



The
BRITISH
UNIVERSITY
IN EGYPT

22CSCI02P

Lab (7)

2-Dimensional Arrays

Problem (1)

Working with Two-Dimensional Arrays: This program will read the prices from the user and store them into a two-dimensional array. It will print those prices in a table form.

```
// This program will read the prices from the user and store them into a two-dimensional array.
// It will print those prices in a table form.

#include <iostream>
#include <iomanip>
using namespace std;

int const MAXROWS = 10;
int const MAXCOLS = 10;

void getPrices(float priceTable[MAXROWS][MAXCOLS], int& numOfRows, int& numOfCols);
void printPrices(float priceTable[MAXROWS][MAXCOLS], int numOfRows, int numOfCols);

int main()
{
    int rowsUsed;                // holds the number of rows used
    int colsUsed;                // holds the number of columns used
    float priceTable[MAXROWS][MAXCOLS]; // a 2D array holding the prices

    getPrices(priceTable, rowsUsed, colsUsed); // calls getPrices to fill the array
    printPrices(priceTable, rowsUsed, colsUsed); // calls printPrices to display array
    system("pause");
    return 0;
}

// *****
//
//                      getPrices
//
// task:   This procedure asks the user to input the number of rows and
//         columns used. It then asks the user to input (rows * columns)
//         number of prices where x = rows * columns. The data is placed in the array.
// datain:  an empty array of float
// dataout: an array filled with numbers and the number of rows
//         and columns used.
//
// *****

void getPrices(float priceTable[MAXROWS][MAXCOLS], int& numOfRows, int& numOfCols)
{
    cout << "Please input the number of rows from 1 to " << MAXROWS << endl;
    cin >> numOfRows;

    cout << "Please input the number of columns from 1 to " << MAXCOLS << endl;
    cin >> numOfCols;

    for (int row = 0; row < numOfRows; row++)
    {
        for (int col = 0; col < numOfCols; col++)
        {
            // Fill in the code to read and store the next value in the array
        }
    }
}
```

```

//*****
//
//          printPrices
//
// task:   This procedure prints the table of prices
// datain: an array of floating point numbers and the number of rows
//         and columns used.
// dataout: none
//
//*****

void printPrices(float priceTable [MAXROWS][MAXCOLS], int numOfRows, int numOfCols)
{
    cout << fixed << showpoint << setprecision(2);

    for (int row = 0; row < numOfRows; row++)
    {
        for (int col = 0; col < numOfCols; col++)
        {
            // Fill in the code to print the table
        }
    }
}

```

Fill in the code to complete both functions `getPrices` and `printPrices`, then run the program with the following data:

Please input the number of rows from 1 to 10

2

Please input the number of columns from 1 to 10

3

Please input the price of an item with 2 decimal places

1.45

Please input the price of an item with 2 decimal places

2.56

Please input the price of an item with 2 decimal places

12.98

Please input the price of an item with 2 decimal places

37.86

Please input the price of an item with 2 decimal places

102.34

Please input the price of an item with 2 decimal places

67.89

**Expected
Output**



1.45	2.56	12.98
37.86	102.34	67.89

Problem (2)

