ECE 175: Computer Programming for Engineering Applications

Homework Assignment 5

Due Date: October 7, 2010 11:59 PM

Write comments to your programs. Programs with no comments will receive PARTIAL credit. At each program you turn in at least the following info should be included

- Author: YOU MUST PUT YOUR NAME ON THE PROGRAM OTHERWISE IT WILL NOT BE GRADED!
- Date created:
- Brief (two-line) description of the program
- Submit .c files

Problem 1: Write a program that returns the min, max and mean value of an array of integers named data_ar. Your program should call a **single** function that returns that mean, max and mean value of the array. The declaration of this function is given below:

```
void array_processing(int x[ ], int size, int *min, int *max, float *mean)
{
body of function
}
```

Declared the array of integers within the main function

```
int data_ar={3, 5, 6, 7, 12, 3, 4, 6, 19, 23, 100, 3, 4, 2, 9, 43, 32, 45, 32, 2, 3, 2, 1};
```

Problem 2: Write a program that takes a time interval in seconds and breaks it up to hours, minutes and seconds.

Sample run:

```
Enter the time interval in seconds: 10468
10468 seconds are equal to 2 hours 54 minutes and 28 seconds.
```

Your program should call a **single** function that returns the hours, minutes and seconds corresponding to the given time interval. The declaration of this function is given below:

```
void conversion(long int time, int *hours, int *mins, int *secs)
{
body of function
}
```

Problem 3: Create a complex number calculator. Your calculator should be able to compute the following:

- Addition of two complex numbers: $z_1 + z_2$
- Subtraction of two complex numbers: $z_1 - z_2$
- Multiplication of two numbers: $z_1 \cdot z_2$
- Division of two complex numbers: $\frac{z_1}{z_2}$
- Computation of the conjugate of a complex number z.

The program should ask the user which of the five operations he wants to perform. It then asks the user to enter the appropriate values for the complex numbers and performs the necessary computation.

Sample run:
Press a for addition, b for subtraction, c for multiplication, d for division e for conjugate or any other key to exit: a
Enter a complex number: 2 5
Enter a complex number: 1 8
(2+5i)+(1+8i)=(3+13i)
Press a for addition, b for subtraction, c for multiplication, d for division e for conjugate or any other key to exit:

To represent a complex number use an array of two elements. E.g. float z[2]; Here z[0] corresponds to the real part and z[1] corresponds to the imaginary part of the complex number. Your program should include the following functions:

1. void read_complex(float *z) // reads a complex number from the keyboard
2. void print_complex(float *z) // prints a float number on the screen in the form a+bi
3. void add_complex(float *z1, float *z2, float *z3) // z3=z1+z2
4. void sub_complex(float *z1, float *z2, float *z3) // z3=z2-z1
5. void mul_complex(float *z1, float *z2, float *z3) // z3=z1· z2
6. void div_complex(float *z1, float *z2, float *z3) // z3=$\frac{z1}{z2}$
7. void conj_complex(float *z) // z=conj(z)

Problem 4: Consider the following game: There are 100 doors (numbered 1 through 100) and 100 students (numbered 1 through 100) waiting in a line. Initially, all the doors are closed. A student numbered x passes through all the doors that are multiples of x (i.e., student numbered x goes to doors $x, 2x, 3x$, ...) and changes the status of each door, i.e., opens the door if it is closed and closes the door if it is open. After all the students complete their turns, which doors remain open? Write a C program that mimics this experiment and prints the numbers of the doors that remain open at the end.

Submit your .c files named problem1.c problem2.c problem3.c problem4.c via D2L dropbox