

# ESO208a

## Programming Assignment-3 Report

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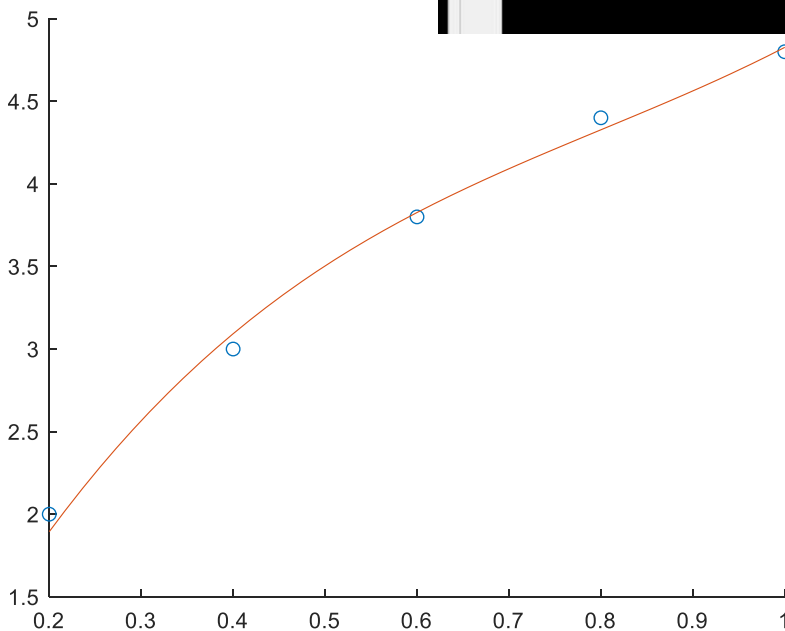
**Section:-O5**

# Tutorial 8 –prob-6

Input=====

```
Editor - D:\matlab\tut8_6.txt
project3.m x ssharma.m x final.m x Prob2.m x
1 0.2 2
2 0.4 3
3 0.6 3.8
4 0.8 4.4
5 1.0 4.8

Command Window
New to MATLAB? See resources for Getting Started.
Enter the file name tut8_6.txt
What do you want to do?
1. Fit a least square polynomial.
2. Fit a lagrange interpolation polynomial
3. Fit a newton interpolation polynomial
4. Fit cubic splines
1
Enter the Size of polynomial 3
fx >>
```



===Graph

Output

```
project3.m x ssharma.m x final.m x Prob2.m x tanmay.m x input.txt x output.txt x BELOVED.m x Periodic_splines.txt x 2.txt x output(
1 The equation of the polynomial is:
2 (6528203385473651*x)/562949953421312 - (407818858302331*x^2)/35184372088832 + (2713946056438397*x^3)/562949953421312
3 Coefficient of regression is -: 0.999471
```

# Tutorial 9 –prob-1

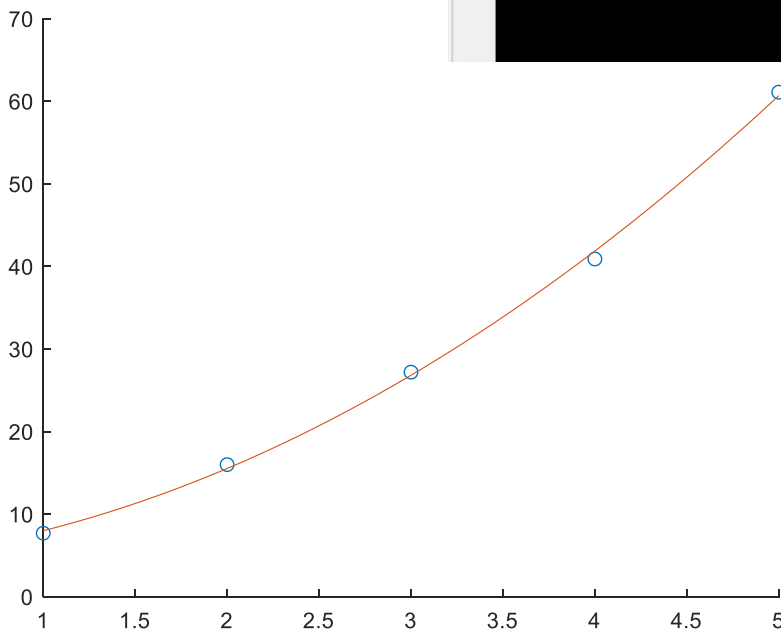
Input=====

```

Editor - D:\matlab\tut9_1.txt
project3.m x final.m x Prob2.m x input.txt x outp
1 1 7.7
2 2 16
3 3 27.2
4 4 40.9
5 5 61.1

Command Window
New to MATLAB? See resources for Getting Started.

Enter the file name tut9_1.txt
What do you want to do?
1. Fit a least square polynomial.
2. Fit a lagrange interpolation polynomial
3. Fit a newton interpolation polynomial
4. Fit cubic splines
1
Enter the Size of polynomial 2
fx >>
    
```



===Graph

$$1(b) - F(2.5) = 20.8$$

Output

```

1 The equation of the polynomial is:
2 (8550405578249617*x)/4503599627370496 + (263*x^2)/140 + 4751297606876169/1125899906842624
3 Coefficient of regression is: 0.999719|
    
```