Write a C++ program that asks the user to enter 5 Elements as Columns for a total of 5 Rows to be saved in a 2-D array (5x5), then prints the sum of each row and each column. Here is a screenshot of the output.

```
C:\Windows\system32\cmd.exe
Please Enter the 1 Element for Row 1:: 1
Please Enter the 2 Element for Row 1:: 2
Please Enter the 3 Element for Row 1:: 3
Please Enter the 4 Element for Row 1:: 4
Please Enter the 5 Element for Row 1:: 5

Please Enter the 1 Element for Row 2:: 6
Please Enter the 2 Element for Row 2:: 7
Please Enter the 3 Element for Row 2:: 8
Please Enter the 4 Element for Row 2:: 9
Please Enter the 5 Element for Row 2:: 10

Please Enter the 1 Element for Row 3:: 11
Please Enter the 2 Element for Row 3:: 12
Please Enter the 3 Element for Row 3:: 13
Please Enter the 4 Element for Row 3:: 14
Please Enter the 5 Element for Row 3:: 15

Please Enter the 1 Element for Row 4:: 16
Please Enter the 2 Element for Row 4:: 17
Please Enter the 3 Element for Row 4:: 18
Please Enter the 4 Element for Row 4:: 19
Please Enter the 5 Element for Row 4:: 20

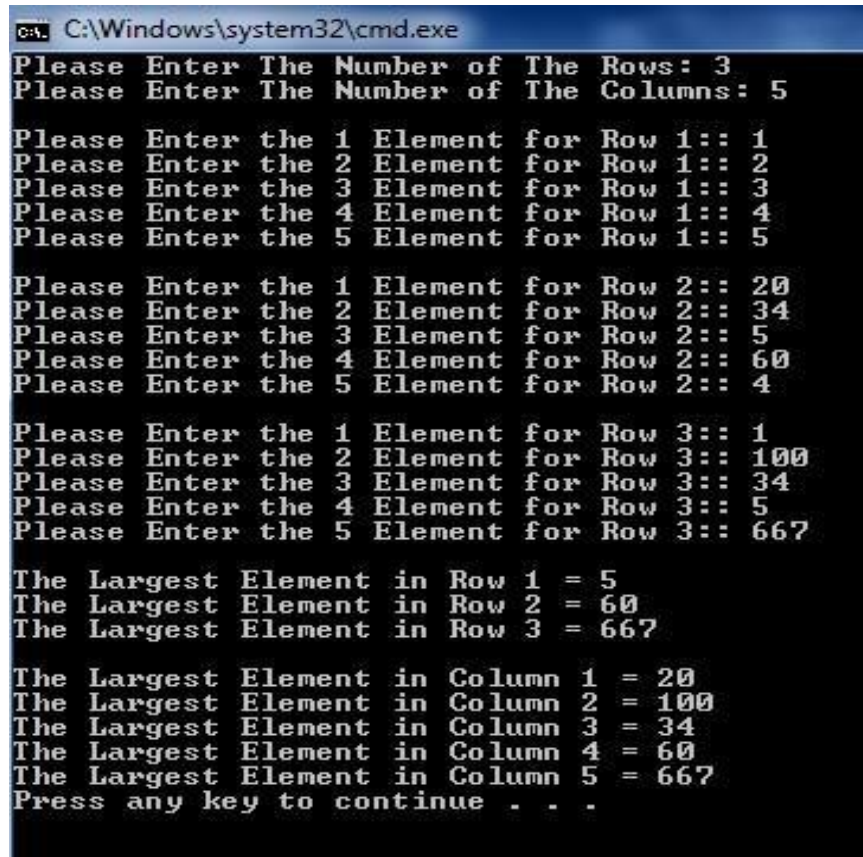
Please Enter the 1 Element for Row 5:: 2
Please Enter the 2 Element for Row 5:: 3
Please Enter the 3 Element for Row 5:: 4
Please Enter the 4 Element for Row 5:: 4
Please Enter the 5 Element for Row 5:: 5

Sum of Row 1 = 15
Sum of Row 2 = 40
Sum of Row 3 = 65
Sum of Row 4 = 179
Sum of Row 5 = 18

Sum of Column 1 = 36
Sum of Column 2 = 174
Sum of Column 3 = 46
Sum of Column 4 = 50
Sum of Column 5 = 55
Press any key to continue . . . _
```

Problem (3)

Write a C++ program that asks the user to enter the number of row and the number of columns of 2-D array and to enter the elements in the array. Your program should find the **largest element** in each row and each column and display them. Here is a screenshot of the output:



```
C:\Windows\system32\cmd.exe
Please Enter The Number of The Rows: 3
Please Enter The Number of The Columns: 5

Please Enter the 1 Element for Row 1:: 1
Please Enter the 2 Element for Row 1:: 2
Please Enter the 3 Element for Row 1:: 3
Please Enter the 4 Element for Row 1:: 4
Please Enter the 5 Element for Row 1:: 5

Please Enter the 1 Element for Row 2:: 20
Please Enter the 2 Element for Row 2:: 34
Please Enter the 3 Element for Row 2:: 5
Please Enter the 4 Element for Row 2:: 60
Please Enter the 5 Element for Row 2:: 4

Please Enter the 1 Element for Row 3:: 1
Please Enter the 2 Element for Row 3:: 100
Please Enter the 3 Element for Row 3:: 34
Please Enter the 4 Element for Row 3:: 5
Please Enter the 5 Element for Row 3:: 667

The Largest Element in Row 1 = 5
The Largest Element in Row 2 = 60
The Largest Element in Row 3 = 667

The Largest Element in Column 1 = 20
The Largest Element in Column 2 = 100
The Largest Element in Column 3 = 34
The Largest Element in Column 4 = 60
The Largest Element in Column 5 = 667
Press any key to continue . . .
```


Problem (4)

