Eso 208 programming assignment 3

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1. **Write a computer program for interpolation using Lagrange polynomials and natural cubic spline. The program should have the following features:**

Input: **The program should read - (i) the number of data points (*n*+1) and the input data points from a text file, and (ii) the number of points, *m*, and the corresponding abscissa,xi* , where the value of *y* has to be estimated.**

Options: **The user should have the option of selecting one or more of the following methods–**

a. **Lagrange polynomials**
b. **Natural cubic spline**

Output: **The output from the program should be in the form of**

(a) A text file containing the values of *y* at xi*
(b) A figure showing the data points and the fitted polynomial

(A)Lagrange polynomial taking the input from input_lagrange and giving output in output_lagrange

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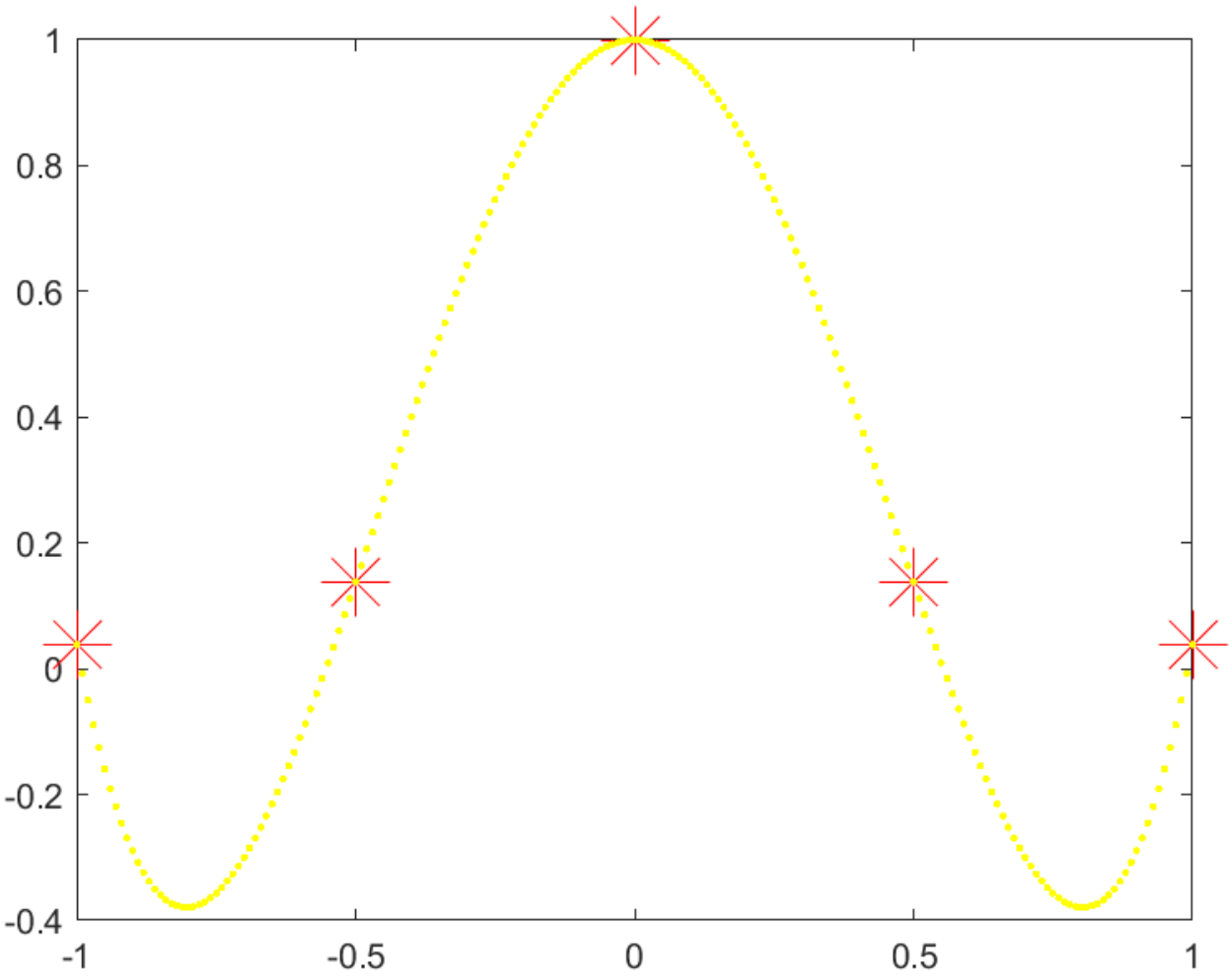
Lagrange Polynomial Method
(X ,Y) is
-0.800000
-0.200000
0.200000
0.800000
```

-0.379336
0.834211
0.834211
-0.379336

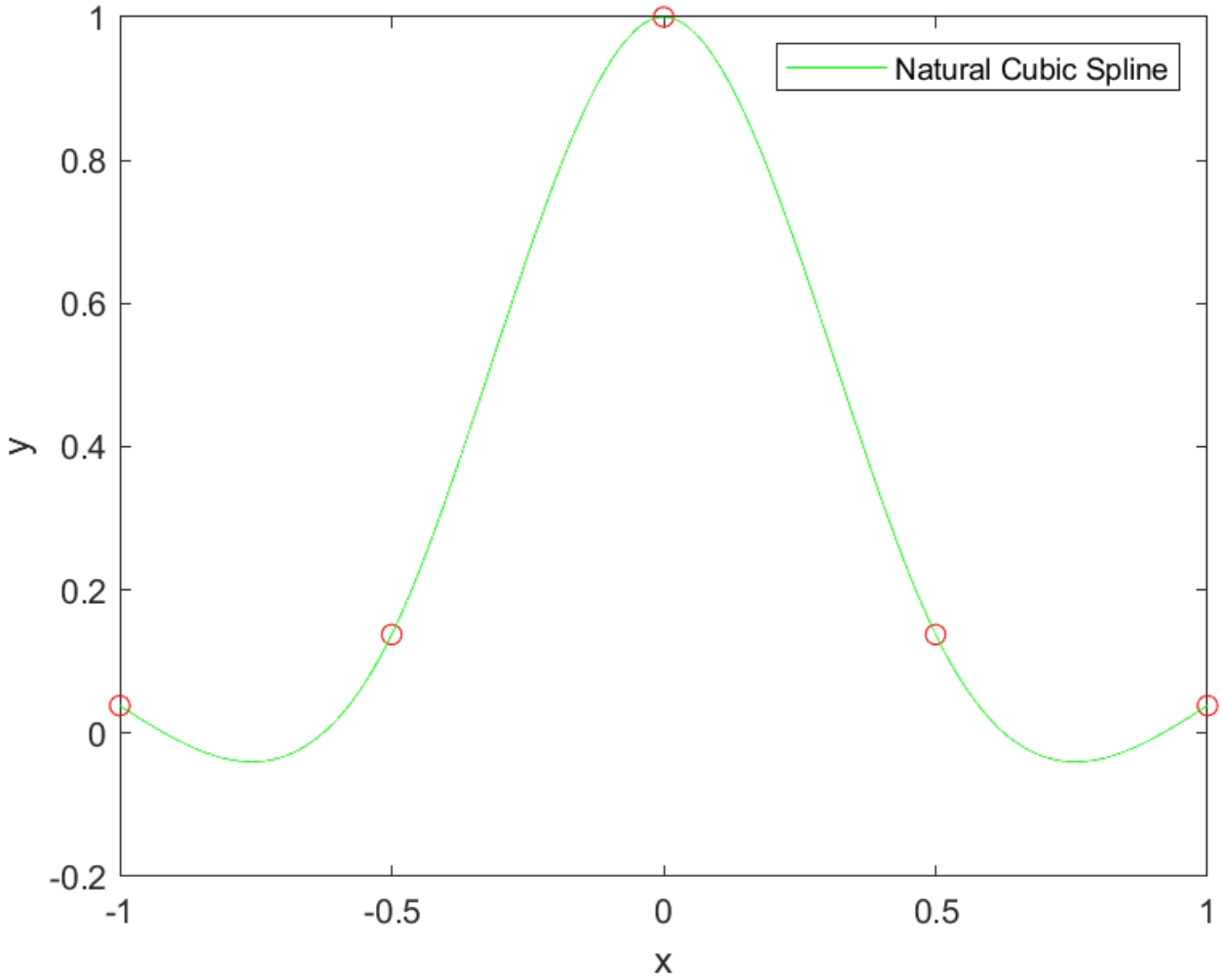


(B)Natural spline
The code is taking input from input.txt and giving output in output1.txt

Enter the method you want to use
1. Least square fitting polynomial
2. Lagrange polynomial
3. Cubic spline
3

1 -> Natural Cubic Spline
2 -> Not-a-Knot Cubic Spline
3 -> Periodic Cubic Spline
4 -> Clamped Cubic Spline
1

Interpolated values of y* at given x*
Periodic Cubic Spline:
-0.8000 0.0043
-0.2000 0.7658
0.2000 0.7658
0.8000 0.0043



Question 2 :1. Write a computer program for polynomial least-squares fitting.

