

# EECS 10: Assignment 6 Addendum

October 31, 2005

Due Monday 11/14/05 at 12:00pm  
Note: This is a two-week assignment.

## Corrections

1. Instructions for options (6), (7), and (8) refer to option (2). They should refer to option (5).
2. The example in the instructions for option (5) shows the angle after the addition operation as 166.937 degrees. It should say 53.130 degrees.

## Further Instructions

1. As mentioned in class, you will need to include an extra option when compiling programs that use functions from “math.h”. Include the option, “-lm” when compiling. This option tells the *linker* where to find the libraries required to use the math functions.  

```
gcc complex.c -o complex -lm
```
2. Please note that the trigonometric functions provided by “math.h” are based on radians, whereas our assignment needs degrees. Recall that 180 degrees =  $\pi$  radians. You will need to convert from radians to degrees after using the functions in “math.h”.
3. The “angle = arctan(y/x)” formula applies only to the quadrant where both  $x$  and  $y$  are positive. When calculating the angle, you will need to check the signs of  $x$  and  $y$  ensure that the angle is in the correct quadrant.

| $x$ | $y$ | <i>angle</i>         |
|-----|-----|----------------------|
| +   | +   | $\arctan(y/x)$       |
| -   | +   | $180 - \arctan(y/x)$ |
| -   | -   | $180 + \arctan(y/x)$ |
| +   | -   | $360 - \arctan(y/x)$ |

4. Dividing by zero in a calculation results in a runtime error. You will need to check for this condition when calculating the angle during the conversion to polar coordinates ( angle =  $\arctan(y/x)$  ). The easy way to handle this is to check if the real part of the number is 0 and then check to see whether the imaginary term is positive or negative. If the imaginary term is  $\geq 0$ , set the angle to 0 degrees. If the imaginary term is negative, set the angle to 180 degrees. There are also special cases that occur when the imaginary term,  $y$ , is equal to 0. Taking (3) into consideration, we arrive at the

following final table:

| $x$ | $y$ | <i>angle</i>         |
|-----|-----|----------------------|
| 0   | +   | 90                   |
| 0   | -   | 270                  |
| +   | 0   | 0                    |
| -   | 0   | 180                  |
| +   | +   | $\arctan(y/x)$       |
| -   | +   | $180 - \arctan(y/x)$ |
| -   | -   | $180 + \arctan(y/x)$ |
| +   | -   | $360 - \arctan(y/x)$ |

**Note:** In order to use this table correctly, you should use the absolute values of  $y$  and  $x$ .