# Object Oriented Programming Lab Spring 2019
# Lab 4: Recursion

## Instructions

- Make your own file submission.cpp. Don't include your main function while submitting the file.
- Please read the questions carefully, read them twice even thrice to understand them completely.
- In case of any query, please raise your hand and we will be there to solve your query.
- Please concentrate, understand, and code. Good Luck : )

## Task 1

Write a function `func1` that prints out the numbers 123456789987654321 using iteration.

## Task 2

Rewrite the solution to the problem in Task 1 using recursion.

## Task 3

Write an iterative function `count` that takes an integer n as parameter and returns the number of digits in that number e.g. n=512364 should return 6.

## Task 4

Rewrite solution to the problem in Task 3 using recursive function `countWithRecursion`.

## Task 5

Write an iterative function `pow` that computes the power of base b and exponent e, and returns its computed value as integer.
Examples:
pow (2,3) will return 8.

## Task 6

Write a recursive function `powWithRecursion` that computes the power of base b and exponent e, returns its computed value as integer.
Examples:
powWithRecursion(2,3) will return 8.

## Task 7

Write an iterative function `DecimalToOctal` that receives an integer n as argument and returns the number of digits greater or equal to 5 in the octal representation of n.
Examples are:
DecimalToOctal (55) will return 2 // (55)10 = (67)8
DecimalToOctal (92) will return 0 // (92)10 = (134)8

## Task 8

Rewrite the solution to the problem in Task 7 using recursive function.

## Task 9

A palindrome is a string that is spelled the same way forward and backward. Some examples of palindromes are "radar" and "madam" etc. Write a recursive function `isPalindrome` that takes a string str as argument and check whether it's a palindrome or not.

Hint: function will receive three arguments, i.e. bool isPalindrome (char *str, int s, int l). s is the starting index and l is the length of the string.
Example:
isPalindrome("MADAM",0,5) will return true

## Task 10

Write a recursive function `Reverse` that takes a string and the length of the string as arguments and returns another string with its characters in the reverse order.
Example:
Reverse("HELLO",5) will return "OLLEH"

## Task 11

The Fibonacci sequence is a series of numbers where the next term is the sum of previous two terms. The first two terms of the Fibonacci sequence is 0 followed by 1. The Fibonacci sequence: 0, 1, 1, 2, 3, 5, 8, 13, 21.
Write a function `fab` that takes the last index of series as argument and returns the value that occurs at the last index in Fibonacci series.
Examples are:
Fab(4) will return 3
Fab(6) will return 8

## Task 12

Write a recursive function `replace` that changes all the occurrences of character 'f' in String 's' to character 't' and then returns the changed string. For example,

replace (steve, e, a) // it will return stava

replace (radar,a,o) // it will return rodor

## Task 13

Write a recursive function `FindMax` which takes 3 arguments: an array of type integer, int index, int length and returns the maximum value of the array. Index is the starting index of the array, while length is the length of the array.

## Task 14

Write a recursive function `PrintPattern` to print pattern that takes two integer arguments n and k. n is the starting number while k is the ending limit.
Example:
PrintPattern(1, 5) will print the following pattern.

1+2++3+++4++++5+++++4****3***2**1*

For printing a character inside PrintPattern() you are required to write another recursive function `PrintChar,` that takes two arguments char ch and int t.This function would print a char ch at t times on screen.
Example:
PrintChar('+',5) will print on screen +++++

Hint: In next three questions you are required to use the previously defined PrintChar() function.

## Task 15

Write a recursive function `PrintPattern3` that receives two arguments: (i) a character ch; (ii) number of lines l; and print the following pattern.
Example:
PrintPattern3 ('*',5) will print following pattern on screen.
*
**
***
****
*****

## Task 16

Write a recursive function `PrintPattern4` that receives three arguments: (i) a character ch; (ii) number of lines lines and (iii) a starting point; and prints the following pattern.
Example:
PrintPattern4 ('*',5,0) will print the following pattern on screen

*****
-****
--***
---**
----*

## Task 17

Write a recursive function `PrintPattern6` that receives three arguments: (i) a character ch; (ii) number of lines lines and (iii) a starting point; and print the following pattern. Example: PrintPattern6('*',5,1) will print following pattern on screen

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