  
Complex number 3: -2.500 + 2.500i  
Complex number 4: 4.000 + 0.000i  
Complex number 5: 0.000 + 4.000i  
Complex number 6: 8.000 + 0.000i  
Complex number 7: 0.000 + 0.000i  
Complex number 8: 0.000 + 0.000i  
Complex number 9: 0.000 + 0.000i  
Complex number 10: 0.000 + 0.000i

#### Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 8

Which complex number would you like to store this new value in? 7

Which complex number would you like to have divided? 1 and 2

2

Complex numbers 1 divided by complex number 2 is: 0.000 + 0.000i and is stored in (

#### Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: e

Exiting manual input.

#### Main Menu

- 1) Manual entry
- 2) Quick debug
- 3) exit

Choice: e

Exiting program.

a\_vitale7@ares:~\$ ./complex\_problem.out

#### Complex number class program

#### Main Menu

- 1) Manual entry
- 2) Quick debug
- 3) exit

Choice: 1

#### Manual complex number editor

#### Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers

8) Divide complex numbers  
9) exit

Choice: 0

Complex number 1:  $0.000 + 0.000i$   
Complex number 2:  $0.000 + 0.000i$   
Complex number 3:  $0.000 + 0.000i$   
Complex number 4:  $0.000 + 0.000i$   
Complex number 5:  $0.000 + 0.000i$   
Complex number 6:  $0.000 + 0.000i$   
Complex number 7:  $0.000 + 0.000i$   
Complex number 8:  $0.000 + 0.000i$   
Complex number 9:  $0.000 + 0.000i$   
Complex number 10:  $0.000 + 0.000i$

#### Manual Menu

0) View complex numbers  
1) Change a complex number  
2) Negate a complex number  
3) Conjugate a complex number  
4) Magnitude of a complex number  
5) Add complex numbers  
6) Subtract complex numbers  
7) Multiply complex numbers  
8) Divide complex numbers  
9) exit

Choice: 1

Which complex number would you like to have changed? 10+10i

Complex value 10 (Format as a+bi): 10+10i

#### Manual Menu

0) View complex numbers  
1) Change a complex number  
2) Negate a complex number  
3) Conjugate a complex number  
4) Magnitude of a complex number  
5) Add complex numbers  
6) Subtract complex numbers  
7) Multiply complex numbers  
8) Divide complex numbers  
9) exit

Choice: 0

Complex number 1:  $0.000 + 0.000i$   
Complex number 2:  $0.000 + 0.000i$   
Complex number 3:  $0.000 + 0.000i$   
Complex number 4:  $0.000 + 0.000i$

Complex number 5:  $0.000 + 0.000i$   
Complex number 6:  $0.000 + 0.000i$   
Complex number 7:  $0.000 + 0.000i$   
Complex number 8:  $0.000 + 0.000i$   
Complex number 9:  $0.000 + 0.000i$   
Complex number 10:  $10.000 + 10.000i$

#### Manual Menu

0) View complex numbers  
1) Change a complex number  
2) Negate a complex number  
3) Conjugate a complex number  
4) Magnitude of a complex number  
5) Add complex numbers  
6) Subtract complex numbers  
7) Multiply complex numbers  
8) Divide complex numbers  
9) exit

Choice: 1

Which complex number would you like to have changed? 1

Complex value 1 (Format as a+bi): 10+10i

#### Manual Menu

0) View complex numbers  
1) Change a complex number  
2) Negate a complex number  
3) Conjugate a complex number  
4) Magnitude of a complex number  
5) Add complex numbers  
6) Subtract complex numbers  
7) Multiply complex numbers  
8) Divide complex numbers  
9) exit

Choice: 2

Which complex number would you like to have changed? 1

Complex value 1 is now:  $-10.000 - 10.000i$

#### Manual Menu

0) View complex numbers  
1) Change a complex number  
2) Negate a complex number  
3) Conjugate a complex number  
4) Magnitude of a complex number  
5) Add complex numbers  
6) Subtract complex numbers



- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 3

Which complex number would you like to have changed? 2

Complex value 2 is now:  $0.000 + 0.000i$

#### Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 3

Which complex number would you like to have changed? 1

Complex value 1 is now:  $-10.000 + 10.000i$

#### Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 3

Which complex number would you like to have changed? 1

Complex value 1 is now:  $-10.000 - 10.000i$

#### Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number

- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 2

Which complex number would you like to have changed? 1

Complex value 1 is now:  $10.000 + 10.000i$

#### Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 0

Complex number 1:  $10.000 + 10.000i$

Complex number 2:  $0.000 + 0.000i$

Complex number 3:  $0.000 + 0.000i$

Complex number 4:  $0.000 + 0.000i$

Complex number 5:  $0.000 + 0.000i$

Complex number 6:  $0.000 + 0.000i$

Complex number 7:  $0.000 + 0.000i$

Complex number 8:  $0.000 + 0.000i$

Complex number 9:  $0.000 + 0.000i$

Complex number 10:  $10.000 + 10.000i$

#### Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 4

Which complex number would you like to see the magnitude of? 1

Complex value 1 has a magnitude of 100.000.

Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 5

Which complex number would you like to store this new value in? 1

Which complex numbers would you like to have the sum of? 1 and 1

The sum of Complex numbers 1 and 1 is: 20.000 + 20.000i and is stored in complex n

Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 0

- Complex number 1: 20.000 + 20.000i
- Complex number 2: 0.000 + 0.000i
- Complex number 3: 0.000 + 0.000i
- Complex number 4: 0.000 + 0.000i
- Complex number 5: 0.000 + 0.000i
- Complex number 6: 0.000 + 0.000i
- Complex number 7: 0.000 + 0.000i
- Complex number 8: 0.000 + 0.000i
- Complex number 9: 0.000 + 0.000i
- Complex number 10: 10.000 + 10.000i

Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 6

Which complex number would you like to store this new value in? 1

Which complex numbers would you like to have subtracted? 1 and 1

Complex numbers 1 and 1 subtracted is: 0.000 + 0.000i and is stored in complex numl

Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 1

Which complex number would you like to have changed? 1

Complex value 1 (Format as a+bi): 10+10i

Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 7

Which complex number would you like to store this new value in? 1

Which complex numbers would you like to have multiplied? 1 and 1

Complex numbers 1 and 1 multiplied is:  $0.000 + 200.000i$  and is stored in complex number 1

Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 0

Complex number 1:  $0.000 + 200.000i$   
Complex number 2:  $0.000 + 0.000i$   
Complex number 3:  $0.000 + 0.000i$   
Complex number 4:  $0.000 + 0.000i$   
Complex number 5:  $0.000 + 0.000i$   
Complex number 6:  $0.000 + 0.000i$   
Complex number 7:  $0.000 + 0.000i$   
Complex number 8:  $0.000 + 0.000i$   
Complex number 9:  $0.000 + 0.000i$   
Complex number 10:  $10.000 + 10.000i$

Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 1

Which complex number would you like to have changed? 1

Complex value 1 (Format as a+bi):  $10+0i$

Manual Menu

- 0) View complex numbers
- 1) Change a complex number

- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 7

Which complex number would you like to store this new value in? 1

Which complex numbers would you like to have multiplied? 1 and 1

Complex numbers 1 and 1 multiplied is:  $100.000 + 0.000i$  and is stored in complex number 1

Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 8

Which complex number would you like to store this new value in? 1

Which complex number would you like to have divided? 1 and 1

Complex numbers 1 divided by complex number 1 is:  $0.000 + 0.000i$  and is stored in complex number 1

Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 0

Complex number 1: 0.000 + 0.000i  
Complex number 2: 0.000 + 0.000i  
Complex number 3: 0.000 + 0.000i  
Complex number 4: 0.000 + 0.000i  
Complex number 5: 0.000 + 0.000i  
Complex number 6: 0.000 + 0.000i  
Complex number 7: 0.000 + 0.000i  
Complex number 8: 0.000 + 0.000i  
Complex number 9: 0.000 + 0.000i  
Complex number 10: 10.000 + 10.000i

Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: e

Exiting manual input.

