CIS 150 – Lab 9

**Submission of Your Work**

You need to prepare and submit ONE SINGLE MS Word document to Canvas (in your lab section) as LastName\_FirstName\_Lab9.doc. It must contain:

* Your NAME
* For each question:
  + Specify the question number.
  + After reading the question requirements, but before beginning any coding, create the test case table, below, through column Expected Output. Write your program then complete the **test table** with actual output results and include in your report.
  + Copy/Paste your completed source code. You must include standard “header” in every program even if code is provided.
  + Paste in a snippet of output showing results for **every listed test case**, labeled with test case #

Test Table:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Test # | Valid / Invalid Data | Description of test | Input Value | Actual Output | Test Pass / Fail |
| 1 |  |  |  |  |  |
| 2 |  |  |  |  |  |
| 3 |  |  |  |  |  |
| 4 |  |  |  |  |  |
| 5 |  |  |  |  |  |
| 6 |  |  |  |  |  |

* Add / delete rows from Test Table as necessary
* Modify column widths as necessary
* Test both valid and invalid input
* Test for every output expected
* If failure is an expected output and it happens then that test Passes
* Any test that fails means the program must be fixed so that it passes the test

### **Question 1**

Write the following two functions.

The first function accepts as input a two-dimensional array of integers. It returns two results: the sum of the elements of the array and the average.

The second function accepts as input a two-dimensional array of integers and integer value V. It returns true if the value V is found in the array, false otherwise.

Write a main program that declares and initializes the following array:

const int ROWS = 4;

const int COLS = 4;

int box[ROWS][COLS] = {{11,8,0,-4}, {74,5,13,42}, {29,-7,45,4}, {100,23,-3,61}};

Your program needs to call both functions and display appropriate messages from main.

### **Question 2**

Let’s consider an input file that contains student id (int), first name (string), last name (string), and grade (float). We assume that the file contains information for a maximum of 10 students.

Write a program that:

* Declare the structure named student composed of id (int), first (string), last (string), and grade (float).
* Asks the user for the name of the input file.
* Reads the grades from the file to fill up an array **of type student.**
* Calculates and displays (to a file) the maximum grade in the array with name.
* Calculates and displays (to a file) the minimum grade in the array with name.
* Calculates and displays (to a file) the average grade.
* Calculates and displays (to a file) how many students were processed.
* Produce a file with the information above based on a file name provided by the user.
* **The main idea is to explore the benefits of using structs. So every task should be done after the whole array is filled up**
* All tasks must be done with functions w/ parameters. Any cin/cout statements must be done from main().

Some function calls to consider using in main (you must define these functions):

count = readGrades(ifs, stuArray);

outputMaxGrade(ofs, stuArray, count);

outputMinGrade(ofs, stuArray, count);

outputAverageGrade(ofs, stuArray, count);

outputStudentCount(ofs, count);