Instructions:
2 sets of problems are given for online lab test.
Set 1: Curve Fitting Using Linear Regression
Set 2: Curve Fitting Using Polynomial Regression.
If you choose Set 1 you will get 20% penalty and for choosing between Set 2 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
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 a straight line to above data and use the equation to approximate the average temperature form the year 2020 to 2040 in steps of 1 year using linear regression and also calculate Correlation Coefficient R of predicted values. If the Correlation Coefficient R is *positive* then print strong positive relation, if the Correlation Coefficient R is *negative* then print strong negative relation and if the Correlation Coefficient R is zero then print no relationship at all. Your program also print the following table: [8]

Year	Approximate Average Temperature in Degree Celsius
2020	
2021	
.	
2040	

[Note: Correlation coefficient formulas are used to find the relationship between data. The formula return a value between −1 and 1.]

Equation for calculating Pearson Correlation Coefficient R:

$$R = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

$$n = size\ of\ the\ data$$
$$x_i = independent\ varialble$$
$$y_i = dependent\ vaiable$$

2. Write a program that fit a 3rd order polynomial to above data use the equation to approximate the average temperature form the year 2020 to 2040 in steps of 1 year using polynomial regression and also calculate Correlation Coefficient R of predicted values. If the Correlation Coefficient R is *positive* then print strong positive relation, if the Correlation Coefficient R is *negative* then print strong negative relation and if the Correlation Coefficient R is zero then print no relationship at all. Your program also print the following tables: [10]

3. ear	Approximate Average Temperature in Degree Celsius
2020	
2021	
.	
2040	

Function	Value
Correlation Coefficient R	
A1	
A2	
A3	
A4	

[Note: Correlation coefficient formulas are used to find the relationship between data. The formula return a value between −1 and 1.]

Equation for calculating Pearson Correlation Coefficient R:

$$R = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

$n = size\ of\ the\ data$
$x_i = independent\ varialble$
$y_i = dependent\ vaiable$

The set of m equations can be represented in matrix notation as follows: $CA = B$

The element of C matrix is: $C(j,k) = \sum_{i=1}^{n} x_i^{j+k-2}, j = 1,2,3,....m\ and\ k = 1,2,3,...m$

$$B(j) = \sum_{i=1}^{n} y_i x_i^{j-1}, j = 1,2,3,....m$$