Write a C++ program for calculating the average grade per student along with the student index. A class has 10 students, and each student has 3 grades (one for each midterm). The user will be asked to enter the 3 grades for each of the students and the program should calculate the average for each student. The output of the program is found in the screenshot below.

```
C:\Windows\system32\cmd.exe
Please Enter Grade<1> for Student<1> :: 1
Please Enter Grade<2> for Student<1> :: 2
Please Enter Grade<3> for Student<1> :: 3

Please Enter Grade<1> for Student<2> :: 10
Please Enter Grade<2> for Student<2> :: 20
Please Enter Grade<3> for Student<2> :: 30

Please Enter Grade<1> for Student<3> :: 70
Please Enter Grade<2> for Student<3> :: 34
Please Enter Grade<3> for Student<3> :: 20

Please Enter Grade<1> for Student<4> :: 50
Please Enter Grade<2> for Student<4> :: 60
Please Enter Grade<3> for Student<4> :: 70

Please Enter Grade<1> for Student<5> :: 12
Please Enter Grade<2> for Student<5> :: 34
Please Enter Grade<3> for Student<5> :: 14

Please Enter Grade<1> for Student<6> :: 15
Please Enter Grade<2> for Student<6> :: 68
Please Enter Grade<3> for Student<6> :: 13

Please Enter Grade<1> for Student<7> :: 13
Please Enter Grade<2> for Student<7> :: 13
Please Enter Grade<3> for Student<7> :: 8

Please Enter Grade<1> for Student<8> :: 35
Please Enter Grade<2> for Student<8> :: 67
Please Enter Grade<3> for Student<8> :: 45

Please Enter Grade<1> for Student<9> :: 34
Please Enter Grade<2> for Student<9> :: 12
Please Enter Grade<3> for Student<9> :: 45

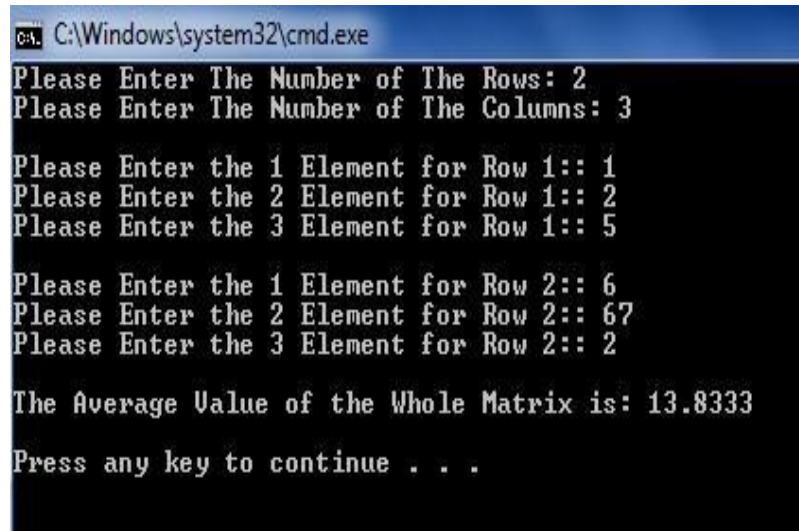
Please Enter Grade<1> for Student<10> :: 10
Please Enter Grade<2> for Student<10> :: 23
Please Enter Grade<3> for Student<10> :: 45

The Average Grade for Student 1 is ::2
The Average Grade for Student 2 is ::20
The Average Grade for Student 3 is ::41.3333
The Average Grade for Student 4 is ::60
The Average Grade for Student 5 is ::20
The Average Grade for Student 6 is ::32
The Average Grade for Student 7 is ::11.3333
The Average Grade for Student 8 is ::49
The Average Grade for Student 9 is ::30.3333
The Average Grade for Student 10 is ::26

Press any key to continue . . . _
```

Problem (5)

Write a C++ program that asks the user to enter the number of row and the number of columns of 2-D array. Then ask the user to enter the elements in the array to find the average value of the whole matrix and display it as shown in the screenshot below.



```
CA: C:\Windows\system32\cmd.exe
Please Enter The Number of The Rows: 2
Please Enter The Number of The Columns: 3

Please Enter the 1 Element for Row 1:: 1
Please Enter the 2 Element for Row 1:: 2
Please Enter the 3 Element for Row 1:: 5

Please Enter the 1 Element for Row 2:: 6
Please Enter the 2 Element for Row 2:: 67
Please Enter the 3 Element for Row 2:: 2

The Average Value of the Whole Matrix is: 13.8333

Press any key to continue . . .
```