

### 1. Test constructors:

1.1 Create complex number  $c0$  with no-arg constructor `Complex()`:

$c0 = 0$ , it's real part  $\text{Re}(c0) = 0$ , it's imaginary part  $\text{Im}(c0) = 0$ , it's absolute value  $|c0| = 0$

1.2 create a complex number  $c1$  with constructor `Complex(a)`:

Enter a number a: 3

$c1 = 3$ , it's real part  $\text{Re}(c1) = 3$ , it's imaginary part  $\text{Im}(c1) = 0$ , it's absolute value  $|c1| = 3$

1.3 create a complex number  $c2$  with constructor `Complex(a,b)`:

Enter number a, b: 3 4

$c2 = 3 + 4i$ , it's real part  $\text{Re}(c2) = 3$ , it's imaginary part  $\text{Im}(c2) = 4$ , it's absolute value  $|c2| = 5$

### 2. Test overloaded stream insertion operator `>>` and extraction operator `<<`:

Enter two complex numbers following the prompts:

Enter the first complex number  $cx1$  with `(cin >> cx1)`: Enter a and b for  $(a + bi)$ : 3 4

'`cout << cx1`' prints  $3 + 4i$

Enter the second complex number  $cx2$  with `(cin >> cx2)`: Enter a and b for  $(a + bi)$ : 5 6

'`cout << cx2`' prints  $5 + 6i$

### 3. Test overloaded arithmetic operators `+`, `-`, `*`, `/`: $(3 + 4i) + (5 + 6i) = 8 + 10i$

$(3 + 4i) - (5 + 6i) = -2 + -2i$

$(3 + 4i) * (5 + 6i) = -9 + 38i$

$(3 + 4i) / (5 + 6i) = 0.639344 + 0.0327869i$

### 4. Test overloaded augmented arithmetic operators `+=`, `-=`, `*=`, `/=`:

$cx1 = 3 + 4i$ ;  $cx2 = 5 + 6i$

$(cx2 += cx1)$ ;  $cx2 = 8 + 10i$

$(cx2 -= cx1)$ ;  $cx2 = 5 + 6i$

$(cx2 *= cx1)$ ;  $cx2 = -9 + 38i$

$(cx2 /= cx1)$ ;  $cx2 = 5 + 6i$

### 5. Test overloaded Unary operators:

#### 5.1 Test overloaded sign operators `+`, `-`:

$cx1 = 3 + 4i$

$+cx1 = 3 + 4i$

$-cx1 = -3 + -4i$

#### 5.2 Test overloaded prefixes `++`, `--`:

$cx1 = -3 + -4i$

$++cx1$ ;  $cx1 = -2 + -4i$

$--cx1$ ;  $cx1 = -3 + -4i$

#### 5.2 Test overloaded postfixes `++`, `--`:

$cx1 = -3 + -4i$

'`cout << cx1++`;' prints  $-3 + -4i$

'`cout << cx1--`' prints  $-2 + -4i$

$cx1 = -3 + -4i$

### 6. Test overloaded subscript operator `[]`:

$cx1 = -3 + -4i$

$cx1[0] = -3$

$cx1[1] = -4$

$cx2[0] == cx2.\text{getRealPart}() = 1$

$cx2[1] == cx2.\text{getImaginaryPart}() = 1$

$cx2 = 5 + 6i$

$3 + cx2 = 8 + 6i$

$3.4 + cx2 = 11.4 + 6i$