

Section 14

PDS Lab

Lab - 8

11.01.2023

Instructions:

Give sufficient comment against each statement in your program.
You should save each program with the file name as specified against each problem.
There is a partial credit even if your program does not run successfully for all the test cases as mentioned.

Problem 1

Write a program that will take the elements of a two-dimensional square array as input from user in row-major order, and print the elements in column-major order.

Your program should take the number of elements in each row or column as input from user. Then the program should ask the user for the array elements as input from user.

Input	Output
Number of elements in one row = 3 1 5 6 3 2 4 7 8 9	Column Major Order: 1 3 7 5 2 8 6 4 9

[Time: 20 Minutes]

[12 + 3 = 15]

Problem 2

A 2-D array element is a saddle point if it is the “maximum” in its column and the “minimum” in its row. Assume all array elements as having distinct values.

For example, the element with index (1, 1) (that is equal to 5) is a saddle point for the matrix below.

1 2 3 7 5 6 8 4 9

Write a program to find the saddle point of a matrix. Your program should take the shape of the 2D array (No of rows and number of columns) as input from user. Your program should also read the array elements from user.

Input	Output
Shape of the 2D array: 3, 3	The saddle point is 7

1 2 3 4 5 6 7 8 9	
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[Time: 25 Minutes]

[15]

Problem 3

Read a text message from the keyboard and store the message in an array. You can consider the maximum size of the message is 100. Write appropriate functions to do the following:

- Count the length of the message. Include the *string.h* library but do not use the methods in *string.h* library. Compare your result with *strlen()* method.
- Count the number of words.
- Count the number of sentences.
- Count the number of vowels.
- Store the frequency counts of each alphabet (not case-sensitive, both 'A' and small 'a' will be treated as the same) in the message.

Write a *main()* function and call all the functions for the message as input to the functions.

Input	Output
At the stroke of the midnight hour, when the world sleeps. India will awake to life and freedom.	Length counted without using library: 96 Length counted by <i>strlen()</i> : 96 Number of words: 18 Number of sentences: 2 Number of vowels: 29 Frequency count of each alphabet: 'a' = 5, 't' = 7, 'h' = 6, 'e' = 11, 's' = 3, 'r' = 4, 'o' = 6, 'k' = 2, 'f' = 3, 'm' = 2, 'i' = 6, 'd' = 5, 'n' = 4, 'g' = 1, 'u' = 1, 'w' = 4, 'l' = 5, 'p' = 1

[Time: 30 Minutes]

[5×3+5×2= 25]

Problem 4

Given two strings S1 and S2, write a program to print the number of times the first string S1 appears in the second string S2 as a substring.

For example, if S1 is “atg” and S2 is “batgccatgatatga”, then the program should print 3. Do not use any of the library functions defined under *string.h* library. Your program should read S1 and S2 from user.

Input	Output
S1: kgp S2: kharagpur	0
S1: pgh S2: adpghyxtpghmnpbgpgxhkke	2

[Time: 25 Minutes]

[10+10 = 20]

Problem 5

A word is called a palindrome if the word remains same if the characters in it are reversed. For example, MADAM, MALAYALAM, POP etc. Check, if a substring of the word is a palindrome. Note that there may be zero or more substring(s) as palindrome. Your program should print all the palindromes in the word. For example, if the word is COCOCOLAUA, then it will print COC, COCOC, AUA etc.

Input	Output
aabbbbaa	aa, bb, bbb, abbba, aabbbbaa
malayalam	malayalam, aya, layal, alayala, ala
india	No palindrome substrings present

[Time: 30 Minutes]

[25]