# CS xyz3-001 Foundations of Programming and Data Structures

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Homework 06

**Due date: check BB**

!!!! NO LATE HOMEWORK WILL BE ACCEPTED !!!

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Write a program that ask user to enter two integers X and Y, and two doubles minZ and maxZ. It then allocates a dynamic 2D array consisting of X rows and Y columns of double values, and sets each value in the 2D array by randomly generating a number between minZ and maxZ. If (minZ == maxZ), then simply set each value in the 2D array to minZ.

Then separately print the overall sum of all the values in the whole 2D array, the sum of each row, and the sum of each column.

**Here is a sample output:**

When the input is

```
5    3    2.0    2.0
```

for X Y minZ maxZ

Your output should be as follows:

```
Overall sum = 30.0
Sum of each row
Row0 = 6.0
Row1 = 6.0
Row2 = 6.0
Row3 = 6.0
Row4 = 6.0
Sum of each column
10.0 10.0 10.0
```

At the end of this document, we provide a template .c file including a function to generate real random numbers. Copy that program and modify it.

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From now on, please make sure your program has no memory leakages. For this, you need to free all the dynamically allocated spaces. There is a tool called valgrind, which checks for memory leakage.

After implementing you program, you can run it with valgrind as follows

> valgrind hw06

When your program finish, valgrind will print a report about memory usage. The report will specify bytes in use at exit and number of allocs and frees. Proper memory management will say All heap blocks freed - - no leaks are possible Copy that report to hw06-valgrind.txt and submit it with other output files.

If you get memory leakages, make sure you free all the allocated memory and then run it again with valgrind.

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**What to do and return:** !!!! NO LATE HOMEWORK WILL BE ACCEPTED !!!

1. Create a directory `abc123-hw06`, using your own abc123. Do all your work under that directory.

2. Follow the problem-solving methodology to solve the problem(s). Then convert your solution(s) to a C program. You can name your program here as `hw06.c`

```
/*
 * Don't forget to include comments about the
 * problem, yourself and each major step in your
 * program! so that we can understand your
 * solution(s).
 */
```

3. Compile and run your program. Copy/paste the results in an output file, which you can name as `hw06-out.txt`. Also make sure you get `hw06-valgrind.txt`, as described above.

4. Zip the whole directory `abc123-hw06 as abc123-hw06.zip`
5. Go to BB Learn (http://learn.utsa.edu/) , login using your abc123
6. Submit your `abc123-hw06.zip` for hw06 under Assignments

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You must submit your work using Blackboard Learn and respect the following rules:

1) All assignments must be submitted as either a zip or tar archive file unless it is a single pdf file.
2) Assignments must include all source code.

3) Assignments must include an output.txt file which demonstrates the final test output run by the student.
4) If your assignment does not run/compile, the output.txt file should include an explanation of what was accomplished, what the error message was that prevented the student from finishing the assignment and what the student BELIEVES to be the underlying cause of the error.

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