# Tutorial 9 –prob-2

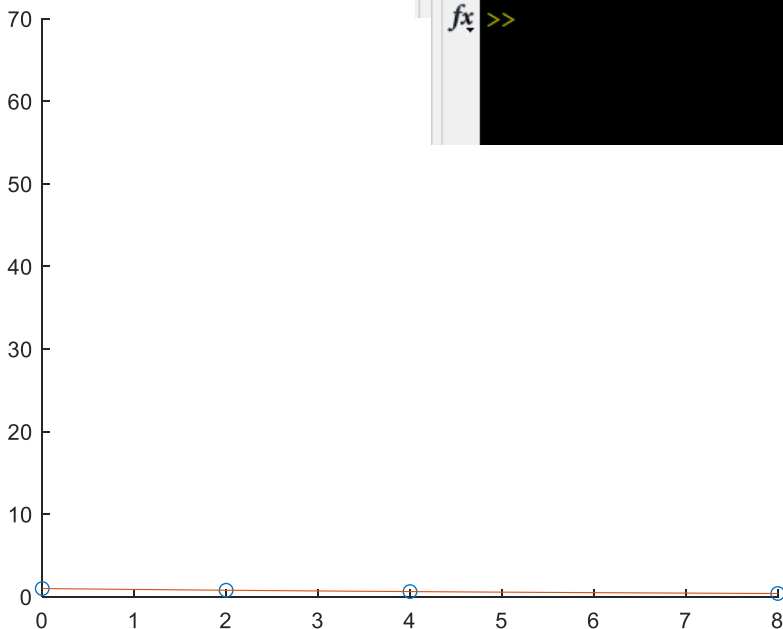
Input=====

```

Editor - D:\matlab\tut9_2.txt
project3.m x final.m x Prob2.m x input.txt x output.txt
1 0 1.000
2 2 0.7937
3 4 0.6300
4 8 0.3968

Command Window
New to MATLAB? See resources for Getting Started.

Enter the file name tut9_2.txt
What do you want to do?
1. Fit a least square polynomial.
2. Fit a lagrange interpolation polynomial
3. Fit a newton interpolation polynomial
4. Fit cubic splines
2
fx >>
    
```



===Graph

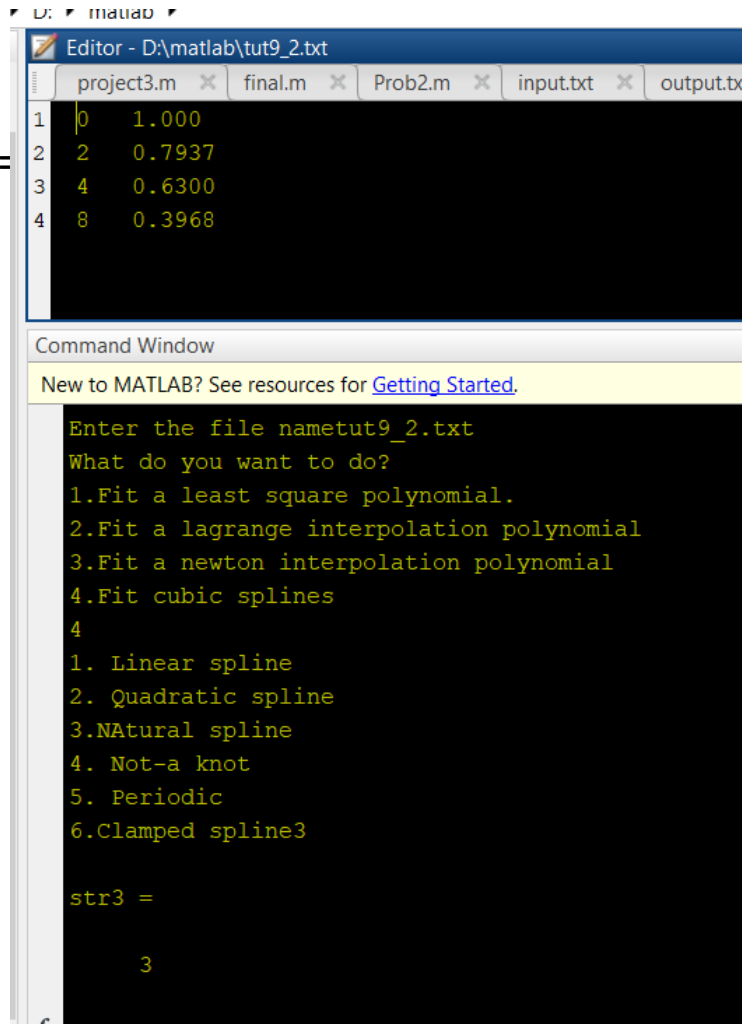
Output

```

1 polynomial is:
2 (51*x^2)/8000 - (72*x)/625 - (100880631653103*x^3)/576460752303423488 + 1
3
    
```

# Tutorial 9 –prob-2(c)

Input====



The image shows a MATLAB interface with an Editor window and a Command Window. The Editor window displays a file named 'tut9\_2.txt' with the following content:

```
1 0 1.000
2 2 0.7937
3 4 0.6300
4 8 0.3968
```

The Command Window shows the following text:

