Mahidol University

ITCS 201 – Fundamentals of Programming
Week 9: Lab Assignments

Name: _____ **ID:** _____

Due: today or in a lab session next week

Instructions:

- Marking lab assignments will be done in the lab
- **Compile** and **Run** your program
- **Show** and **Explain** the output to the lecturer or the lab assistance.

---------- **Lab Assignments** ----------

In this assignment, you need to write C programs for the following problems.

Lab 1: Declare a 2-D array with 3 rows and 4 columns. Then randomly assign the array with 12 integers with the values between 0 and 9, inclusive. Then, print the contents of the array, with 3 rows and 4 columns. For readability, you should include a space between each number. The output should look like the following, with the **x**'s representing numbers in the array.

Example output:
x x x x x x x x x x x x

You may use the following code to get a random integer between 0 and 9.

```c
#include <stdio.h>
#include <time.h>
#include <stdlib.h>

int main() {
    // Initialization, should only be called once.
    srand(time(NULL));
    // Random an integer between 0 and 9
    int rand_number = rand() % 10;
    printf("Random number: %d\n", rand_number);
    return 0;
}
```

Lab 2: Extend the **Lab 1** to also compute the sum of each row and each column. Specifically, after the 2-D array has been randomly initialized with 12 integers, your program will then compute the sum of each row and each column, and print out the output.

For example, if the 2-D array is randomly initialized with the following values:

5	3	3	6
2	1	2	7
3	0	4	8

The expected output should be as shown below:

Example output:
Sum of rows: 17 12 15 Sum of columns: 10 4 9 21

Bonus Questions

Bonus Lab: Write a program to determine whether an input square matrix is symmetric. First the program will ask a user to input the number of row and column of the matrix. It should print out an error when the number of rows and columns are not equal (i.e., not a square matrix). Then the program will ask the user to enter the value of each element in the matrix. Finally, the program will print out whether an input square matrix is symmetric or not.

- If the matrix is symmetric, the program should print out:
  "The matrix is a symmetric".
- If the matrix is not symmetric, the program should print out:
  "The matrix is not a symmetric".

Note: The maximum number of row and column is 5.

Example output:
Enter the number of rows and columns: 3 4 The matrix must be a square matrix. Enter the number of rows and columns: 3 3 Enter element 0,0: 1 Enter element 0,1: 2 Enter element 0,2: 3 Enter element 1,0: 2 Enter element 1,1: 1 Enter element 1,2: 5 Enter element 2,0: 3 Enter element 2,1: 5 Enter element 2,2: 1 The matrix is symmetric. Enter the number of rows and columns: 3 3 Enter element 0,0: 0 Enter element 0,1: 0 Enter element 0,2: 0 Enter element 1,0: 1

```
Enter element 1,1: 1
Enter element 1,2: 1
Enter element 2,0: 2
Enter element 2,1: 2
Enter element 2,2: 2
The matrix is not symmetric.
```