Main Menu

- 1) Manual entry
- 2) Quick debug
- 3) exit

Choice: 1

Manual complex number editor

Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 3

Which complex number would you like to have changed? 1

Complex value 1 is now: 0.000 + 0.000i

Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 0

Complex number 1: 0.000 + 0.000i  
Complex number 2: 0.000 + 0.000i  
Complex number 3: 0.000 + 0.000i  
Complex number 4: 0.000 + 0.000i  
Complex number 5: 0.000 + 0.000i  
Complex number 6: 0.000 + 0.000i  
Complex number 7: 0.000 + 0.000i  
Complex number 8: 0.000 + 0.000i  
Complex number 9: 0.000 + 0.000i  
Complex number 10: 0.000 + 0.000i

Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 9

Exiting manual input.

Main Menu

- 1) Manual entry
- 2) Quick debug
- 3) exit

Choice: 3

```
Exiting program.
a_vitale7@ares:~$ ./complex_problem.out

Complex number class program

Main Menu

1) Manual entry
2) Quick debug
3) exit

Choice: 1

Manual complex number editor

Manual Menu

0) View complex numbers
1) Change a complex number
2) Negate a complex number
3) Conjugate a complex number
4) Magnitude of a complex number
5) Add complex numbers
6) Subtract complex numbers
7) Multiply complex numbers
8) Divide complex numbers
9) exit

Choice: 0

Complex number 1: 0.000 + 0.000i
Complex number 2: 0.000 + 0.000i
Complex number 3: 0.000 + 0.000i
Complex number 4: 0.000 + 0.000i
Complex number 5: 0.000 + 0.000i
Complex number 6: 0.000 + 0.000i
Complex number 7: 0.000 + 0.000i
Complex number 8: 0.000 + 0.000i
Complex number 9: 0.000 + 0.000i
Complex number 10: 0.000 + 0.000i

Manual Menu

0) View complex numbers
1) Change a complex number
2) Negate a complex number
3) Conjugate a complex number
4) Magnitude of a complex number
5) Add complex numbers
6) Subtract complex numbers
7) Multiply complex numbers
8) Divide complex numbers
9) exit
```

```
Choice: 1

Which complex number would you like to have changed? 1

Complex value 1 (Format as a+bi): 1+1i

Manual Menu

0) View complex numbers
1) Change a complex number
2) Negate a complex number
3) Conjugate a complex number
4) Magnitude of a complex number
5) Add complex numbers
6) Subtract complex numbers
7) Multiply complex numbers
8) Divide complex numbers
9) exit

Choice: 1

Which complex number would you like to have changed? 2

Complex value 2 (Format as a+bi): 2+2i

Manual Menu

0) View complex numbers
1) Change a complex number
2) Negate a complex number
3) Conjugate a complex number
4) Magnitude of a complex number
5) Add complex numbers
6) Subtract complex numbers
7) Multiply complex numbers
8) Divide complex numbers
9) exit

Choice: 1

Which complex number would you like to have changed? 3

Complex value 3 (Format as a+bi): 3+3i

Manual Menu

0) View complex numbers
1) Change a complex number
2) Negate a complex number
3) Conjugate a complex number
4) Magnitude of a complex number
5) Add complex numbers
6) Subtract complex numbers
7) Multiply complex numbers
```

8) Divide complex numbers  
9) exit

Choice: 0

Complex number 1: 1.000 + 1.000i  
Complex number 2: 2.000 + 2.000i  
Complex number 3: 3.000 + 3.000i  
Complex number 4: 0.000 + 0.000i  
Complex number 5: 0.000 + 0.000i  
Complex number 6: 0.000 + 0.000i  
Complex number 7: 0.000 + 0.000i  
Complex number 8: 0.000 + 0.000i  
Complex number 9: 0.000 + 0.000i  
Complex number 10: 0.000 + 0.000i

#### Manual Menu

0) View complex numbers  
1) Change a complex number  
2) Negate a complex number  
3) Conjugate a complex number  
4) Magnitude of a complex number  
5) Add complex numbers  
6) Subtract complex numbers  
7) Multiply complex numbers  
8) Divide complex numbers  
9) exit

Choice: 9

Exiting manual input.

