Lab 9: Programming Fundamentals
Strings and Functions

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 required to complete all the tasks in lab time. Evaluation will be started 30 minutes before end time.*
- 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 :)

Q 1. Write a program that finds the smallest and largest substring in a given string. For example, if string contains following value = 'My Village is a beautiful place', your program should print "a" and beautiful.

Q 2. Write a Menu Driven C++ program that creates a character array/string by taking input from user and perform following tasks by displaying menu to user:

- Calculate length of string.
- Count number of words in string.
- Check a string is palindrome or not.
- Find a word within the array. If found display its starting position.
- Convert a string in lowercase.
- Convert a string in uppercase.

Q 3. Write a function in c++ which takes an array of integers & size of array as arguments and sorts the array in descending order.
You should test the function by calling it in main function.

Q 4. Create a calculator that takes a number, a basic math operator (+,-,*,/,$\hat{}$), and a second number all from user input, and have it print the result of the mathematical operation. The mathematical operations should be wrapped inside of functions.

Q 5. Write a program in C++ to check whether two given strings are an anagram.
Test Data :
Input the first String : spare
Input the second String : pears
Expected Output :

spare and pears are Anagram.

Q 6. Write a function named coinToss that simulates the tossing of a coin. When you call the function, it should generate a random number in the range of 1 through 2. If the random number is 1, the function should display heads. If the random number is 2, the function should display tails. Demonstrate the function in a program that asks the user how many times the coin should be tossed and then simulates the tossing of the coin that number of times.

Q 7. Write a program that creates a two-dimensional array initialized with test data. Use any data type you wish. The program should have the following functions:

- getTotal. This function should accept a two-dimensional array as its argument and return the total of all the values in the array.
- getAverage. This function should accept a two-dimensional array as its argument and return the average of all the values in the array.
- getRowTotal. This function should accept a two-dimensional array as its first argument and an integer as its second argument. The second argument should be the subscript of a row in the array. The function should return the total of the values in the specified row.
- getColumnTotal. This function should accept a two-dimensional array as its first argument and an integer as its second argument. The second argument should be the subscript of a column in the array. The function should return the total of the values in the specified column.
- getHighestInRow. This function should accept a two-dimensional array as its first argument and an integer as its second argument. The second argument should be the subscript of a row in the array. The function should return the highest value in the specified row of the array.
- getLowestInRow. This function should accept a two-dimensional array as its first argument and an integer as its second argument. The second argument should be the subscript of a row in the array. The function should return the lowest value in the specified row of the array.

Demonstrate each of the functions in this program.

Q 8. A teacher has five students who have taken four tests. The teacher uses the following grading scale to assign a letter grade to a student, based on the average of his or her four test scores.
Test Score Letter Grade
90 to 100 A
80 to 89 B
70 to 79 C
60 to 69 D
0 to 59 F
Write a program that uses an array of character arrays to hold the five student names, an array of five characters to hold the five students letter grades, and five arrays of four double s to hold each students set of test scores. The program should allow the user to enter each students name and his or her four test scores. It should then calculate and display each students average test score and a letter grade based on the average.

Input Validation: Do not accept test scores less than 0 or greater than 100.

Q 9. write a program that use switch and loop statements and then solve the following conversions. Make function of each type of conversion which takes a number and prints its equivalent number system.

- Decimal to binary conversion
- Decimal to hexadecimal
- Decimal to octal
- Octal to binary
- Octal to hexadecimal
- Octal to decimal