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**BST-AMS-12 :** Advanced Programming

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**Dates :** 21.11.2022 (**assigned), and** 19.11.2022, 10:59 (due date)

**Exam Type :** Homework 1

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**Question.** Our goal was to write a program solve the approximation problem below. However, our software developer has quit the job and we need you to complete the missing (dotted) parts in the program. Good luck.

**Problem:** The exponential function can be evaluated by the following infinite series:



Most of the time engineers are satisfied with an approximate value of the series. Thus, instead of infinite series they use a finite series to obtain a *series approximation* as:



Write a program to implement this approximate formula to obtain an approximate value for the exponential function and to compute the percent relative error as



You can use the math library function *exp( )* for *ex* in your program to determine the "*true solution*." That is, your program needs to obtain x and N from the user and print the approximate result and %error.

---------------------- Below is the partial code and you need to complete

#include <stdio.h>

#include <math.h> // Math header file

**// Function prototypes**

double ………………………………………….

double ………………………………………….

long ………………………………………….

int main() {

double x, trueSolution, approximateSolution, relativeError; int n;

printf("Please enter x and N for which you want the approximate series be computed\n");

scanf("%lf%d",&x,&n); // read x and N

trueSolution = **……………………………………………………..…………………………………**

//compute the approximate value for e^x using N terms

approximateSolution = ………………………………………………………………………………

// Display result

printf("The exact solution is : %lf\n", trueSolution);

printf("For the N = %d terms the approximates solution is : %lf\n", n, approximateSolution);

relativeError = ………………………………………………………………….;

printf("The relative error is : %lf \n", …………………………………………);

return 0;

};

// Function definitions

double approximateFunction(double x, int N){

double result = 0;

for (int i = 0; i<= N; i++)

result += …………………………………………………………………….

return result;

};

double myPowerFunct(double y, int N){

double result = 1;

…………..

return result;

};

long myFactorial(int K){

if (K<=1)

return 1;

else

return ……………………………………………………………………………..

};

***Notes***

1. *The above main program is almost complete, you will need to fill the dotted areas only. Make sure you test the code, run several times, and understand well.*
2. *Mail your homework (to*  [hasan.dag.extern@srh.de](mailto:hasan.dag.extern@srh.de)) *file named as* ***yourNameLastName\_HW1.c***
3. *Failure in naming your files properly will cause loss of grade (up to 5%) on your homework.*