UNIVERSITY OF MORATUWA
Faculty of Information Technology
B.Sc.(Hons.) in Information Technology and
B.Sc.(Hons.) in Artificial Intelligence
IN1101 – Programming Fundamentals

Level 1 – Semester 1

Q1.

Assume that you are the software developer of the "Matrix O" company and you are asked to develop a program to rotate a 2D Matrix. Details of the program to be implemented are mentioned below.

- Write a C program to create a 2D integer array of size 4x3. Insert values to the first column of the array from the keyboard and assign 0 for all the other elements.

- Write a function called ***displayArray()*** to display the contents.

```
void displayArray (int arr[][3], int row, int col);
```

- In your main function call ***displayArray()*** to display the array created.

- Rotate the content of the columns by 1 in the forward direction as shown below

Before Rotating

45	0	0
8	0	0
90	0	0
23	0	0

After Rotating

0	45	0
0	8	0
0	90	0
0	23	0

(ex: Move the contents of the 2nd column to 3rd column, 1st column to 2nd column and 3rd column to 1st column)

- Call ***displayArray()*** to display the contents after rotating.

Q2.

a) Write a program to create an integer array Arr1 of size 5. Get the values for the array as input from the user and store the values. The array should contain only positive integers. If user enters a negative value, display an error message to the user. After entering the values display the content of the Arrl.

Q3.

Write a program to do the following.

i. Create a 4 x 4 2D integer array to store marks obtained for four modules of four students as shown below.

Module ID	1000	1001	1002	1003
Student 1				
Student 2				
Student 3				
Student 4				

ii. Write a function called inputData() to input the marks to the array from the keyboard.

```
void inputData(int data[][4], int rowSize, int colSize)
```

User interface should be as follows,
Module 1000 :
Enter Marks of Student 1:
Enter Marks of Student 2:
Enter Marks of Student 3:
Enter Marks of Student 4:
Module 1001 :
Enter Marks of Student 1:
Enter Marks of Student 2:
Enter Marks of Student 3:
Enter Marks of Student 4:
…………………..
…………………..

iii. Write a function called **display** to display the marks.

```
void display(int data[][4] ,int rowSize, int colSize)
```

sample output of display function should be as follows,

```
              1000     1001     1002     1003
Student 1     34       23       23       89
Student 2     5        45       45       21
Student 3     46       65       77       34
Student 4     76       78       65       56
```

iv. Write a function called ***findHighestStudent*** to find the student who has taken the highest mark for the given module.

```
int findHighestStudent(int data[][4], int rowSize, int colSize, int moduleID)
```

v. Do the following in the main program.

a. Call the function ***inputData()*** to store the marks in the array created in section (ii).

b. Call the **display()** function

c. Call the function **findHighestStudent()** to print the student who obtained the highest mark for module ID 1002 and 1003

Q4.

Write a program to,

a) Create a 10 x 3 2D array to store some real numbers.

b) Write a function called ***inputData()*** to store the following data in the array.

```
void inputData (double account [] [3], int rowSize)
```

(You need to enter only the Initial Amount)

	Column 1 Initial Amount	Column 2 Interest	Column 3 Account Balance
Row 1	2300		
Row 2	3500		
Row 3	8500		
Row 4	5700		
Row 5	4500		
Row 6	7200		
Row 7	4800		
Row 8	2500		
Row 9	6500		
Row 10	5900		

c). Write a function called ***CalcInterest()*** to calculate and store the interest amount for each amount entered in the array. The interest amount is 4.5% of the initial amount. The Interest amount should be stored in Column 2.

```
void CalcInterest (double account[][3] , int rowSize)
```

d) Write a function called **CalcBalance()** to calculate and store the Account Balance for each amount entered in the array. The Total Account Balance is (Initial Amount + Interest). The Account Balance should be stored in Column 3.

```
void CalcBalance(double account[][3], int rowSize)
```

e) Write a function to find the total Amount of account balance in the array.

```
double findTotBalance(double account[][3] ,int rowSize)
```

f) Write a function to print all the Account Balances in the array.

```
void print(double account[][3]   int rowSize)
```

g) Do the following in the main program

(i) Call the function **inputData()** to store the values in the array.
(ii) Call the function **CalcInterest()** to calculate and store the interest.
(iii) Call the function **CalcBalance()** to calculate and store the Account Balance .
(iv) Print the total amount of account balance using **findTotBalance()** .
(v) Use **print()** function to print the details.