Input: **The program should read the following inputs from a text file –**

(i) the number of points (*n*+1), (ii) data points .

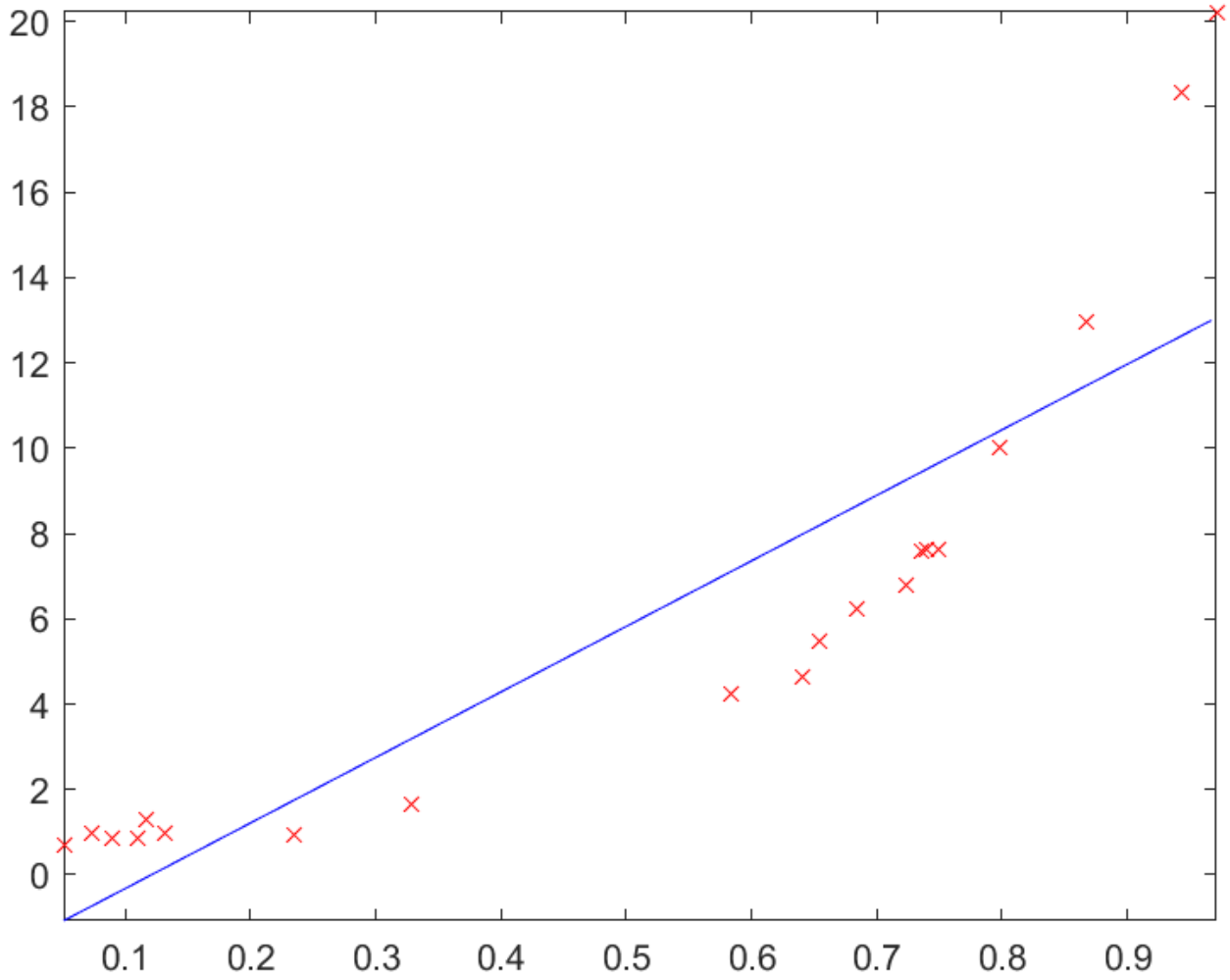
Options: **The user should have an option of selecting the degree of polynomial**

