Data structures and Algorithms LAB – BSEF19

(Morning and Afternoon)

Lab 02 – 04-03-2021

Task 01 (60)

1. Write programs to run the iterative and recursive functions for computing factorial of an integer. The functions are provided in the file recursion.txt. [20 marks]
2. Write programs to run the iterative and recursive functions for computing ***N***th Fibonacci of an integer. Two variants of recursive functions are provided in the slides, and you have to search the iterative version from internet or have to develop your own. [30 marks]

Fill the time taken by the execution of the function in the following table for above tasks. [10 marks]

N, the parameter	Iterative Factorial	Recursive Factorial	Iterative Fibonacci	Recursive Fibonacci**1**	Recursive Fibonacci**2**	Comments/Remarks
3						
5						
10						
11						
12						
15						
30						
50				---		
100				---		
1000				---		
10000				---		
100000				---		
10000000				---		

Also mark ✗ at left of the cell in above where you think (somehow) result is incorrect

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Task 02 (10 each)

1. Write a recursive function called ***sumover*** that has one argument n which is an unsigned integer. The function returns a double value which is the sum of reciprocals of the first n positive integers. For example, sumover(1) returns 1.0 and sumover(2) returns 1.5 as it is 1/1+1/2.
2. Write a recursive function to compute the AVERAGE of an array of floats of size N, and also a program to test it.
3. The Binomial coefficient provides n-choose-k whose recursive formula is given as under. Write a recursive function to compute value of ***int nchoosek(int n, int k)***, and also a program to test it.

The recursive formula for n-choose-k is the following:

$$\binom{n}{k} = \binom{n-1}{k-1} + \binom{n-1}{k}$$

The base case is: $\binom{n}{n} = \binom{n}{0} = 1$

Sr #	N	K	Binomial coefficient

4. Write the recursive function ***void printBin(int n)*** to print the binary number equivalent to its integer parameter. You have to write the main function which call the above-mentioned function in a loop to print first 50 binary numbers, one per line.

   HINT: Use remainder and quotient of n divided by 2.

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