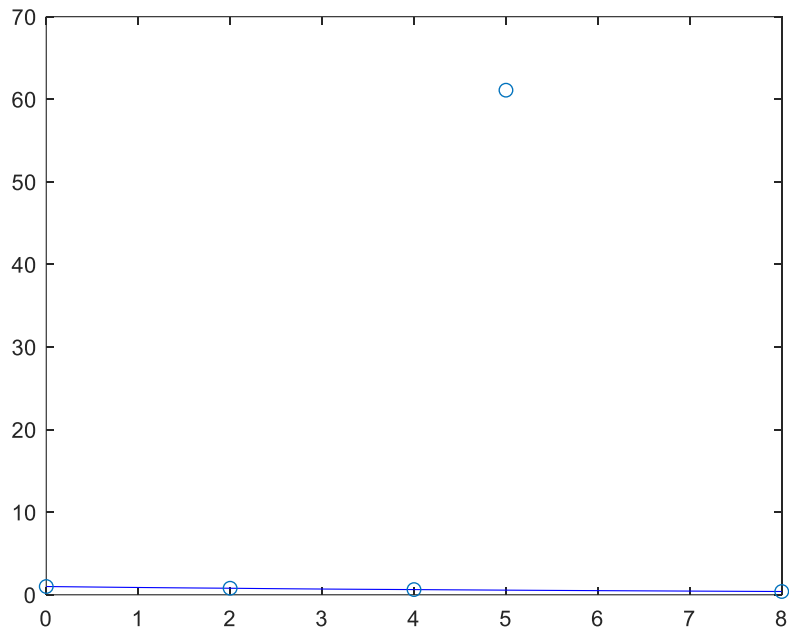
```
New to MATLAB? See resources for Getting Started.

Enter the file name tut9_2.txt
What do you want to do?
1. Fit a least square polynomial.
2. Fit a lagrange interpolation polynomial
3. Fit a newton interpolation polynomial
4. Fit cubic splines
4
1. Linear spline
2. Quadratic spline
3. NATural spline
4. Not-a knot
5. Periodic
6. Clamped spline3

str3 =

3
```

Output on second page



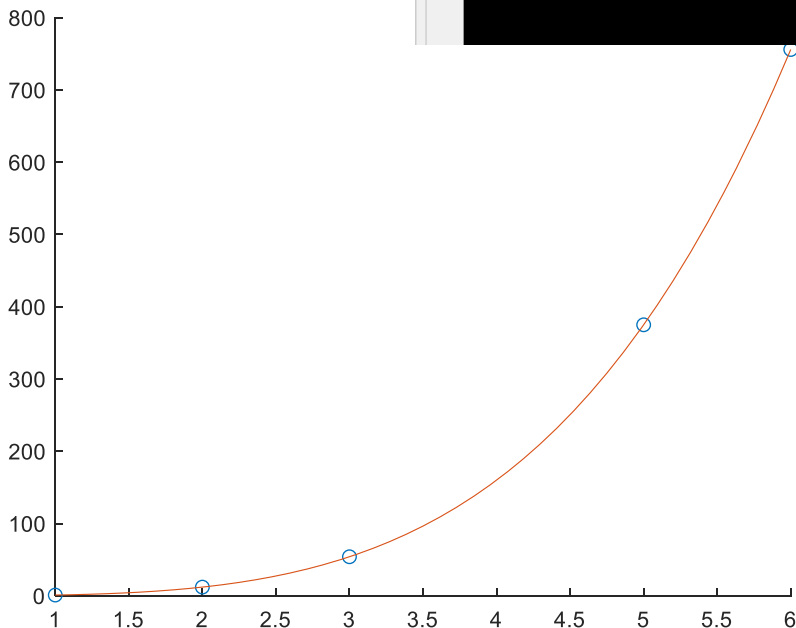
```
1 The Interval for Interpolation 0.000000 to 2.000000
2 a3 = 0.004344
3 a2 = 0.000000
4 a1 = -0.120525
5 a0 = 1.000000
6 The Value of the first derivative at first node is -0.1205 and at second node is -0.0684
7 The Value of the second derivative at first node is 0.0000 and at second node is 0.0521
8
9 The Interval for Interpolation 2.000000 to 4.000000
10 a3 = -0.003363
11 a2 = -0.046238
12 a1 = -0.265125
13 a0 = 1.165900
14 The Value of the first derivative at first node is -0.4904 and at second node is -0.7964
15 The Value of the second derivative at first node is 0.0521 and at second node is 0.0118
16
17 The Interval for Interpolation 4.000000 to 8.000000
18 a3 = -0.000491
19 a2 = -0.011775
20 a1 = -0.144650
21 a0 = 1.051600
22 The Value of the first derivative at first node is -0.2624 and at second node is -0.4272
23 The Value of the second derivative at first node is 0.0118 and at second node is 0.0000
24
```

# Tutorial 9 –prob-3(a)

Input=====

```
Editor - D:\matlab\tut9_3.txt
project3.m x final.m x Prob2.m x input.txt x output.txt x tut9_1
1 1 1
2 2 12
3 3 54
4 5 375
5 6 756

Command Window
New to MATLAB? See resources for Getting Started.
Enter the file name tut9_3.txt
What do you want to do?
1. Fit a least square polynomial.
2. Fit a lagrange interpolation polynomial
3. Fit a newton interpolation polynomial
4. Fit cubic splines
2
fx >>
```



===Graph

Output

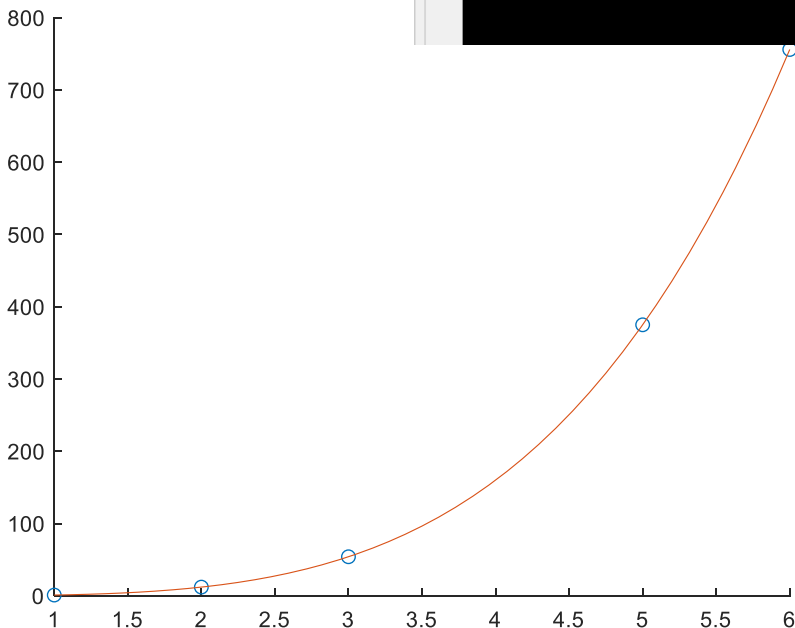
```
project3.m x final.m x Prob2.m x input.txt x
1 polynomial is:
2 x^3/2 - x/4398046511104 + x^4/2
```

