

**Assignment 05**

Second Year BS (Honours) 2020-2021

Course Title: Math Lab II (Fortran), Course Code: AMTH 250

Department of Applied Mathematics, University of Dhaka

Name:**Roll No:****Group:**

[Write a FORTRAN program to solve each of the following problems. Use files for input/output unless specified otherwise. Name the files and the code according to the assignment and problem no., e.g., for problem no. Y of assignment X, input & output file names must be 'inXqY.txt' and 'outXqY.txt' respectively.]

Day-1

1.	Use appropriate Lagrange interpolating polynomials to approximate $f(0.43)$ if $f(0) = 1$; $f(0.25) = 1.64872$; $f(0.5) = 2.71828$; $f(0.75) = 4.48169$	[5]
2.	Consider the following system of linear equations $3x_1 + 6x_2 + 2x_3 = 0$ $3x_1 - x_2 + x_3 = 1$ $3x_1 + 3x_2 + 7x_3 = 4$ Use Jacobi's iterative technique to find approximations $x(k)$ starting with $x(0) = (0; 0; 0)^t$ within 10^{-5} .	[10]
3.	Use the Gauss-Seidel iterative method to approximate the solution with a tolerance of 10^{-2} of the following linear system $x_1 - x_3 = 0.2$ $-\frac{1}{2}x_1 + x_2 - \frac{1}{4}x_3 = -1.425$ $x_1 - \frac{1}{2}x_2 + x_3 = 2$	[10]
4.	Use the SOR method with $w = 1.2$ to solve the following linear systems with a tolerance $TOL = 10^{-3}$ in the l_∞ norm. $4x_1 + x_2 - x_3 = 5$ $-x_1 + 3x_2 + x_3 = -4$ $2x_1 + 2x_2 + 5x_3 = 1$	[10]

Day-2

5.	<p>Evaluate the integral</p> $I = \int_0^{7.5} (1.5x^3 - 7x - 1 - e^x)dx$ <p>using the following methods:</p> <p>(a) Trapezoidal method. Divide the whole interval into 30 subintervals.</p> <p>(b) Simpson's 1/3 method. Divide the whole interval into 18 subintervals.</p> <p>Compare the results of each method in a suitable table with suitable headings.</p>	[15]
6.	Use the Simpson 3/8 rule to find approximations to $\int_0^{\frac{\pi}{4}} e^{3x} \sin(2x) dx$ with $n = 12$	[10]
7.	Use Weddle's rule to approximate $\int_e^{2e} \frac{1}{x \ln x} dx$ with $n = 30$	[10]