

CS 1101 – Introduction to Computer Science

Spring 2022

Lab 10 - 2D Arrays

Due Date: Friday, April 15, end of the day (11:59pm).

Objective: The goal of this assignment is to get familiar with **2D arrays**.

Assignment:

In this program, you are to create 3 boards following the next steps:

- 1) Ask the user for an integer n , this will be the size of the rows and columns of the three boards.
- 2) Declare three 2D array of integers of size n
example: `int [][] boardOne = [n] [n]`

n=size of rows and columns

			n
n			

3) **Board One:**

- Fill the board with integers following the instructions. For *row 0, column n* and *column 0, row n* ask the user for integers.
The acceptable integers are 1, 2, 3, 4, and 5.
example: the user enters 1,2, 3, 4

1	2	3	4
2			
3			
4			

- Starting in *row 1, column 1* to *row n , column n* fill the board by multiplying the 2 integers value in the previous row.
*example: `boardOne[1][1] = boardOne[0][0] * boardOne[0][1]`*

1	2	3	4
2	1X2		
3	4	12	72
4	12	48	864

1	2	3	4
2	2	6	12
3	4	12	72
4	12	48	864

Board Two:

- Fill the board with random numbers from 0-10. (Including 0 and not including number 10.)

Board Three:

- Fill the board by adding Board One + Board Two

1	2	3	4
2	2	6	12
3	4	12	72
4	12	48	864

 $+$

1	2	2	1
2	2	6	5
3	4	2	2
4	4	5	4

1+1	2+2	3+2	4+1
2+2	2+2	6+6	12+5
3+3	4+4	12+2	72+2
4+4	12+4	48+5	864+4

- 4) Print the elements in Board One
- 5) Print the elements in the Diagonal of Board One.
- 6) Prints the sum of the elements of Board One.
- 7) Print the elements in Board Two.
- 8) Print the result of adding all integers in row 0 of Board Two.
- 9) Print the result of adding all integers in column 0 of Board Two.
- 10) Print the average of all the elements in Board Two.
- 11) Print the elements in Board Three.
- 12) Print Board Three in reverse order (from the last element to the first).
- 13) Create an array with the minimum values on each board. Then, print the minimum value found on all boards.

- 14) Create an array with the maximum values on each board. Then, print the maximum value found on all boards.

Example:

```
Enter the size of the board rxc:
```

```
4
```

```
Enter 4 numbers between (1-5)
```

```
1
```

```
2
```

```
3
```

```
4
```

```
----Board #1---
```

```
1 | 2 | 3 | 4 |
2 | 2 | 6 | 12 |
3 | 4 | 12 | 72 |
4 | 12 | 48 | 864 |
```

```
The elements in the diagonal are:
```

```
1 , 2 , 12 , 864 ,
```

```
The sum of all elements: 1051
```

```
----Board #2---
```

```
3 | 9 | 9 | 2 |
5 | 9 | 2 | 3 |
9 | 7 | 5 | 2 |
3 | 6 | 5 | 9 |
```

```
The sum of all elements in row 0: 23
```

```
The sum of all elements in column 0: 20
```

```
The average of all elements: 5.5
```

```
----Board #3---
```

```
4 | 11 | 12 | 6 |
7 | 11 | 8 | 15 |
12 | 11 | 17 | 74 |
7 | 18 | 53 | 873 |
```

```
----Board #3 in Reverse---
```

```
873 | 53 | 18 | 7 |
74 | 17 | 11 | 12 |
15 | 8 | 11 | 7 |
6 | 12 | 11 | 4 |
```

```
----Min Values array---
```

```
[ 1 , 2 , 4 , ]
```

```
----Max Values array---
```

```
[ 864 , 9 , 873 , ]
```

```
The min value of all elements in all boards: 1
```

```
The max value of all elements in all boards: 873
```

Deliverables: You are expected to submit one file to Blackboard:

- (i) `Lab10_Lastname.java` --- the java file of your program.

Grading Criteria:

- [97 points] Java program that is similar to the algorithm.
 - [20 pts] Program compiles and runs.
 - [20 pts] The program uses **methods**, conditional statements, loops, and **arrays**.
 - [10 pts] Correct types for each variable, correct naming conventions, and variables should have meaningful variable names.
 - [35 pts] The program has correct logic and generates correct output. (Implementing arrays)
 - [5 pts] The program is indented properly.
 - [5 pts] The program uses meaningful variable names.
 - [2 pts] The program has proper documentation.
- [3 points] The deliverables follow the proper name Lab10_LastName
- Late submission: [-10] points for every 24 hours after the deadline.

If you need any clarification, please ask your TA for further details.