

## Lab 11: Programming Fundamentals

### Strings, Functions and Pointers

#### Instructions

- Make your own files like Q1.cpp, Q2.cpp, zip the files with your roll number and upload on the slate. Someone failed to upload the task, will be awarded with zero marks.
  - *Apply proper checks and necessary conditions while taking input and calculating a value*
  - *Use proper Indentation in your code. Marks will be deducted if proper indentation is missing.*
  - When you are asked to write any function, you must write main function to check the correct working of that particular function(s).
  - Please read the questions carefully, read them twice even thrice to understand them completely.
  - In case of any query, please raise your hands and we will be there to solve your query.
  - Identify the appropriate data types of variables that you want to use in the program.
  - Always print the appropriate messages for the inputs and outputs of program in proper formatted style.
  - You are advised to delete your code while you are leaving lab, in case of plagiarism you can be awarded with F grade in lab.
  - Please concentrate, understand and code. Good Luck :)
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#### Q 1. Password Verifier

Imagine you are developing a software package that requires users to enter their own passwords. Your software requires that users passwords meet the following criteria:

1. The password should be at least six characters long.
2. The password should contain at least one uppercase and at least one lowercase letter.
3. The password should have at least one digit.

Write a program that asks for a password and then verifies that it meets the stated criteria. If it doesn't, the program should display a message telling the user why.

#### Q 2. Date Printer

Write a program that reads a string from the user containing a date in the form mm/dd/yyyy. It should print the date in the form March 12, 2014.

#### Q 3. Pig Latin

Write a program that reads a sentence as input and converts each word to Pig Latin. In one version, to convert a word to Pig Latin you remove the first letter and place that letter at the end of the word. Then you append the string 'ay' to the word. Here is an example:

**English:** I SLEPT MOST OF THE NIGHT

**Pig Latin:** IAY LEPTSAY OSTMAY FOAY HETAY IGHNTAY

**Q 4.** Given a length  $n$ , count the number of strings of length  $n$  that can be made using 'a', 'b' and 'c' with at most one 'b' and two 'c's allowed.

**Input:** Input contains an integer N denoting the length of the string.

**Output:** Output the count of the strings that can be formed under the given constraint.

**Constraints:**  $1 \leq N \leq 1000$

*Example:* **Input:** 1

**Output:** 3

**Explanation:**

1. a

2. b

3. c

**Input:** 2

**Output:** 8

**Explanation:**

1. aa

2. ab

3. ba

4. ac

5. ca

6. bc

7. cb

8. cc

**Q 5.** Given a string find the no of ways in which the string can be partitioned into two palindromes. Note that both these partitions should be non-empty, i.e. the lengths should be greater than 0.

**Palindrome-** A string is called palindrome if the reverse of the string is same as the string.

*Example-* ahjha

**Constraints:** Length of string is less than 20

*Example:* **Input :** asagghgg

**output:** 1

**Explanation:**

The above string can be partitioned into

asa — gghgg both these are palindromes. There is no other way of partitioning.

**Input :** asasasas

**output:** 4

**Explanation:** The above string can be partitioned into the following ways:

1. a — sasasas

2. asa — sasas

3. asasa — sas

4. asasasa s

**Q 6. Range Finder:**

The range of an array is defined as the difference between the maximum and minimum elements of the array. For example, if  $A = [1, 4, -1, 3, 2]$  then  $\text{Range}(A) = 4 - (-1) = 5$ .

You have to write a function to calculate the range of a given array A (of integers). You must use pointers and dynamic allocation (malloc/new).

The function must have arguments the form (int\*, int).

**Sample Input:** 5

12 42 52 1 -2

**Sample Output:** 54

**NOTE:** For an array of size 1, the answer should be 0

**Q 7. Element Shifter:**

Write a function that accepts an int array and the arrays size as arguments. The function should create a new array that is one element larger than the argument array. The first element of the new array should be set to 0. Element 0 of the argument array should be copied to element 1 of the new array, element 1 of the argument array should be copied to element 2 of the new array, and so forth. The function should return a pointer to the new array.