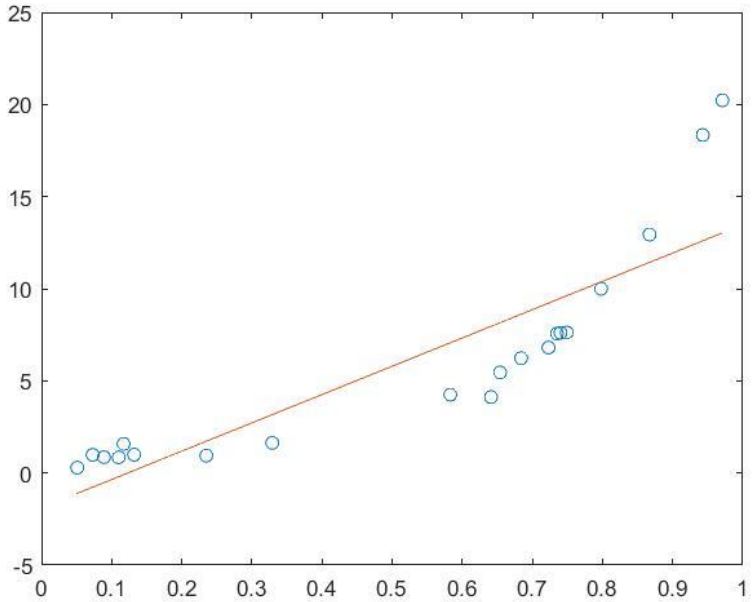
Least Square:

Input:

```
0.051 0.287
0.073 0.983
0.089 0.857
0.798 9.997
0.943 18.345
0.684 6.233
0.132 0.994
0.723 6.805
0.110 0.845
0.117 1.578
0.641 4.122
0.329 1.633
0.654 5.462
0.749 7.621
0.583 4.249
0.740 7.610
0.235 0.935
0.735 7.564
0.971 20.224
0.867 12.940
```

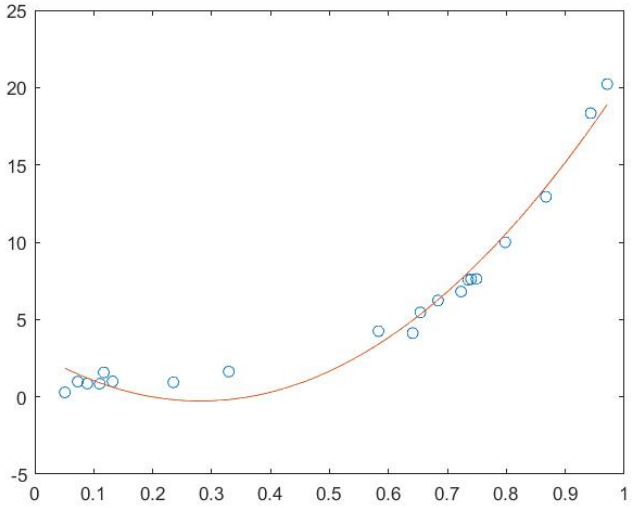
1. Linear

```
0.757172 value of r square
-1.889820   15.363890  coefficients
```



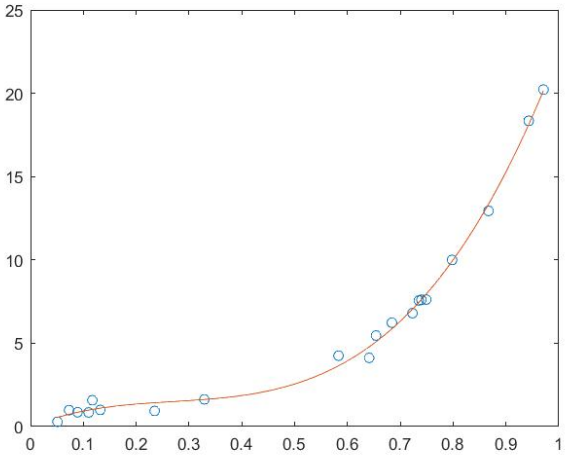
2. Quadratic

```
0.976508
2.907038     -22.625813   40.279
```



