

PROGRAMMING ASSIGNMENT 2:

READ: Savitch: **Ch 12 & 13** – Applets, Buttons, and ActionListeners.
Plus information given in class.

PROGRAMMING: You will create a directory called **PA2** in your cs8w home directory.
All of your PA2 work will be done in this **PA2** directory.
Name your program **PA2.java**

DUE: Thursday, April 25, 2002 – 11:00pm

Turnin: **cd**
turninPA2

You will write an applet named **PA2** which will allow the user to enter the real and imaginary parts of two Complex numbers and allow the user to select whether to add, subtract, multiply, or divide these two Complex numbers using the ComplexP1 class.

You are provided a **PA2.html** and **ComplexP1.class**. They is located in the public/Assignments directory. You can copy them into your PA2 directory.

Your **class PA2** will be defined as follows

```
public class PA2 extends JApplet implements ActionListener
```

```
    public void init()
```

```
        - initialize the GUI components, lay them out onto the applet, set up  
        the event handling.
```

```
    public void actionPerformed((ActionEvent e)
```

```
        - identify which GUI component fired the Action event and perform the  
        appropriate action (add, subtract, multiply, divide). Keep a running  
        output of the operations in a scrollable JTextField.
```

Any instance variables must be defined **private**. Using the "principle of least privilege," try to define local variables as much as possible and only define instance variables if that variable is needed across multiple methods. No static variables or methods.

See the **AppletExample** handout for examples on creating GUI Components, layout of GUI components on an applet, and event handling.

If your program does not compile with the provided ComplexP1.java, you will receive a ZERO for the entire Programming Assignment. Your program will be tested with several different valid input values. Your program will be graded for proper comments and style as discussed in class.

A sample program is available for you to try in the public/Assignments directory.

```
cd ../../public/Assignments  
appletviewer PA2.html
```

You should copy the PA2.html file and the ComplexP1.class file from this Assignments directory into your PA2 directory.

Example:
 appletviewer PA2.html

The figure displays four screenshots of the Applet Viewer window titled "Applet Viewer: PA2.class", each showing a different operation performed on two complex numbers. The input values for both objects are consistent across all screenshots: Complex object 1 has a real part of -3.445 and an imaginary part of 3.591; Complex object 2 has a real part of 99.7 and an imaginary part of -8.462.

Top Left: Addition
 The "Add" button is highlighted. The output text area shows:
 $c1 = [-3.44 + 3.59i]$
 $c2 = [99.70 - 8.46i]$
 $c3 = c1 + c2 = [96.26 - 4.87i]$
 The status bar at the bottom reads: "Add the two complex numbers."

Top Right: Subtraction
 The "Subtract" button is highlighted. The output text area shows:
 $c1 = [-3.44 + 3.59i]$
 $c2 = [99.70 - 8.46i]$
 $c3 = c1 + c2 = [96.26 - 4.87i]$
 $c1 = [-3.44 + 3.59i]$
 $c2 = [99.70 - 8.46i]$
 $c3 = c1 - c2 = [-103.14 + 12.05i]$
 The status bar at the bottom reads: "Subtract the two complex numbers."

Bottom Left: Multiplication
 The "Multiply" button is highlighted. The output text area shows:
 $c1 = [-3.44 + 3.59i]$
 $c2 = [99.70 - 8.46i]$
 $c3 = c1 - c2 = [-103.14 + 12.05i]$
 $c1 = [-3.44 + 3.59i]$
 $c2 = [99.70 - 8.46i]$
 $c3 = c1 * c2 = [-343.47 - 30.39i]$
 The status bar at the bottom reads: "Multiply the two complex numbers."

Bottom Right: Division
 The "Divide" button is highlighted. The output text area shows:
 $c1 = [-3.44 + 3.59i]$
 $c2 = [99.70 - 8.46i]$
 $c3 = c1 * c2 = [-343.47 - 30.39i]$
 $c1 = [-3.44 + 3.59i]$
 $c2 = [99.70 - 8.46i]$
 $c3 = c1 / c2 = [-0.03 - 0.42i]$
 The status bar at the bottom reads: "Dividing the two complex numbers."