National University of Computer and Emerging Sciences



Lab Manual 10

Programming Fundamentals

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| Section | F |
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## Objectives

After performing this lab, students shall be able to:

* Have an improved problem-solving ability
* Design algorithm for basic problems
* Understanding of 2D arrays, function overloading, default function parameters

## Note: Implement generic logics.

1. Write C++ program to display a table that represents a Pascal triangle of any size. In Pascal triangle, the first and the second rows are set to 1. Each element of the triangle (from the third row downward) is the sum of the element directly above it and the element to the left of the element directly above it. Pascal triangle(size=5) below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1 |  |  |  |  |
| 1 | 1 |  |  |  |
| 1 | 2 | 1 |  |  |
| 1 | 3 | 3 | 1 |  |
| 1 | 4 | 6 | 4 | 1 |

1. Write a C++ program in which you have an array of size 20 and fill it randomly with values. Now process the array so that its prime numbers are moved to the left side of the array and the odd numbers are moved to the right side of the array. If a number is prime and odd as well then move it to the left side. And then display the processed array.

**Sample Array:** 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20  
**Output:** 2 3 5 7 11 13 17 19 4 6 8 10 12 14 16 18 20 1 9 15  
Order of numbers can vary in output but condition must be satisfied.

1. Write a program that asks the user for a string and then it reverses the word which is after the even count of the space.

**Sample Input:**

Each word after even space count in this array will be reversed.

**Sample Output:**

hcaE word retfa even ecaps count ni this yarra will eb reversed.

1. Write a program that asks the user for a string and then it turns upper case letters to lower case and lower case letters to upper case. If there is any character other than the alphabets, it will removes that character from the array.

**Sample String:** I’m goinG to ConVert this String.

**Output:** iM GOINg TO cONvERT THIS sTRING.

1. What is the output of the code segment below?

int main()

{

int nums[9] = {13, 11, 15, 9, 7, 5, 8, 3, 1};

int n = mys(nums, 9);

cout << n << endl;

return 0;

}

int mys(int array[], int len)

{

int n = 1;

for (int i = 1; i < len; i++) {

if (array[i] < array[i - 1])

n++;

else

n = 1;

}

return n;

}

**Submit this in a text file or word file.**

1. Write a function **equalsIgnoreCase**, which receives two char arrays and their sizes, and returns true if the two char arrays contain the same characters irrespective of the case. For example, for character arrays {'a', 'B', 'c'} and {'A', 'b', 'c'}, the function returns true, but for {'a', 'B', 'c'} and {'a', B'}, or {'a', 'B', 'c'} and {'X', 'b', 'z'}, the function returns false. The prototype would be:

bool equalsIgnoreCase( char[] ar1, int size1, char ar2[], int size2);

1. Write a program and initialize a 5x5 2D array with your values. Print this matrix and then ask the user to choose a row and a column. Display the common values of that row and column. Now find the greatest common divisor (GCD) for the elements of row and column separately and display it. Let the GCD of row be R and GCD of column be C. Now find the GCD of R and C and display it as well.  
     
   **SAMPLE MATRIX:**

**1 2 3 4 5**

**6 4 7 8 9**

**10 8 11 12 13**

**14 16 15 16 17**

**18 32 19 20 21**

**Sample Input:**

**Row number: 1  
Column number: 2**

**Output:  
GCD for row: 60  
GCD for column: 32  
GCD for computed GCDs: 480**