

# CS 99: Fundamental Programming Concepts Summer 2000

## Objects and Classes

1. What is the difference between an object and a class?
2. What is a reference?
3. When is a constructor called? If there are multiple constructors, how does Java decide which to call?
4. Complex Numbers

Complex numbers are numbers with both real and imaginary components. They are written in the form  $a + bi$  where  $a$  and  $b$  are real numbers, and  $i$  is the square root of  $-1$ .

The sum of two complex numbers is the sum of its real and imaginary components. Similarly, the difference of two complex numbers is the difference of its real and imaginary components.

Some examples:

$$\begin{aligned} 2+3i + 5+2i &= (2+5) + (3+2)i = 7+5i \\ 2+3i - 5+2i &= (2-5) + (3-2)i = -3+1i \end{aligned}$$

Java has no built in type for representing complex numbers. In this exercise, we will create one by writing a class named `Complex`.

What fields, or instance data, will `Complex` need? Declare them in the space below.