Output: **The output from the program should be in the form of**

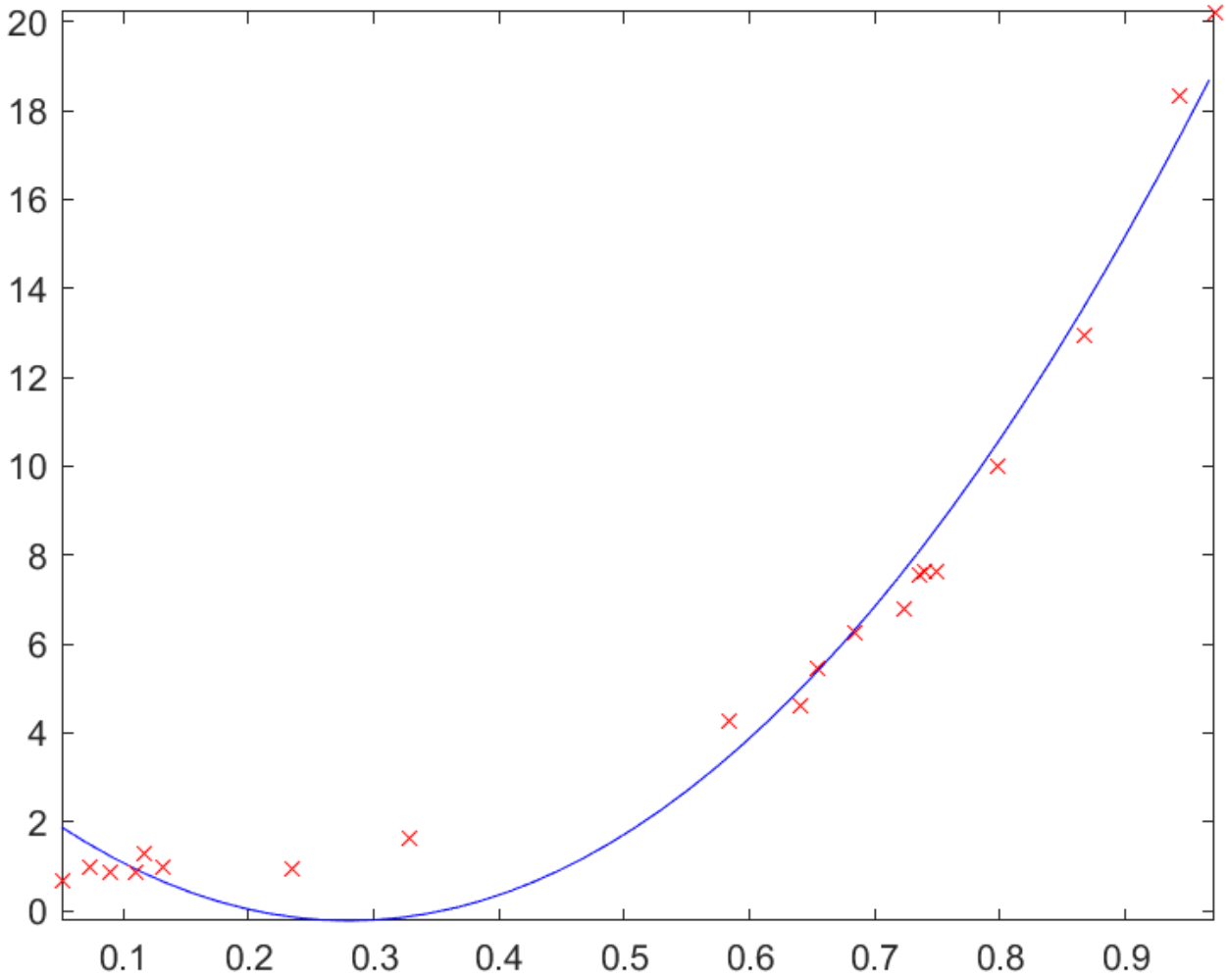
(a) A text file containing the coefficients of polynomials and coefficient of determination
(b) A figure showing the data points and the fitted polynomial.