# Tutorial 9 –prob-3(b)

Dummy=====

```
Editor - D:\matlab\tut9_3.txt
project3.m x final.m x Prob2.m x input.txt x output.txt x tut9_1
1 1 1
2 2 12
3 3 54
4 5 375
5 6 756

Command Window
New to MATLAB? See resources for Getting Started.
Enter the file name tut9_3.txt
What do you want to do?
1. Fit a least square polynomial.
2. Fit a lagrange interpolation polynomial
3. Fit a newton interpolation polynomial
4. Fit cubic splines
2
fx >>
```



===Graph

Output

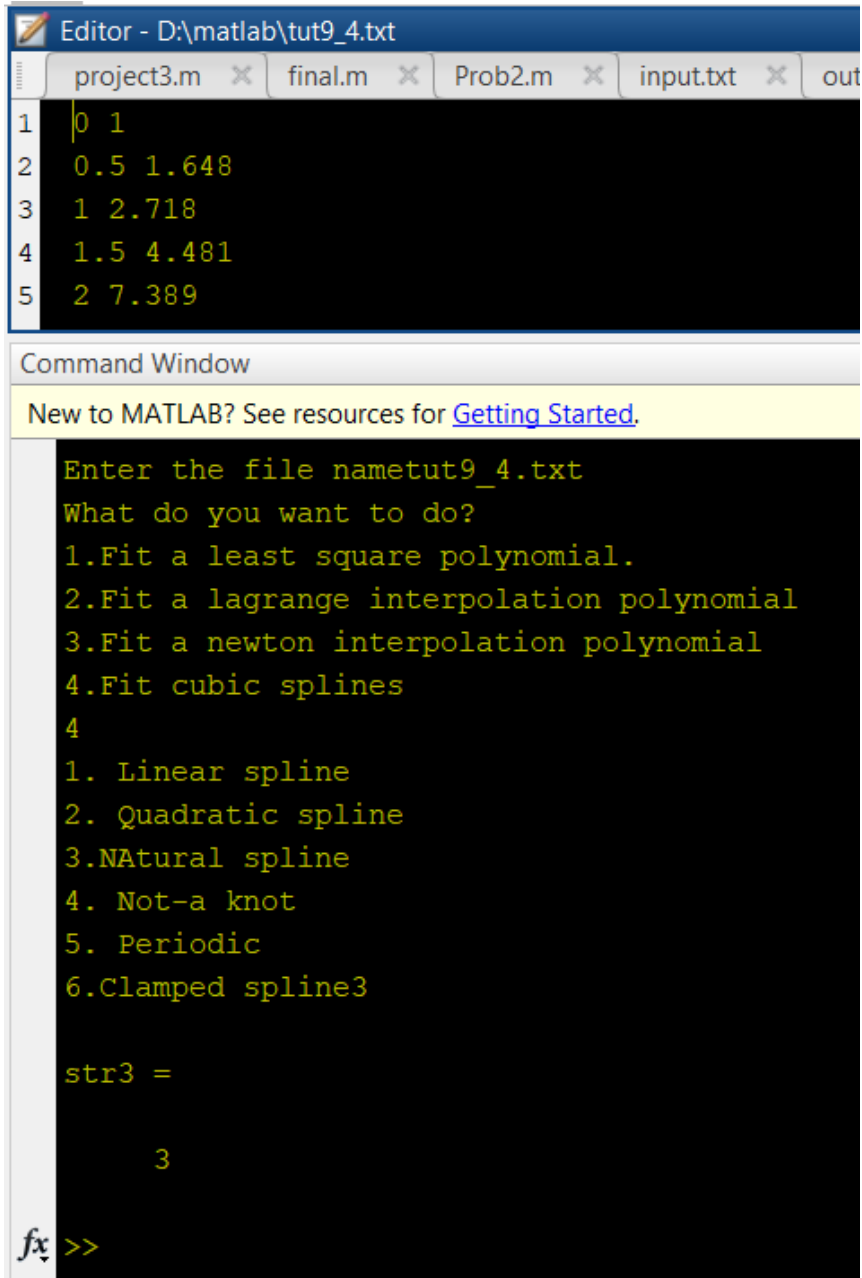
```
project3.m x final.m x Prob2.m x input.txt x
1 polynomial is:
2 x^3/2 - x/4398046511104 + x^4/2
```