#### Main Menu

1) Manual entry  
2) Quick debug  
3) exit

Choice: 1

#### Manual complex number editor

#### Manual Menu

0) View complex numbers  
1) Change a complex number  
2) Negate a complex number  
3) Conjugate a complex number  
4) Magnitude of a complex number  
5) Add complex numbers  
6) Subtract complex numbers  
7) Multiply complex numbers  
8) Divide complex numbers

9) exit

Choice: 0

Complex number 1: 0.000 + 0.000i  
Complex number 2: 0.000 + 0.000i  
Complex number 3: 0.000 + 0.000i  
Complex number 4: 0.000 + 0.000i  
Complex number 5: 0.000 + 0.000i  
Complex number 6: 0.000 + 0.000i  
Complex number 7: 0.000 + 0.000i  
Complex number 8: 0.000 + 0.000i  
Complex number 9: 0.000 + 0.000i  
Complex number 10: 0.000 + 0.000i

#### Manual Menu

0) View complex numbers  
1) Change a complex number  
2) Negate a complex number  
3) Conjugate a complex number  
4) Magnitude of a complex number  
5) Add complex numbers  
6) Subtract complex numbers  
7) Multiply complex numbers  
8) Divide complex numbers  
9) exit

Choice: 999

Exiting manual input.

#### Main Menu

1) Manual entry  
2) Quick debug  
3) exit

Choice: 1

#### Manual complex number editor

#### Manual Menu

0) View complex numbers  
1) Change a complex number  
2) Negate a complex number  
3) Conjugate a complex number  
4) Magnitude of a complex number  
5) Add complex numbers  
6) Subtract complex numbers  
7) Multiply complex numbers  
8) Divide complex numbers  
9) exit

Choice: def

Invalid Choice.

#### Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 0

Complex number 1:  $0.000 + 0.000i$   
Complex number 2:  $0.000 + 0.000i$   
Complex number 3:  $0.000 + 0.000i$   
Complex number 4:  $0.000 + 0.000i$   
Complex number 5:  $0.000 + 0.000i$   
Complex number 6:  $0.000 + 0.000i$   
Complex number 7:  $0.000 + 0.000i$   
Complex number 8:  $0.000 + 0.000i$   
Complex number 9:  $0.000 + 0.000i$   
Complex number 10:  $0.000 + 0.000i$

#### Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 1

Which complex number would you like to have changed? 1

Complex value 1 (Format as a+bi):  $99.92+294.3i$

#### Manual Menu

- 0) View complex numbers
- 1) Change a complex number

- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 4

Which complex number would you like to see the magnitude of? 1

Complex value 1 has a magnitude of 29406.456.

#### Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 1

Which complex number would you like to have changed? 2

Complex value 2 (Format as a+bi):  $327.23-283.45i$

#### Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 0

Complex number 1:  $99.920 + 294.300i$   
Complex number 2:  $327.230 - 283.450i$   
Complex number 3:  $0.000 + 0.000i$   
Complex number 4:  $0.000 + 0.000i$

Complex number 5: 0.000 + 0.000i  
Complex number 6: 0.000 + 0.000i  
Complex number 7: 0.000 + 0.000i  
Complex number 8: 0.000 + 0.000i  
Complex number 9: 0.000 + 0.000i  
Complex number 10: 0.000 + 0.000i

Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 6

Which complex number would you like to store this new value in? 3

Which complex numbers would you like to have subtracted? 1 and 2

Complex numbers 1 and 2 subtracted is: -227.310 + 577.750i and is stored in complex number 3

Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 5

Which complex number would you like to store this new value in? 4

Which complex numbers would you like to have the sum of? 1 and 2

The sum of Complex numbers 1 and 2 is: 427.150 + 10.850i and is stored in complex number 4

Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number

- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 7

Which complex number would you like to store this new value in? 5

Which complex numbers would you like to have multiplied? 1 and 2

Complex numbers 1 and 2 multiplied is: 116116.157 + 67981.465i and is stored in complex number 5

Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 8

Which complex number would you like to store this new value in? 6

Which complex number would you like to have divided? 1 and 2

Complex numbers 1 divided by complex number 2 is: 0.000 + 0.000i and is stored in complex number 6

Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice:

0



Complex number 1: 99.920 + 294.300i  
Complex number 2: 327.230 - 283.450i  
Complex number 3: -227.310 + 577.750i  
Complex number 4: 427.150 + 10.850i  
Complex number 5: 116116.157 + 67981.465i  
Complex number 6: 0.000 + 0.000i  
Complex number 7: 0.000 + 0.000i  
Complex number 8: 0.000 + 0.000i  
Complex number 9: 0.000 + 0.000i  
Complex number 10: 0.000 + 0.000i

Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 1

Which complex number would you like to have changed? 9

Complex value 9 (Format as a+bi): 20+20i

Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 1

Which complex number would you like to have changed? 8

Complex value 8 (Format as a+bi): 2.5-2.5i

Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number

- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 8

Which complex number would you like to store this new value in? 10

Which complex number would you like to have divided? 9 and 8  
8

Complex numbers 9 divided by complex number 8 is: 0.000 + 0.000i and is stored in (

Manual Menu

- 0) View complex numbers
- 1) Change a complex number
- 2) Negate a complex number
- 3) Conjugate a complex number
- 4) Magnitude of a complex number
- 5) Add complex numbers
- 6) Subtract complex numbers
- 7) Multiply complex numbers
- 8) Divide complex numbers
- 9) exit

Choice: 9

Exiting manual input.

Main Menu

- 1) Manual entry
- 2) Quick debug
- 3) exit

Choice: e

Exiting program.  
a\_vitale7@ares:~\$ ./complex\_problem.out

Complex number class program

Main Menu

- 1) Manual entry
- 2) Quick debug
- 3) exit

Choice: 2

Please input two complex numbers formatted as such: a +bi or a -bi  
 Numeric 0: 88.88+0i  
 Numeric 1: 0+77.77i  
 Complex number one: 88.880 + 0.000i  
 Complex number two: 0.000 + 77.770i  
 debug complex Negation  
 Complex number one negated: -88.880 + 0.000i  
 debug complex conjugation  
 Complex number one conjugated: 88.880 + 0.000i  
 debug complex magnitude  
 Complex number one magnitude: 88.880 + 0.000i  
 debug complex addition  
 Complex number one added to complex number two equals: 88.880 + 77.770i  
 debug complex subtraction  
 Complex number one subtracted by complex number two equals: 88.880 - 77.770i  
 debug complex multiplication  
 Complex number one multiplied by complex number two equals: 0.000 + 6912.198i  
 debug complex division  
 Complex number one divided by complex number two equals: 0.000 - 1.143i

Main Menu  
 1) Manual entry  
 2) Quick debug  
 3) exit  
 Choice: 2  
 Please input two complex numbers formatted as such: a +bi or a -bi  
 Numeric 0: 20+20i  
 Numeric 1: 2+2i  
 Complex number one: 20.000 + 20.000i  
 Complex number two: 2.000 + 2.000i  
 debug complex Negation  
 Complex number one negated: -20.000 - 20.000i  
 debug complex conjugation  
 Complex number one conjugated: 20.000 - 20.000i  
 debug complex magnitude  
 Complex number one magnitude: 20.000 + 20.000i

Complex number one magnitude: 20.000 - 20.000i  
 debug complex addition  
 Complex number one added to complex number two equals: 22.000 + 22.000i  
 debug complex subtraction  
 Complex number one subtracted by complex number two equals: 18.000 + 18.000i  
 debug complex multiplication  
 Complex number one multiplied by complex number two equals: 0.000 + 80.000i  
 debug complex division  
 Complex number one divided by complex number two equals: 10.000 + 0.000i

Main Menu  
 1) Manual entry  
 2) Quick debug  
 3) exit  
 Choice: 2  
 Please input two complex numbers formatted as such: a +bi or a -bi  
 Numeric 0: 20+20i  
 Numeric 1: 2+0i  
 Complex number one: 20.000 + 20.000i  
 Complex number two: 2.000 + 0.000i  
 debug complex Negation  
 Complex number one negated: -20.000 - 20.000i  
 debug complex conjugation  
 Complex number one conjugated: 20.000 - 20.000i  
 debug complex magnitude  
 Complex number one magnitude: 20.000 - 20.000i  
 debug complex addition  
 Complex number one added to complex number two equals: 22.000 + 20.000i  
 debug complex subtraction  
 Complex number one subtracted by complex number two equals: 18.000 + 20.000i  
 debug complex multiplication  
 Complex number one multiplied by complex number two equals: 40.000 + 40.000i  
 debug complex division  
 Complex number one divided by complex number two equals: 10.000 + 10.000i