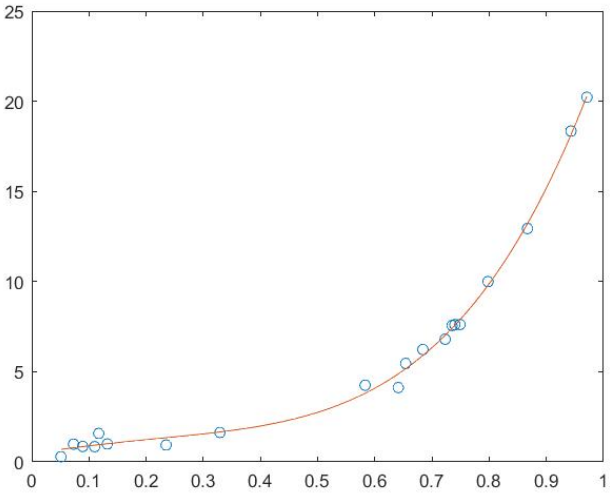
3. Cubic

```
0.996541
-0.009668    12.917014    -40.709692   50.261700
```



4. Quartic

```
0.996784
0.465837     4.773275     -4.972829    -4.250426    26.746661
```

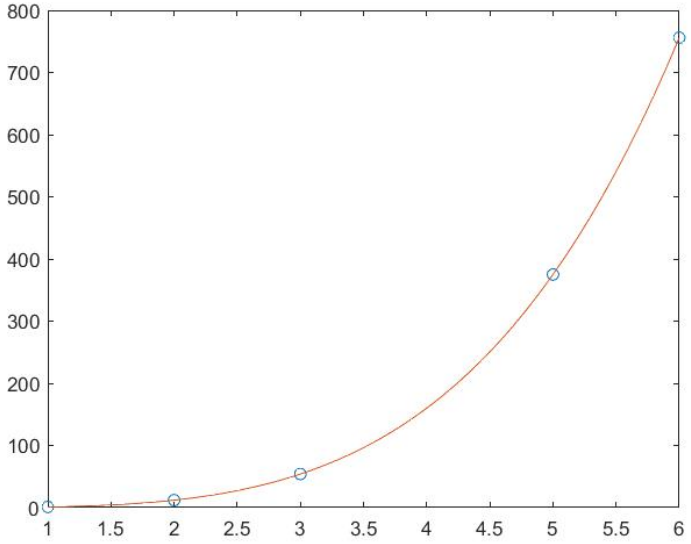


LAGRANGE :