# Tutorial 9 –prob-4(a)

Input=====

- m



The image shows a MATLAB Editor window with the file 'D:\matlab\tut9\_4.txt' open. The editor contains a table of data with 5 rows and 2 columns. Below the editor is the Command Window, which displays a menu of options for fitting a polynomial or spline to the data. The user has selected option 4, 'Fit cubic splines', and the Command Window shows the resulting spline coefficients.

```
Editor - D:\matlab\tut9_4.txt
project3.m  final.m  Prob2.m  input.txt  out

1 | 0 1
2 | 0.5 1.648
3 | 1 2.718
4 | 1.5 4.481
5 | 2 7.389

Command Window
New to MATLAB? See resources for Getting Started.

Enter the file name tut9_4.txt
What do you want to do?
1. Fit a least square polynomial.
2. Fit a lagrange interpolation polynomial
3. Fit a newton interpolation polynomial
4. Fit cubic splines
4
1. Linear spline
2. Quadratic spline
3. Natural spline
4. Not-a knot
5. Periodic
6. Clamped spline3

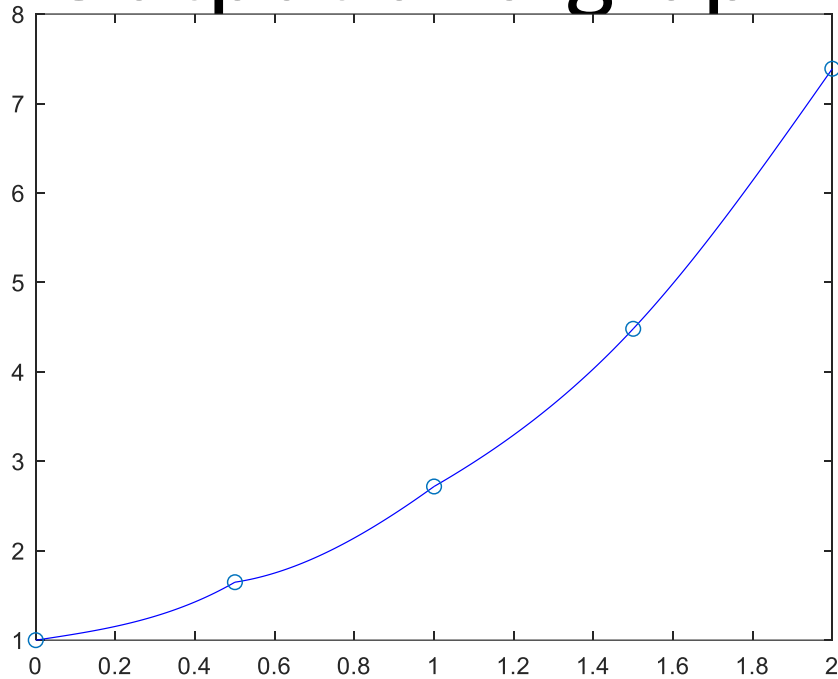
str3 =

3

fx >>
```

Output on second page

# Output and graph

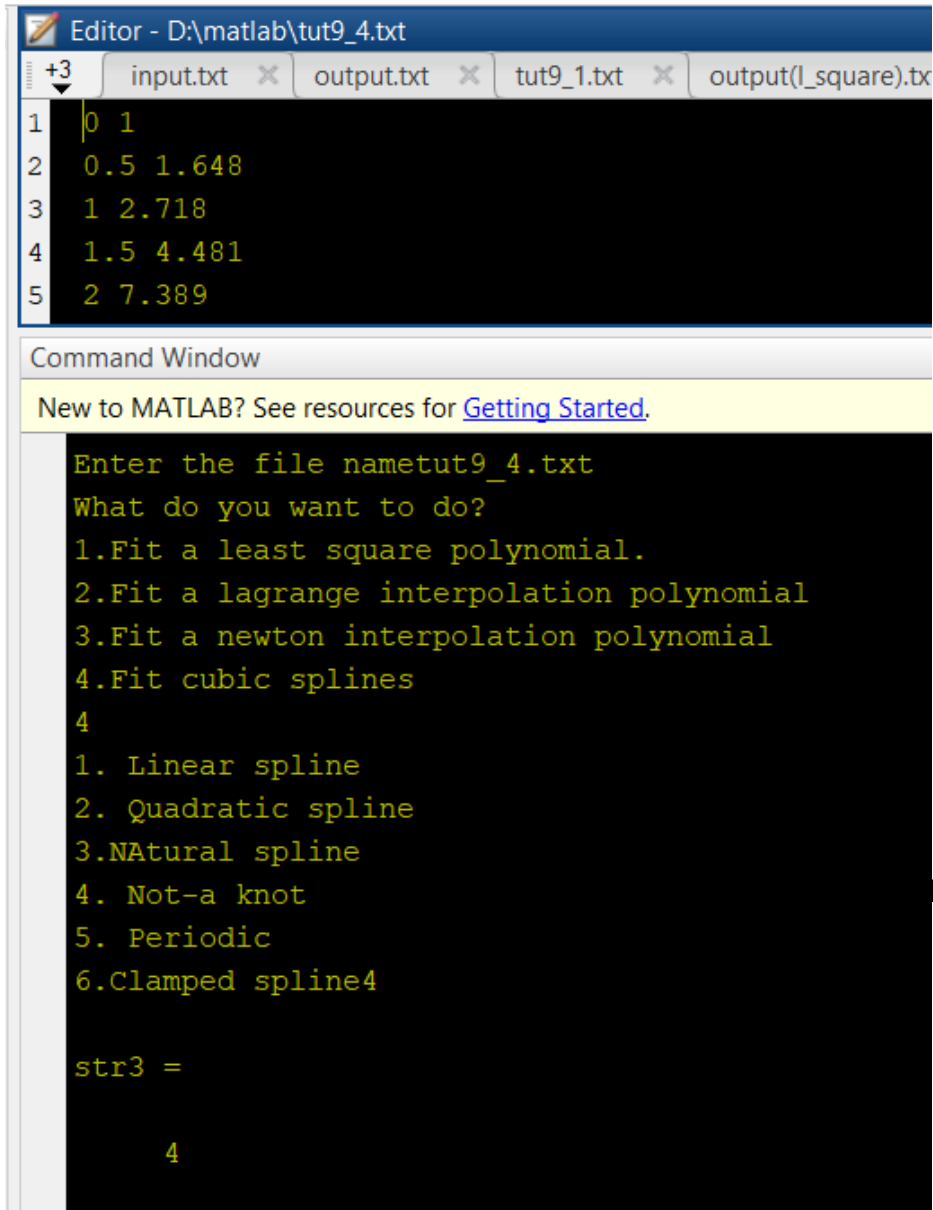


```
project3.m x final.m x Prob2.m x input.txt x output.txt x tut9_1.txt x output(l_square).txt x ssharma.m x output(lang).
1 The Interval for Interpolation 0.000000 to 0.500000
2 a3 = 2.508267
3 a2 = 0.000000
4 a1 = 0.668933
5 a0 = 1.000000
6 The Value of the first derivative at first node is 0.6689 and at second node is 2.5501
7 The Value of the second derivative at first node is 0.0000 and at second node is 7.5248
8
9 The Interval for Interpolation 0.500000 to 1.000000
10 a3 = -1.640533
11 a2 = -6.223200
12 a1 = -4.323867
13 a0 = 2.459200
14 The Value of the first derivative at first node is -11.7775 and at second node is -21.6919
15 The Value of the second derivative at first node is 7.5248 and at second node is 2.6032
16
17 The Interval for Interpolation 1.000000 to 1.500000
18 a3 = 1.205333
19 a2 = 2.314400
20 a1 = 3.586667
21 a0 = 0.240400
22 The Value of the first derivative at first node is 11.8315 and at second node is 18.6659
23 The Value of the second derivative at first node is 2.6032 and at second node is 6.2192
24
25 The Interval for Interpolation 1.500000 to 2.000000
26 a3 = -2.073067
27 a2 = -12.438400
28 a1 = -18.542533
29 a0 = 11.305000
30 The Value of the first derivative at first node is -69.8509 and at second node is -93.1729
```