Main Menu

- 1) Manual entry
- 2) Quick debug
- 3) exit

Choice: 2

Please input two complex numbers formatted as such: a +bi or a -bi

Numeric 0: 20+20i

Numeric 1: 0+2i

Complex number one: 20.000 + 20.000i

Complex number two: 0.000 + 2.000i

debug complex Negation

Complex number one negated: -20.000 - 20.000i

debug complex conjugation

Complex number one conjugated: 20.000 - 20.000i

debug complex magnitude

Complex number one magnitude: 20.000 - 20.000i

debug complex addition

Complex number one added to complex number two equals: 20.000 + 22.000i

debug complex subtraction

Complex number one subtracted by complex number two equals: 20.000 + 18.000i

debug complex multiplication

Complex number one multiplied by complex number two equals: -40.000 + 40.000i

debug complex division

Complex number one divided by complex number two equals: 10.000 - 10.000i

Main Menu

- 1) Manual entry
- 2) Quick debug
- 3) exit

Choice: e

Exiting program.

a\_vitale7@ares:~\$ ./complex\_problem.out

Complex number class program

Main Menu

- 1) Manual entry
- 2) Quick debug

3) exit

Choice: 2

Please input two complex numbers formatted as such: a +bi or a -bi

Numeric 0: 55.125+12.5i

Numeric 1: 85.5+0i

Complex number one: 55.125 + 12.500i

Complex number two: 85.500 + 0.000i

debug complex Negation

Complex number one negated: -55.125 - 12.500i

debug complex conjugation

Complex number one conjugated: 55.125 - 12.500i

debug complex magnitude

Complex number one magnitude: 55.125 - 12.500i

debug complex addition

Complex number one added to complex number two equals: 140.625 + 12.500i

debug complex subtraction

Complex number one subtracted by complex number two equals: -30.375 + 12.500i

debug complex multiplication

Complex number one multiplied by complex number two equals: 4713.188 + 1068.750i

debug complex division

Complex number one divided by complex number two equals: 0.645 + 0.146i

Main Menu

- 1) Manual entry
- 2) Quick debug
- 3) exit

Choice: 2

Please input two complex numbers formatted as such: a +bi or a -bi

Numeric 0: 0.245+0.24i

Numeric 1: 0.23+0.257i

Complex number one: 0.245 + 0.240i

Complex number two: 0.230 + 0.257i

debug complex Negation

Complex number one negated: -0.245 - 0.240i

debug complex conjugation

```
Complex number one conjugated: 0.245 - 0.240i

    debug complex magnitude
Complex number one magnitude: 0.245 - 0.240i

    debug complex addition
Complex number one added to complex number two equals: 0.475 + 0.497i

    debug complex subtraction
Complex number one subtracted by complex number two equals: 0.015 - 0.017i

    debug complex multiplication
Complex number one multiplied by complex number two equals: -0.005 + 0.118i

    debug complex division
Complex number one divided by complex number two equals: 0.992 - 0.065i
```

```
                Main Menu

1) Manual entry
2) Quick debug
3) exit

Choice: e
```

```
Exiting program.
a_vitale7@ares:~$ ./complex_problem.out
cat complex_problem.tpq
/*****
*
*   Why do your class methods take fewer arguments than you would
*   expect?
*       Most of the class functions are only altering two double
*       values based on new inputs or predefined alterations like
*       addition.
*
*   Does the compiler change y when you have 'x+ y' in your program?
*   So should your addition method change the other complex number
*   (the argument object)? How can you tell the compiler this in the
*   most efficient way? Does this phenomenon extend to the other
*   operations?
*       The compiler does not change y in the program. My addition
*       method(s) do not change the argument complex number, it only
*       uses it for returning calculations. The most effecient way
*       to prevent it from being altered is to make it constant or
*       not have any operation that causes it to be altered. This
*       phenomina does extend to other operations.
*
*   What kind of value should be returned from the standard math
*   operations (i.e. what TYPE of value)? From conjugate? From
*   magnitude?
*       The type of value returned should be the same complex class
*       value. Conjugation alters the i value from positive to
```

```
*       negative or vise versa, and magnitude returns a double
*       value based on the values of the normal value and the i
*       value.
*
*****/
a_vitale7@ares:~$ exit
exit
```

Script done on 2022-03-07 17:06:29-06:00 [COMMAND\_EXIT\_CODE="0"]