The code is taking the input from input_least.txt and giving the output in output_least.txt

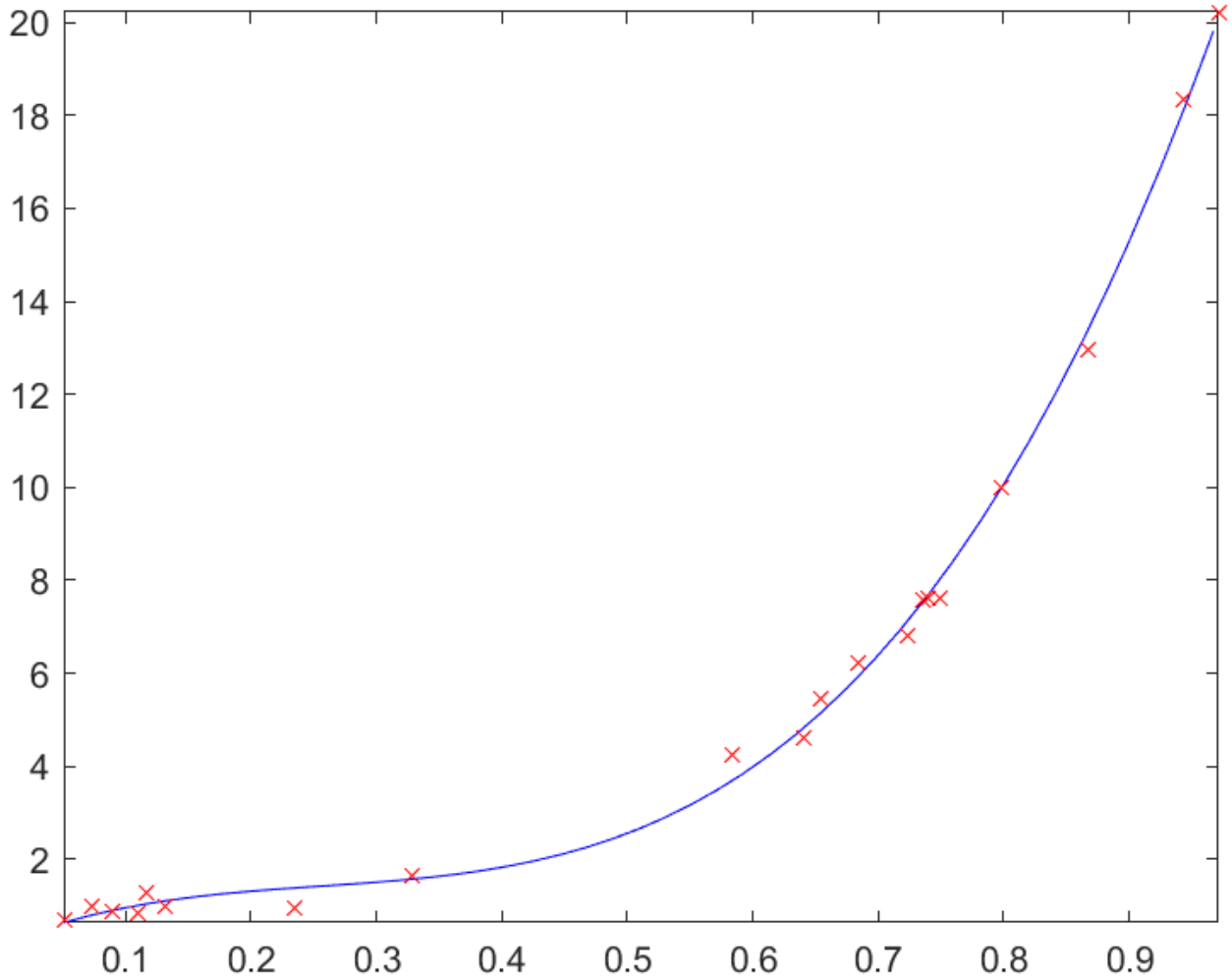
For polynomial of degree 1
Enter the method you want to use
1. Least square fitting polynomial
2. Lagrange polynomial
3. Cubic spline
1
Give your no. of data and data points in a file named 'input_least.txt'
Please enter the degree of the polynomial for regression
1
Coefficient are :
-1.859589
15.363438
R-sq is : 0.866552



