CSE2202: Numerical Methods Lab

Online 5 B2

Instructions:
2 sets of problems are given for online lab test.
Set 1: Curve Fitting Using Lagrange Interpolation
Set 2: Curve Fitting Using Newton Divide Difference Interpolation.
If you choose Set 1 you will get 20% penalty and for choosing between Set 3 there is no penalty.
After completing your code you must upload you code and output in the following google form link.
Time for Set 1: 30 Minutes
Time for Set 2: 40 Minutes

Problem Description: The following table list the average temperature of Bangladesh from the year 1993 to 2013:

Year	Average Temperature in Degree Celsius
1993	25.00317
1994	25.26167
1995	25.41583
1996	25.44025
1997	24.85925
1998	25.52417
1999	25.71483
2000	25.15017
2001	25.337
2002	25.38033
2003	25.28083
2004	25.38633
2005	25.532
2006	25.76567
2007	25.34375
2008	25.3895
2009	25.90492
2010	25.94033
2011	25.20508
2012	25.53358
2013	25.9675

1. Write a program that fit 5th degree Lagrange Interpolating Polynomial and use the interpolating polynomial to find the average temperature form the year 2020 to 2040 in steps of 1 year using Lagrange Interpolation formula and also calculate Mean Squared Error (MSE) of given data. Your program also print the following table: [8]

Year	Approximate Average Temperature in Degree Celsius
2020 2021 . 2040	

The MSE usually measure of the quality of an approximated value—it is always non-negative, and values closer to zero are better.

Equation for calculating MSE:

$$MSE = \frac{1}{n}\sum_{i=0}^{n}(y_i - \tilde{y_i})^2$$

$$n = size\ of\ the\ data$$

$$y_i = trure\ calue\ of\ average\ temerature$$

$$\tilde{y_i} = approximated\ value\ of\ average\ temerature$$

2. Write a program that fit 3rd degree Newton Divide Difference Interpolating Polynomial and use the interpolating polynomial to find the average temperature form the year 2020 to 2040 in steps of 1 year using Newton Divide Difference Interpolation formula and also calculate Mean Squared Error (MSE) of given data. Your program also print the following tables and coefficients of interpolating polynomial: [10]

Year	Approximate Average Temperature in Degree Celsius
2020 2021 . 2040	

Function	Value
Mean Squared Error (MSE)	
A0	
A1	

A2	
A3	

The MSE usually measure of the quality of an approximated value—it is always non-negative, and values closer to zero are better.

Equation for calculating MSE:

$$MSE = \frac{1}{n}\sum_{i=0}^{n}(y_i - \tilde{y_i})^2$$

$$n = size\ of\ the\ data$$

$$y_i = trure\ calue\ of\ average\ temerature$$

$$\tilde{y_i} = approximated\ value\ of\ average\ temerature$$