# Tutorial 9 –prob-4(b)

Input=====

- m



The image shows a MATLAB environment with an Editor window and a Command Window. The Editor window displays a file named 'tut9\_4.txt' with the following data:

x	y
0	1
0.5	1.648
1	2.718
1.5	4.481
2	7.389

The Command Window shows the following text:

```
Enter the file name tut9_4.txt
What do you want to do?
1. Fit a least square polynomial.
2. Fit a lagrange interpolation polynomial
3. Fit a newton interpolation polynomial
4. Fit cubic splines
4
1. Linear spline
2. Quadratic spline
3. Natural spline
4. Not-a knot
5. Periodic
6. Clamped spline
4

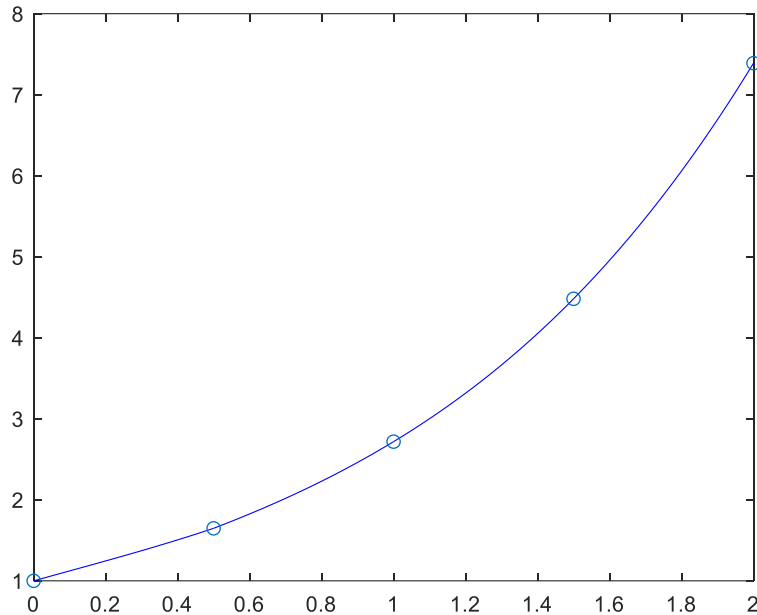
str3 =

4
```

