

## CS 271 Lab #5

### Extending Your Knowledge of Functions and Arrays

**Comments:** Header comments and inline comments are required.

**Style:** Your program must adhere to the course style guidelines for naming, indentation, and spacing, etc.

1. Using the program structure explained in Labs 3 and 4, construct the following set of files:

- lab5functions.h
- lab5functions.c
- lab5test.c - contains the main function
- makefile

2. You will write the following 3 functions. Function prototypes go in lab5functions.h. Function definitions go in lab5functions.c.

- a) function name: duplicates  
2 parameters: an integer array and an int (the size of the array)  
return value: an int

Count and return the number of duplicates in the array. A "duplicate" is a number that appears more than once in the array.

Example: Assume the array contains 7, 4, 5, 9, 7, 12, 4, 8, 4, 5. The size is 10.

7 appears more than once in the array.  
4 appears more than once in the array.  
5 appears more than once in the array.

The function should return 3.

Don't sort the array. Don't change the array.

- b) function name: highestTwo  
2 parameters: a float array and an int (the size of the array)  
return value: none

Determine the two highest numbers in the array. (If the highest value occurs twice in the array, then the two highest numbers will be the same value.)

Print meaningful text along with the highest two numbers.

Don't sort the array. Don't change the array.

- c) function name: columnSums  
4 parameters: a two-dimensional array of double values, an int (the number of rows), another int (the number of columns), and a one-dimensional array of double values. The number of columns in the two-dimensional array is the same as the number of elements in the one-dimensional array.  
return value: none

Calculate the sum of the elements in each column of the two-dimensional array and store the sum in the corresponding element of the one-dimensional array.

Don't change the two-dimensional array.

3. Write statements to test the functions in lab5test.c. Print meaningful messages with all output.
4. The makefile must contain the following targets with appropriate gcc commands:

```
all  
lab5functions.o  
lab5test.o
```