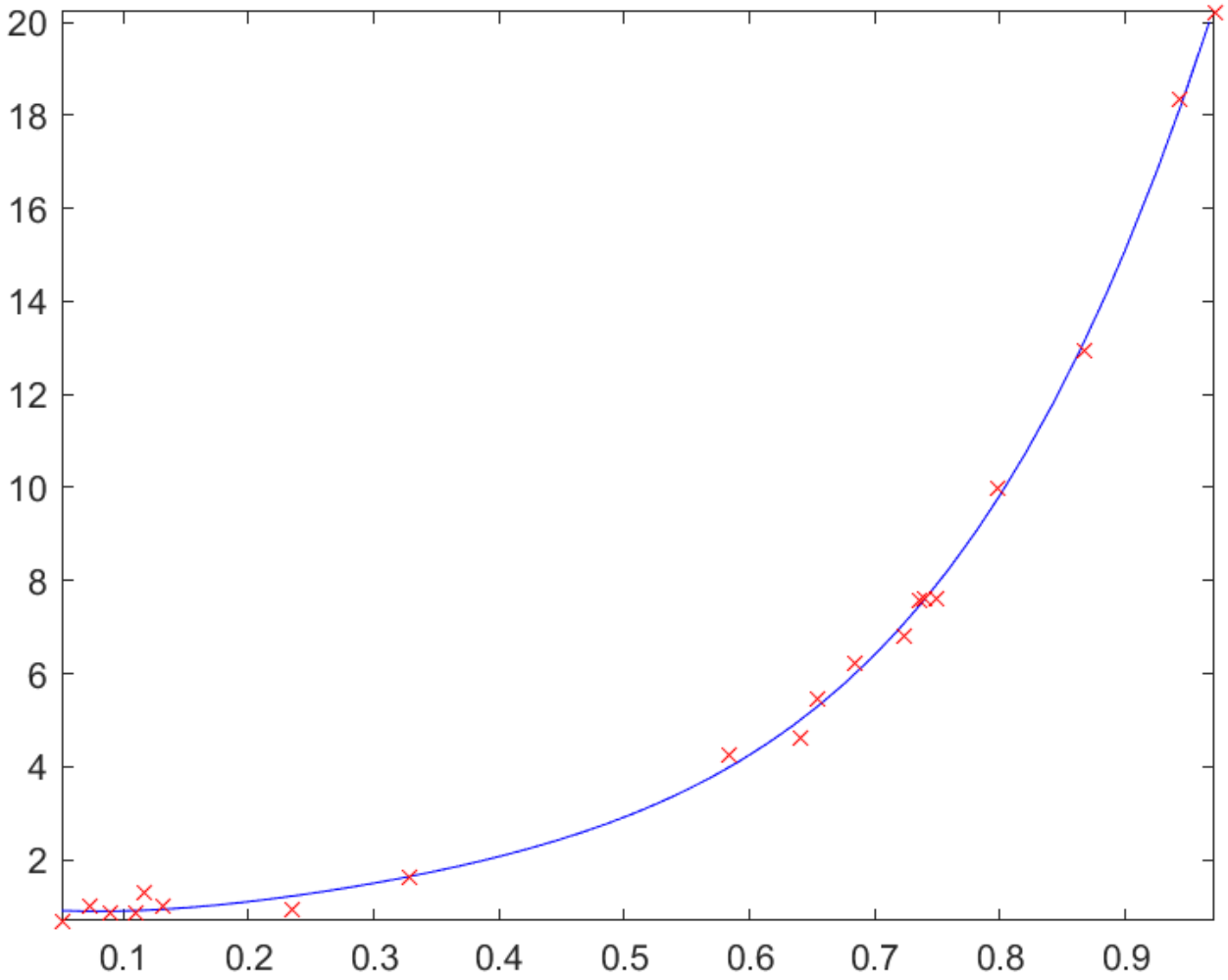
For polynomial of degree 2
Enter the method you want to use
1. Least square fitting polynomial
2. Lagrange polynomial
3. Cubic spline
1
Give your no. of data and data points in a file named 'input_least.txt'
Please enter the degree of the polynomial for regression
2
Coefficient are :
2.917007
-22.465799
40.109322
R-sq is : 0.988643

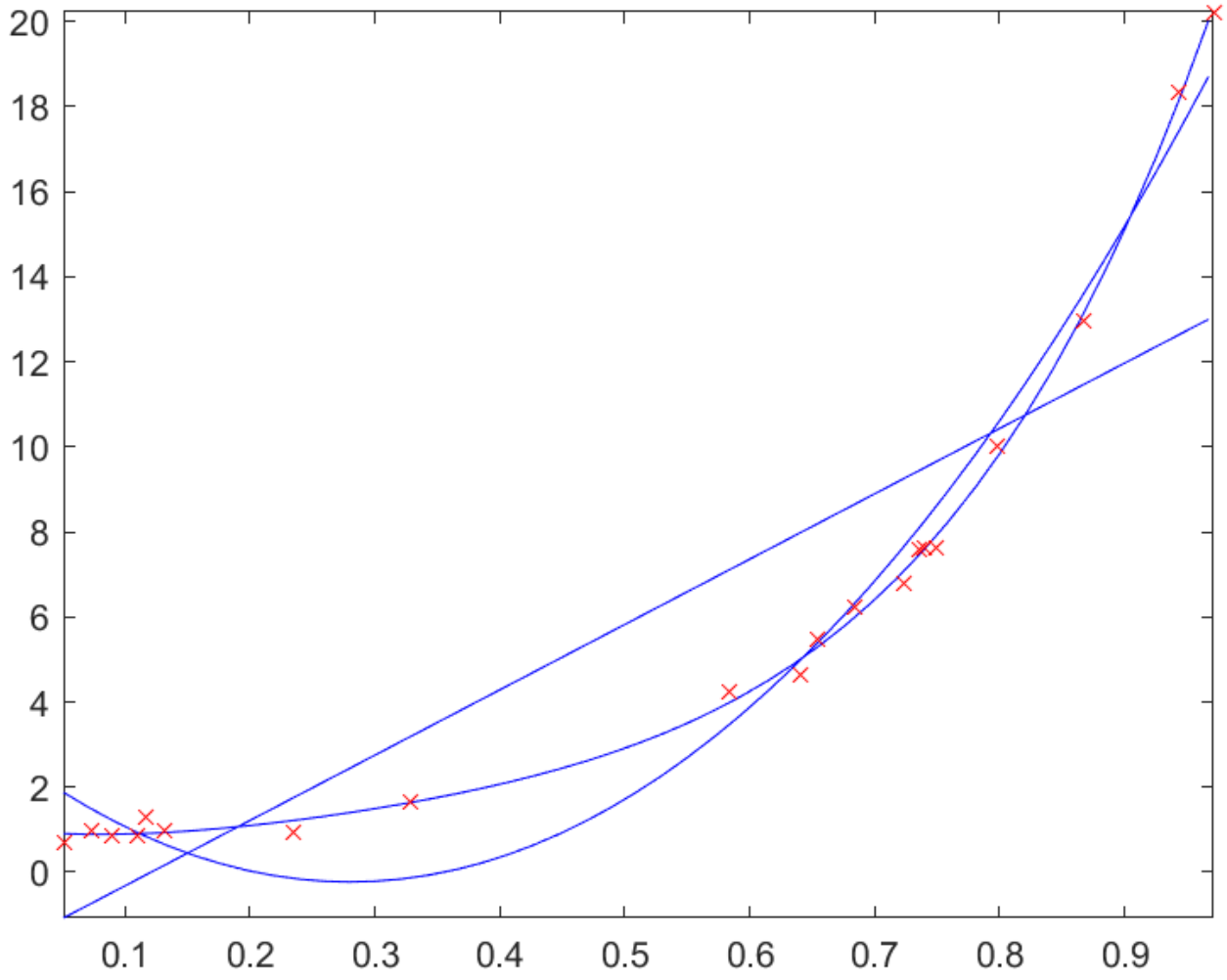


For polynomial of degree 3
Coefficient are :
0.154966
11.192300
-36.585222
47.596476
R-sq is : 0.998729



For polynomial of degree 4:
Please enter the degree of the polynomial for regression
4
Coefficient are :
1.027082
-3.744007
28.959217
-52.383390
49.055647
R-sq is : 0.999186


20
18
16
14
12
10
8
6
4
2
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9


20
18
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0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9