**Online on Interpolation (Section B2)**

**Time: 50 Mins Marks: 20**

**Finding Closing Index of Stock Market**

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In this problem, you have been given a text file *stock.txt*. The first column represents the number of days passed in a fiscal year for Dhaka Stock Exchange (DSE). The second column represents the closing index of DSE of that particular day. As you can see, closing indexes are calculated in a five day interval, your task is to find the closing index of any particular day using Lagrange Polynomial Interpolation method.

You have to perform the following tasks.

* Read the file from your program to store the values in an array. You must use numpy arrays. **(3)**
* Then take a day, *X* as input from the user (the value will be within the range of given time points in the file *stock.txt*). Now you need to find the closing index (Y) of day X using the Lagrange Polynomial of order 4. Choose the sequence of the points for your estimates to attain the best possible accuracy. **(8)**
* Also, find the absolute approximate relative error for *X*. **(4)**
* Finally, draw a scatter plot of the given data and overlay the graph of the polynomial you derived. Also indicate the interpolated values in the graph. Use separate colors to distinguish the plots. **(5)**