National University of Computer & Emerging Sciences (NUCES)
Islamabad, Department of Computer Science

Object Oriented Programming – Spring 2023

LAB 5

Learning Outcomes

In this laboratory, you will implement the concept using recursion.

Submission Instructions:

1. Create a single cpp file containing all the functions of the problems and main function.
2. Save the **cpp** file with the task number e.g. Q1.cpp
3. Now create a new folder with name *ROLLNO_SEC_LAB01* **e.g. i22XXXX_A_LAB05**
4. You need to display your roll no and name before the output of each question.
5. Move all of your .**cpp files (without the main function i.e., comment out themainfunction)** to this newly created directory and compress it into a **.zip file**.
6. Now you have to submit this zipped file on Google Classroom.
7. If you don't follow the above-mentioned submission instruction, you will be marked **zero.**
8. Plagiarism in the Lab Task will result in **zero** marks in the whole category.

Task 1:

Print all numbers in range [100,999] such that sum of digits at even position is equal to sum of digits at odd position

Prototype: int* sum_of_digits(int start, int end, int size_of_resultant_array)

Output:

110 121 132 143 154 165 176 187 198 220 231 242 253 264 275 286 297 330 341 352 363 374 385 396 440 451 462 473 484 495 550 561 572 583 594 660 671 682 693 770 781 792 880 891 990

Task 2:

Write a recursive function to reverse a string without reversing the characters of words in string. Example: "this is a car" becomes "car a is this".

Prototype: string reverse_string(string s)

Task 3:

Given an array A, make a triangle such that the bottom most level has all array elements. Then, at each level number of elements is one more than the previous level. Elements at each level is the sum of consecutive elements in the previous level.

Input: [1,2,3,4,5]

Output: [3, 5, 7, 9]

[8,12,16]

[20,28]

[48]

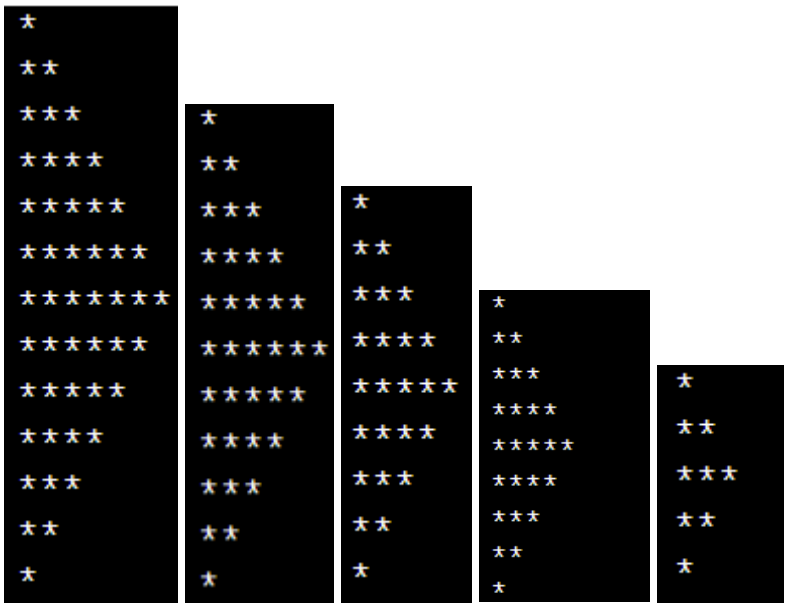
Prototype: int sum_of_sequence(int* arr,int size)**

Task 4:

Write a program that displays the following shape using nested for loop. Don't hard code the values. Ask user to input the number of lines that shape must cover, so that by changing a single variable the size of the whole shape changes

For example:

For n=13 , n=11 , n=9 , n=7 , n=5



Prototype: void diamond_pattern(int number)