CSCD 240
2D/1D Arrays

What is provided?

Two text files one named **cscd240Lab10data.txt,** which contain a large dataset, and **testData.txt** which contains a much smaller data set which will allow you to ensure the algorithm is working correctly. You will need to be able to process each individually, meaning run your program with one file and capture the output, and then run your program again with a different file. The first line of the file is the header, the number of rows and the number of columns separated by a space. The maximum size of the 2D array will be 300 rows, with each row containing up to 100 elements (These numbers are inclusive). The array will be 2D integer array.

What you need to complete.

Implement the following features:

1. Read the header information, it will tell you how many rows and columns are contained within the data file.

2. Read the data into a static 2D array. You are required to use the I/O redirection and scanf(). The integers in the file are separated by space with each row containing a carriage return at the end.

3. Sort the 2D array by the column. Each column is sorted independently. For example if your data is

3	25
37	100
5	2

Your output would be:

3	2
5	25
37	100

You are **not allowed** to swap rows in the 2D array. Swapping whole row of elements is prohibited. **Hint**: use a separate 1D array to store the data, and then sort that data. No sorting will be conducted on the 2D array, all sorting/swapping will occur on the 1D array.

4. After the 1D array is sorted, the original 2D array is intact, output the sorted results into a new text file, named cscd240Lab10sorted.txt. You are required to use I/O redirection and printf(). The output file should have a same format as the input file including the header. Elements are separated by only one space.

   For the small input file testData.txt:
   5 3
   383 386 277
   415 293 335
   368 492 149
   421 362 27
   190 59 263

   The output file would appear as:
   5 3
   190 59 27
   368 293 149
   383 362 263
   415 386 277
   421 492 335

   The original 2D array is not modified; all sorting/swapping occurs on the 1D array.

5. Your solution must be modular. You will write functions to complete the processing. You must use 2 constants ROWS and COLS which will be 300 and 100 respectively.

Submission:

A zip containing:

- all your c files and/or h files – the file that contains main will be named cscd240Lab10.c
- your output file – named cscd240Lab10output.txt
- a **makefile** with lab10 as the target. If you miss the makefile in your zip file, you get a penalty of 5% deducted from your total score.