

LAB #13

"COMPLEX" CLASSES

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This lab should be completed during the scheduled lab sessions. In order to complete this lab you must demonstrate programs to your lab TA. The technical knowledge on how to accomplish these tasks is found in the assigned reading or the lecture notes, but the lab TA will help as well.

1. Write a JAVA class to support complex numbers. Complex numbers have a real part and an imaginary part. They are generally represented as $(r + ia)$ where "r" is a floating point number representing the "real" part and "a" is a floating point number representing the "imaginary" part ("i" denotes the imaginary square root of -1). Your class should support addition, subtraction, multiplication, division, equality testing, and printing (i.e. the "toString" method).

Consider two complex numbers:

$$z_1 = x_1 + iy_1$$

$$z_2 = x_2 + iy_2$$

Addition: $z_1 + z_2 \Rightarrow (x_1 + x_2) + i(y_1 + y_2)$

Subtraction: $z_1 - z_2 \Rightarrow (x_1 - x_2) + i(y_1 - y_2)$

Multiplication: $z_1 * z_2 \Rightarrow (x_1*x_2 - y_1*y_2) + i(y_1*x_2 + x_1*y_2)$

Division: $z_1/z_2 = ((x_1*x_2 + y_1*y_2)/(x_2*x_2 + y_2*y_2) + i((y_1*x_2 - x_1*y_2)/(x_2*x_2 + y_2*y_2))$

Equality: z_1 is equal to z_2 if x_1 is equal to x_2 and y_1 is equal to y_2

2. Write a JAVA application that prompts the user to enter four floating point numbers: ("a", "b", "c", and "d"). Use the console for input. Your program should construct two complex numbers $z_1 = a + ib$, and $z_2 = c + id$. Compute and display the results of adding, subtracting, multiplying, and dividing these numbers. Your code only needs to run for one pair, you do not have to keep looping.
3. Cut and paste your source code and screen shots of running code into your lab document and hand it in. Be sure to demo your running code

to your TA so that the TA has a record of "checking you off" as having done this lab.

NOTE: Electronic hand in should be working at this point. Submit your lab work through the homework drop box in WebCT. However, if you encounter any problems, revert to paper based hand in.