FAST School of Computing

Object Oriented Programming – Spring 2023

Cyber Security Department

LAB 05

Recursion in C++

Learning Outcomes

In this lab you are expected to learn the following:

- Advanced Implementation of Recursion Technique

Note: Plagiarism(from some else or internet) in any 1 question will lead to zero marks in the whole lab task.

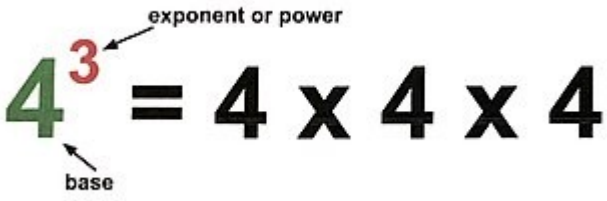
Run the test cases for problem 1, 3, 5 and 6

Problem 1:

Write a recursive function to calculate the power of the given number.

Input: 5, 3 **Output**: 125

int pow(int b,int e)



Problem 2:

Write a recursive function that receives three arguments:

(i) a character ch; (ii) number of lines lines and (iii) a starting point; and print the following pattern on screen. **void Pattern1(char ch,int lines, int start)**

Example:

void Pattern1('*',5,1) will print following pattern on screen

```
----*
---**
--***
-****
*****
-****
--***
---**
----*
```

Problem 3:

Write a recursive function to produce multiplication of two numbers without using ***** operator.

int product(int a, int b)

Problem 4:

Write a recursive function to print the following pattern:

void Pattern2(5,1,1) would print:

```
A
B C
D E F
G H I J
K L M N O
```

First parameter tells total number of rows

Second parameter would manipulate the alphabetical values

Third parameter will deal with the values in a row

Problem 5:

Write a recursive function that, given two strings, returns whether the first string is a sub sequence of the second.

For example:

given ***hart*** *and* ***cathartic***, you should r**eturn true,**

given ***bat*** *and* ***table***, you should **return false.**

bool SubString(char str1[], char str12[], int length1, int length2)

Problem 6:

Lets check the fittest number.

Consider it as first series:

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19,.....

Now, after removing every second element we get following series:

1, 3, 5, 7, 9, 11, 13, 15, 17, 19,.....

Repeating the process, we get:

1, 5, 9, 13, 17.....

Continue this process till two numbers are left.

User will enter a number and you have to find that whether the number has survived or not.

Input: N = 5 Output: 1

Explanation: 5 is a fittest number because it survives after all iterations.

int fittest (int number)

Submission Details:

1. Save single .cpp file with your roll no and lab number e.g. i22-XXXX_Lab5.cpp
2. Take screen shot of running test cases of tasks.
3. Zip the .cpp file and screen shots (Do not create .rar file) with roll no and lab no. e.g. i22-XXXX_Lab5.zip.
4. Submit the zip file on google class room.