

Assignment 02

Second Year BS (Honors) 2023-2024

Course Title: Math Lab II, Course Code: AMTH-250

Department of Applied Mathematics, University of Dhaka

Name:

Roll:

Group:

[Write a FORTRAN program to solve each of the following problems. Always use **files** named according to the assignment no. and problem no. to take input and show output unless **specified otherwise**, e.g., for problem no. **Y** of assignment no. **X**, input and output file names should be 'in_aXqY.txt' and 'ot_XqY.txt' respectively.]

1. A hydrologist is tracking the water level of a river (in meters) at various times of the day to assess flood risks. The following data has been recorded:

Time (hours)	Water Level (meters)
2:00 AM	1.2
6:00 AM	1.5
10:00 AM	1.9
2:00 PM	2.3
6:00 PM	2.1
10:00 PM	1.8

Estimate the river's water level at 8:00 AM and 4:00 PM using suitable difference formula.

2. The set of the following five data points is given:

x	1	2	4	5	7
y	52	5	-5	-40	10

Determine the interpolated value for $x = 3$ using

- a. Lagrange's interpolation formula
- b. Newton's divided difference formula

3. Values of x (in degrees) and $\sin(x)$ are given in the following table:

x (in degrees)	sin(x)
15	0.2588190
20	0.3420201
25	0.4226183
30	0.5
35	0.5735764
40	0.6427876

Determine the value of $\sin(38^\circ)$.