

PDS Lab Section 11

Lab Day 10 – February 3, 2021

The top two lines of your programs must contain the following information:

//Roll No.: <Type in your roll no.>

//Name: <Type in your name>

You have to give different names to your C files and upload them in Moodle. Please read the instructions given below.

Document your programs meaningfully using appropriately named variable and sufficient amount of comments as suggested in an earlier email. There will be marks for documentation.

1. Write a C program consisting of the following functions.
 - a. **main:** Declare an integer array of size 16 and name it **binNum**. Fill the elements of **binNum** with random 1 and 0 values by calling **rand()**. Then call **recb2d** and **nonRecb2d** and display the returned decimal numbers along with the array of 1 and 0 values.
 - b. **nonRecb2d:** It is a non-recursive function and should take an array of 1s and 0s and array size *s* as two parameters and return the decimal equivalent considering the values in array as representing an unsigned binary number.
 - c. **recb2d:** It is a recursive function and should take an array of 1s and 0s and array size *s* as two parameters and return the decimal equivalent considering the values in array as representing an unsigned binary number.

The main function will also display the total number of additions and multiplications performed separately for the non-recursive and the recursive cases. You may use global variables if required.

Name your C program file as LD10_1_<roll_no>.c.

[15 Marks]

2. Fill a 6×6 matrix with random integers in the range 1 to 9.
 - a. Display the matrix properly formatted.
 - b. Display all the elements on the principal diagonal.
 - c. Check if the following submatrix occurs anywhere in it (for any *i*, where *i*=1 to 7). Display Yes or No. If yes, also display the value(s) of *i*, the starting position (row number and column number – to be counted starting from 0) of the submatrix(es) and the corresponding elements of the submatrix(es) in the 2D array.

i	i+1
i+1	i+2
 - d. Check if the sum of the elements of any row (counted starting from 0) is equal to the sum of the elements of another row. Display Yes or No. If Yes, display the elements of the corresponding rows.

Example for understanding the problem:

- a. Matrix is displayed below

```
3 1 2 4 2 9
6 2 3 5 7 4
5 8 5 2 1 6
2 8 6 3 4 3
8 6 9 4 5 7
6 5 2 4 7 2
```

b. Elements of the principal diagonal: 3 2 5 3 5 2

c. Yes

Value of i = 1 at row = 0, column = 1

Submatrix:

1 2

2 3

Value of i = 3 at row = 3, column = 3

Submatrix:

3 4

4 5

d. Sum of row 1 = Sum of row 2 = 27

Row 1

6 2 3 5 7 4

Row 2

5 8 5 2 1 6

Sum of row 3 = Sum of row 5 = 26

Row 3

2 8 6 3 4 3

Row 5

6 5 2 4 7 2

Name your C program file as LD10_2_<roll_no>.c.

[25 Marks]

3. Write a C program to read the first names (less than 15 characters) and ages (integer) of upto 10 students admitted to a department. User will first enter the number of such students for which inputs will have to be taken (maximum 10).

a. Print the names and ages of all students having the same name.

b. Print the names and ages of all students having identical ages.

Name your C program file as LD10_3_<roll_no>.c.

[10 Marks]

Submit your .c file in Moodle against the assignment submission link for Lab Day 10.