graph

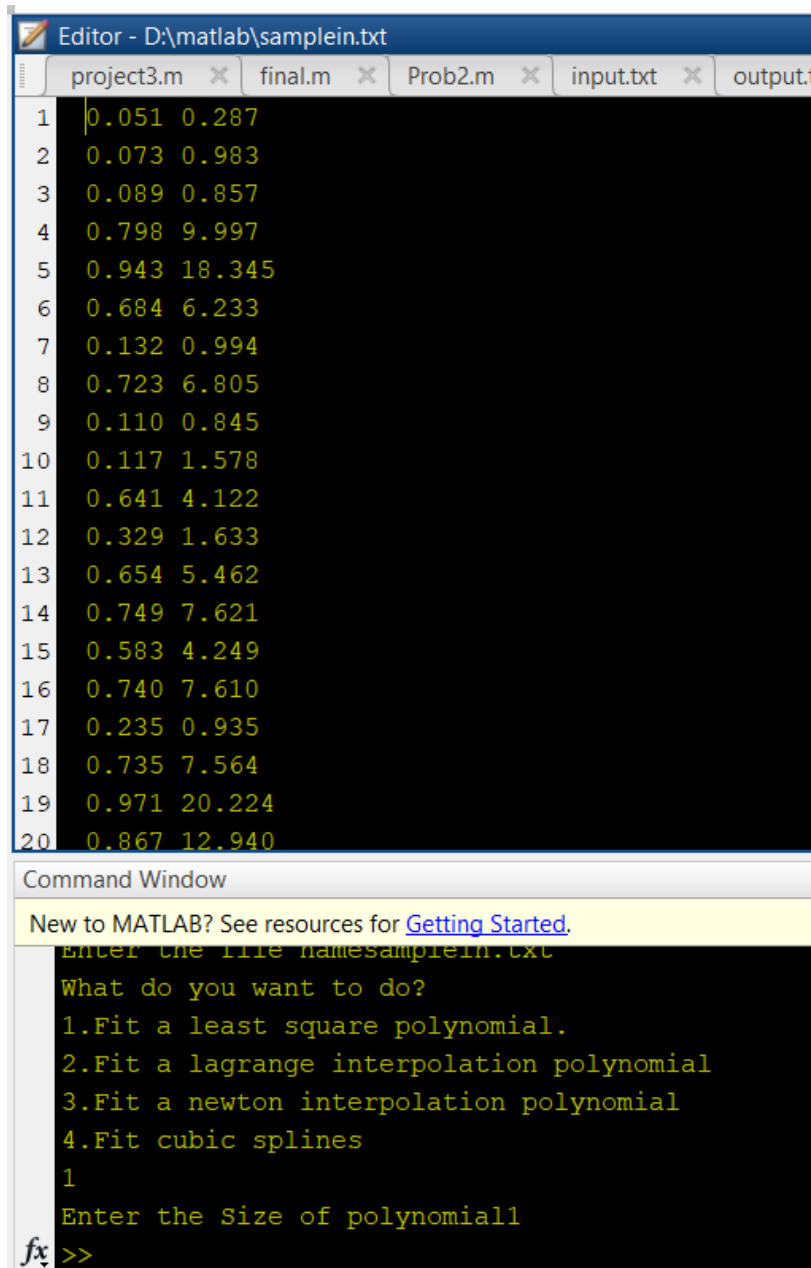
Output on second page

# Graph and figure



```
project3.m x final.m x Prob2.m x input.txt x output.txt x tut9_1.txt x output(l_square).txt x ssharma.m x output
1 The Interval for Interpolation 0.000000 to 0.500000
2 a3 = 0.488754
3 a2 = 0.114435
4 a1 = 1.231029
5 a0 = 1.000000
6 The Value of the first derivative at first node is 1.2310 and at second node is 1.7120
7 The Value of the second derivative at first node is -0.2289 and at second node is 1.2374
8
9 The Interval for Interpolation 0.500000 to 1.000000
10 a3 = 0.488754
11 a2 = 0.114435
12 a1 = 1.456333
13 a0 = 0.887348
14 The Value of the first derivative at first node is 1.9373 and at second node is 3.1515
15 The Value of the second derivative at first node is 1.2374 and at second node is 2.7037
16
17 The Interval for Interpolation 1.000000 to 1.500000
18 a3 = 0.625449
19 a2 = 0.524522
20 a1 = 1.866420
21 a0 = 0.750652
22 The Value of the first derivative at first node is 4.7918 and at second node is 7.6618
23 The Value of the second derivative at first node is 2.7037 and at second node is 4.5800
24
25 The Interval for Interpolation 1.500000 to 2.000000
26 a3 = 0.625449
27 a2 = 0.524522
28 a1 = 1.866420
29 a0 = 0.750652
30 The Value of the first derivative at first node is 7.6618 and at second node is 11.4699
31 The Value of the second derivative at first node is 4.5800 and at second node is 6.4563
```

