Fast National University of Computer and Emerging Sciences,

Lahore

Dept. of computer Science / Data Science

Programming Fundamentals Lab

Graded Homework

(BCS-1K)

Objectives

- **1-D integer array**
- **1-D Character Array**
- **Functions**
- **Function with arrays**
- **C strings**
- **Passing Array into the function**

Introduction

Functions

A function is a group of statements that is given a name, and which can be called from some point of the program. The most common syntax to define a function is:

```
type name (parameter1, parameter2, ...)
{ statements
}
```

Where:

- **type** is the datatype of the value returned by the function.
- **Name** is the identifier by which the function can be called.
- **Parameters** (as many as needed): Each parameter consists of a datatype followed by an identifier, with each parameter being separated from the next by a comma. Each parameter looks very much like a regular variable declaration (for example: int x), and in fact acts within the function as a regular variable which is local to the function. The purpose of parameters is to allow passing arguments to the function from the location where it is called from.

- **Statements** is the function's body. It is a block of statements surrounded by braces { } that specify what the function actually does.

Example:
```
// function example
#include <iostream>
using namespace std;

int addition (int a, int b)
{
        int r;
        r=a+b;
        return r;
}
int main ()
{
        int z;
        z = addition (5,3);
        cout << "The result is" << z;
}
```

Output: The result is 8

Dealing with Char Arrays

```
#include <iostream>
#include"string"
using namespace std

int main() {
    const int MAX_SIZE = 100;  // Defining a maximum size for the char array.
    char input[MAX_SIZE];

    // Taking input in a char array.
    cout << "Enter a string (less than " << MAX_SIZE << " characters): ";
    cin.ignore();
    cin.getline(input, MAX_SIZE);  // Using getline to read a full line (including spaces).

    // Print the char array based on a condition.
    // For this example, we'll only print characters that are not vowels.
    cout << "String after removing vowels: ";
    for (int i = 0; input[i] != '\0'; i++) {  // Iterate until the null character.
        char c = input[i];
        if (c != 'a' && c != 'e' && c != 'i' && c != 'o' && c != 'u' &&
            c != 'A' && c != 'E' && c != 'I' && c != 'O' && c != 'U') {
            cout << c;
        }
    }

    cout << endl;

    return 0;
}
```

Problems

Question No 1

Raising a number to a power p is the same as multiplying n by itself p times. Write a function called power that takes two arguments, a double value for n and an int value for p, and return the result as double value. Use default argument of 2 for p, so that if this argument is omitted the number will be squared. Write the main function that gets value from the user to test power function.

```
Enter the base number: 25
Enter the exponent (default is 2 if omitted): 3
25 raised to the power 3 is: 15625
```

Question No 2

Write a program for a simple c++ calculator which have different functions for different operations. Make a menu base selection screen using switch statement. Ever operation should have its own function. Calculator should have following operations.

Note: Your variables define has local scope. Sum your Roll_No (which is Globally define) with the result.

```
Menu:
1. Addition
2. Subtraction
3. Multiplication
4. Division
5. Exit
Enter your choice: 2
Enter First number: 23
Enter Second number: 20
Result: 12348
```

Question No 3 (function with parameter passed by value)

Implement the following function in C++ called that takes in as input a number N and prints the

first N number of the fibonacci sequence. Please also write the driver program for N = 10 and 15.

void fibonacciSeries(int n)

```
First 10 Fibonacci numbers:
0 1 1 2 3 5 8 13 21 34

First 15 Fibonacci numbers:
0 1 1 2 3 5 8 13 21 34 55 89 144 233 377
```

Question No 4 (function with parameter passed by reference):

Write a program in C++ (using function with parameter passed in by reference) for finding the

character grade against marks out of 100. The character grade is determined as follows:

If the marks are more than 80 the grade is A

If the marks are more than 65 but less than 80 the grade is B

If the marks are more than 50 but less than 65 the grade is C

If the marks are less than 50 the grade is F

The function's signature should be as follows:

void calculateGrade(int marks, char &grade)

The driver program should include a loop that lets the user repeat the grade calculation until the user enters -1.

```
Enter marks (or -1 to exit): 23
Grade: F
Enter marks (or -1 to exit): 65
Grade: C
Enter marks (or -1 to exit): 76
Grade: B
Enter marks (or -1 to exit): -1
```

Question No 5

Write a function void printDiagonal() for printing number in diagonal excluding multiple of 3, as shown in sample output. **Note:** Input shall be taken within the function and not as a parameter.

```
Enter the number of rows/columns: 7
1
  2
      4
        5
            7
```

Question No 5

Write a C++ function to find and print all unique elements of a given 1 D array of integers.

```
Unique elements in the array are: 20 40 50 60
```

Question No 6

Function to cyclically rotate an array by a given factor d

Input:
arr[] = {1, 2, 3, 4, 5, 6, 7}, d = 2
Output: *3 4 5 6 7 1 2*

Input: *arr[] = {3, 4, 5, 6, 7, 1, 2}, d=2*
Output: *5 6 7 1 2 3 4*

Question No 7

Write c++ program function ReverseString() which takes string as user input and finds the reverse of that string word by word. Note: **Implement through 1D character arrays.**

```
Enter the string: Fast Nuces
tsaF secuN
```

Question No 8

Write a C++ function, which will take a static array as input, array size and a number as parameters. The function will loop through the array to find if that array contains the number. If found, the function will return that index number on which that number is found, otherwise return -1. The function prototype will be: int Search(int arr[], int size,int num).

```
Input array: 4 5 6 7 8 10
Enter the number to be found: 8
The value 8 is present at index 4
```

Question No 9

Write a C++ function which will take static array as input and then return true if the string is palindrome otherwise return false and also display the suitable message. The function prototype shall be:

bool PalindromeString (char arr[],int size)

```
Input array: 12344321
The input string 12344321 is a palindrome

Input array: 12345321
The input string 12345321 is not a palindrome

Input array: Afifa
The input string Afifa is a palindrome
```