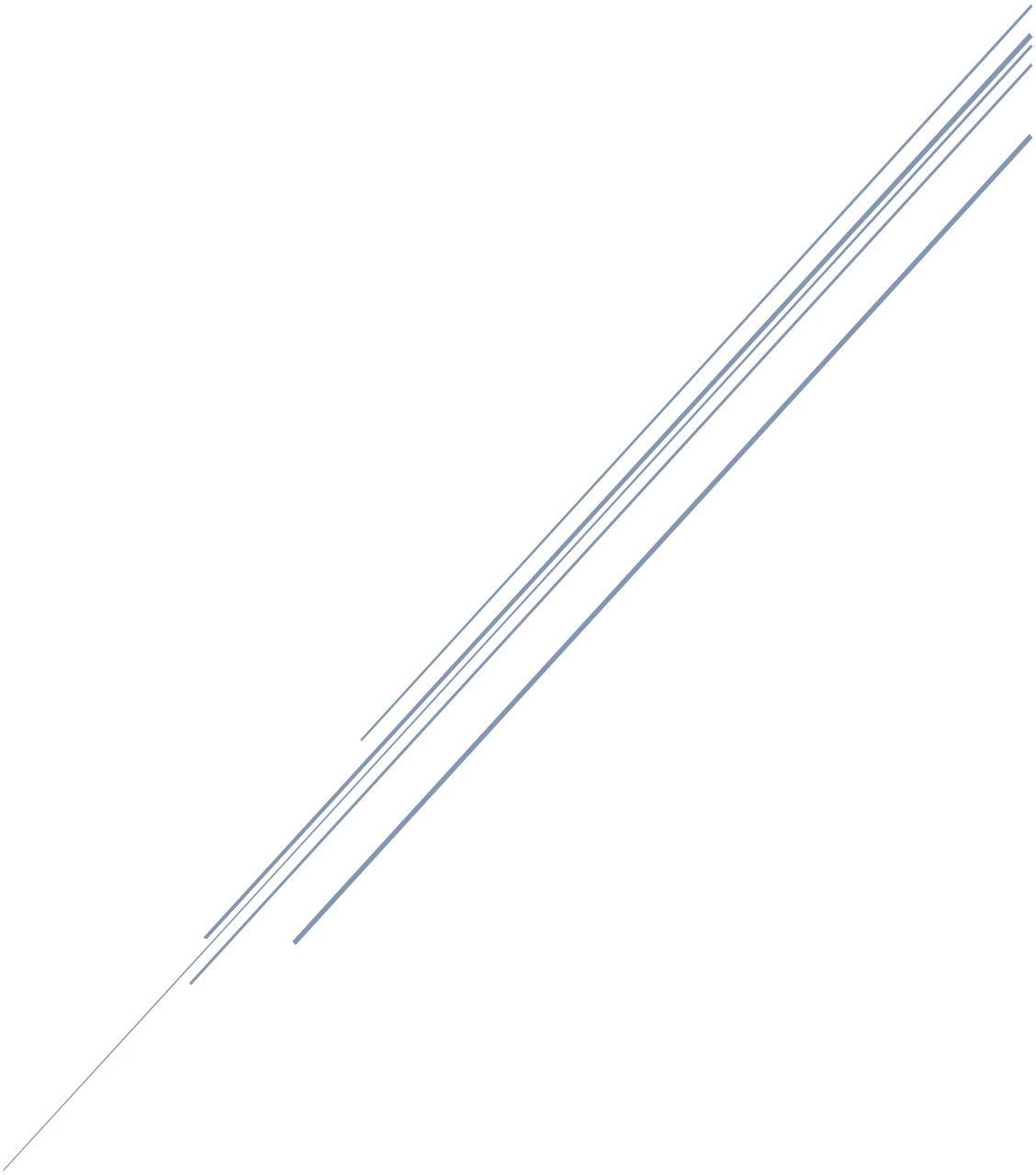
LAB# 10 TAYLOR SERIES EXPANSION

CST8233 W2021



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LAB OBJECTIVE

The objective of this lab is to get familiar with the following:

1- Taylor series Expansion

Earning

To earn your mark for this lab, each student should finish the lab's requirements within the lab session and demonstrate the working code to the instructor.

STATEMENT OF THE PROBLEM:

The Taylor series expansion of $f(x) = \ln x$ around a is given as:

$$\ln x = \sum_{n=1}^{\infty} (-1)^{n-1} \frac{(x-a)^n}{n}$$

Part A

Write a C\C++ program which takes x as input and computes the series for up to **10 terms**. Your program should print the final value of $f(x) = \ln x$ around $a = 1$ obtained along with the absolute and relative errors.
Your program needs to get the true value of $f(x) = \ln x$ using the built-in function in C\C++.

Run your program for x = 0.5, 1.5, 2.0, and 3.3. Report the results you get for each one. How accurate are your results?

Part B

Run your program for the same value of x as in part A but change the number of terms to be **100**. Report the results you get for each one. How accurate are your results?

Sample Test:

Enter the value of x: 1.5

The number 0f terms: 10

True value = 0.405465

Approximate value = 0.405435

Absolute error=0.000030

Relative error =0.007512