# Sample\_input

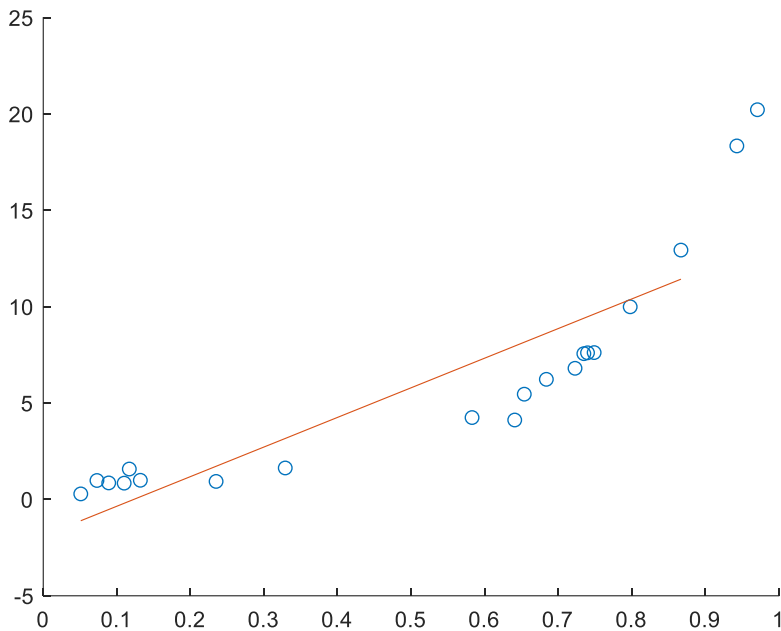


The image shows a MATLAB interface with an Editor window and a Command Window. The Editor window displays a file named 'samplein.txt' containing 20 rows of two-column numerical data. The Command Window shows a prompt for the file name, followed by a menu of four options for polynomial fitting. The user has entered '1' to select the first option, 'Fit a least square polynomial', and is now prompted to enter the size of the polynomial.

```
Editor - D:\matlab\samplein.txt
project3.m x final.m x Prob2.m x input.txt x output.txt
1 0.051 0.287
2 0.073 0.983
3 0.089 0.857
4 0.798 9.997
5 0.943 18.345
6 0.684 6.233
7 0.132 0.994
8 0.723 6.805
9 0.110 0.845
10 0.117 1.578
11 0.641 4.122
12 0.329 1.633
13 0.654 5.462
14 0.749 7.621
15 0.583 4.249
16 0.740 7.610
17 0.235 0.935
18 0.735 7.564
19 0.971 20.224
20 0.867 12.940

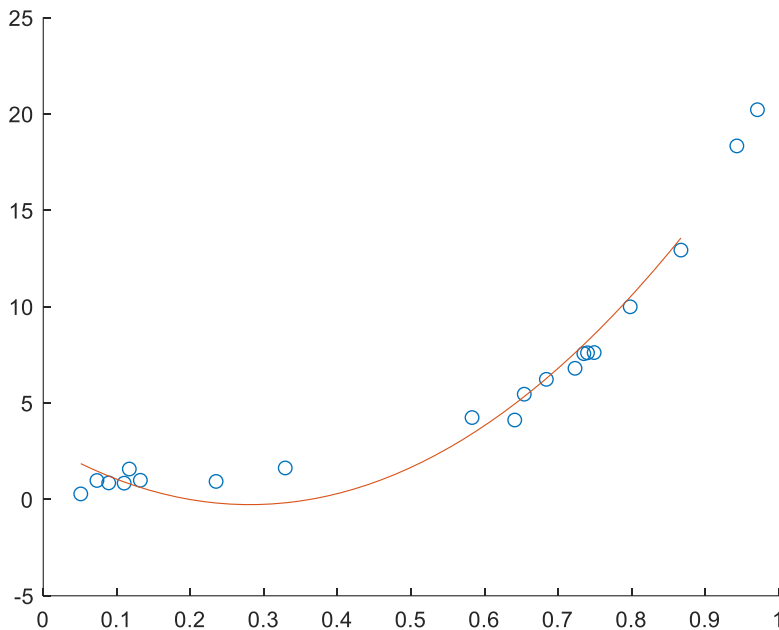
Command Window
New to MATLAB? See resources for Getting Started.
Enter the file name: samplein.txt
What do you want to do?
1. Fit a least square polynomial.
2. Fit a lagrange interpolation polynomial
3. Fit a newton interpolation polynomial
4. Fit cubic splines
1
Enter the Size of polynomial: 1
fx >>
```

# Linear coefficients



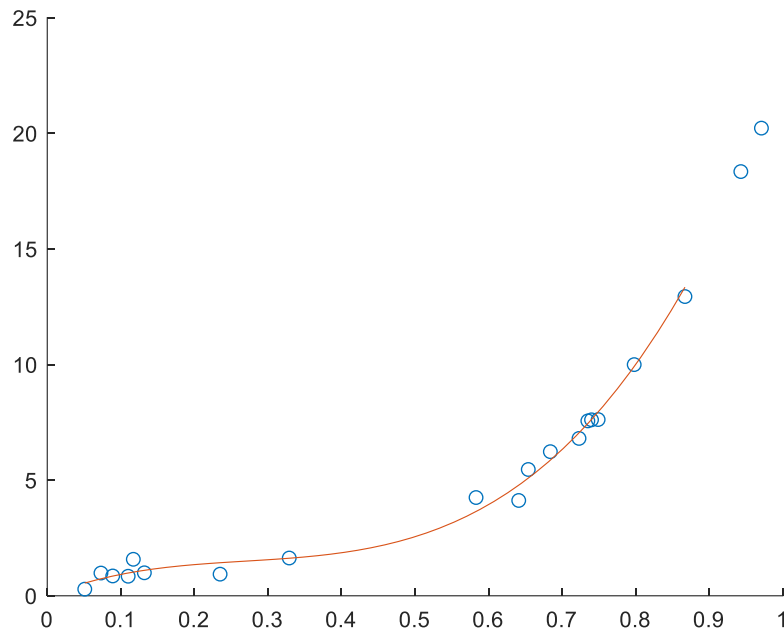
```
Editor - D:\matlab\output(l_square).txt
project3.m x final.m x Prob2.m x input.txt x output.txt x tut9_1.txt x output(l_square).txt
1 The equation of the polynomial is:
2 (270284407426871*x)/17592186044416 - 8510994706050697/4503599627370496
3 Coefficient of regression is: 0.874678
```

# Quadratic coefficients



```
Editor - D:\matlab\output(l_square).txt
project3.m x final.m x Prob2.m x input.txt x output.txt x tut9_1.txt x output(l_square).txt x tut9_4.txt x samplein.txt x +
1 The equation of the polynomial is:
2 (5668829895988063*x^2)/140737488355328 - (6368600111720069*x)/281474976710656 + 3273033507608663/1125899906842624
3 Coefficient of regression is: 0.987876
```

# Cubic coefficients



```
Editor - D:\matlab\output(_square).txt
project3.m x final.m x Prob2.m x input.txt x output.txt x tut9_1.txt x output(_square).txt x tut9_4.txt x samplein.txt x +
1 The equation of the polynomial is:
2 (7271632157785703*x)/562949953421312 - (5729379784779091*x^2)/140737488355328 + (7073705431582441*x^3)/140737488355328 - 2786476823535205/28823037
3 Coefficient of regression is: 0.998215
```