1. Input:

```
1 1
2 12
3 54
5 375
6 756
```

Output polynomial coefficients: `0.500000 0.500000`

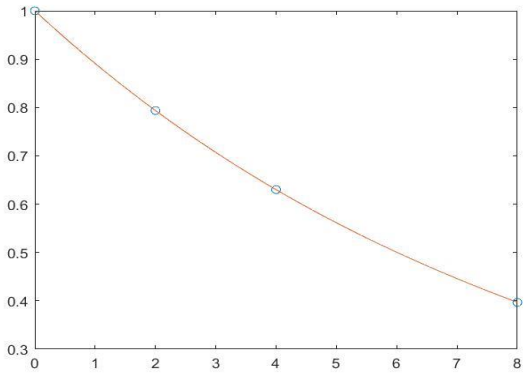


2. Input

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

Output

```
1.000000 -0.115200 0.006375 -0.000175
```

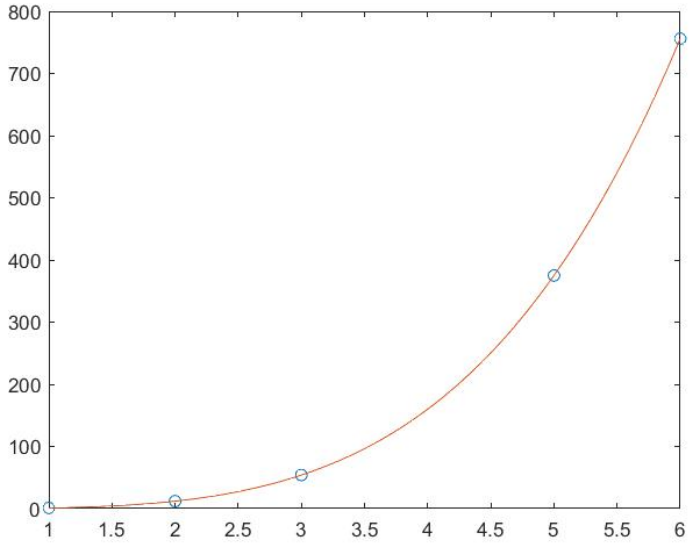


NEWTON

1. Input

```
1 1
2 12
3 54
5 375
6 756
```

Output: `0.500000 0.500000 0.000000 0.000000 0.000000`

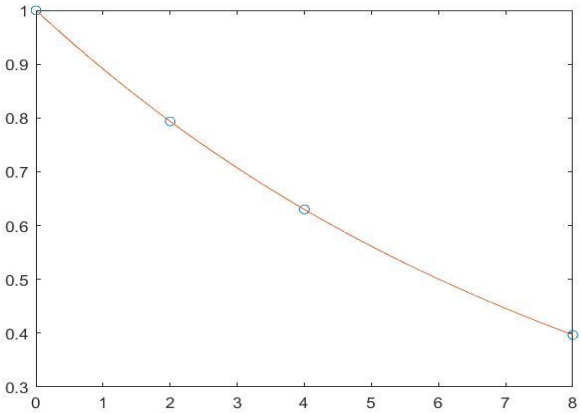


2. Input

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

Output:

```
-0.000175 0.006375 -0.115200 1.000000
```



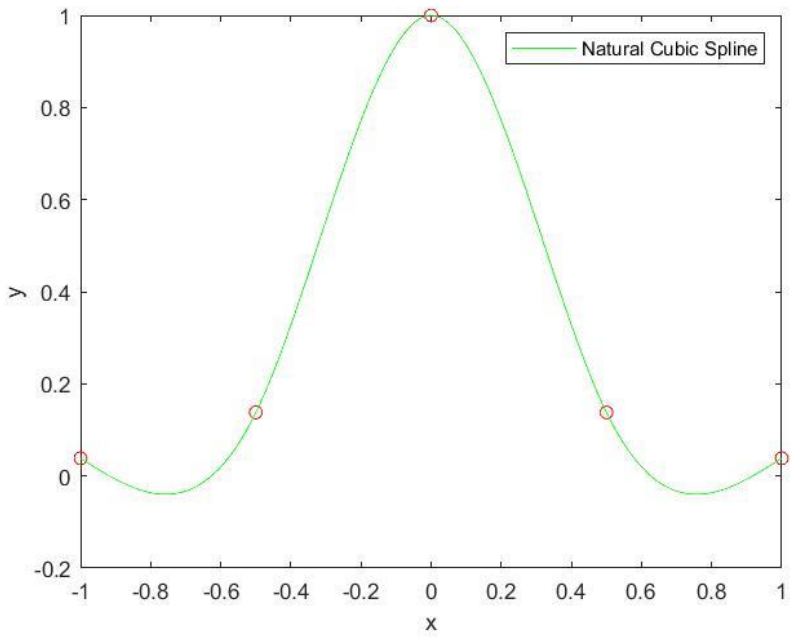
SPLINES:

Input:

```
-1.000 0.0385
-0.500 0.1379
0.000 1.0000
0.500 0.1379
1.0  0385
```

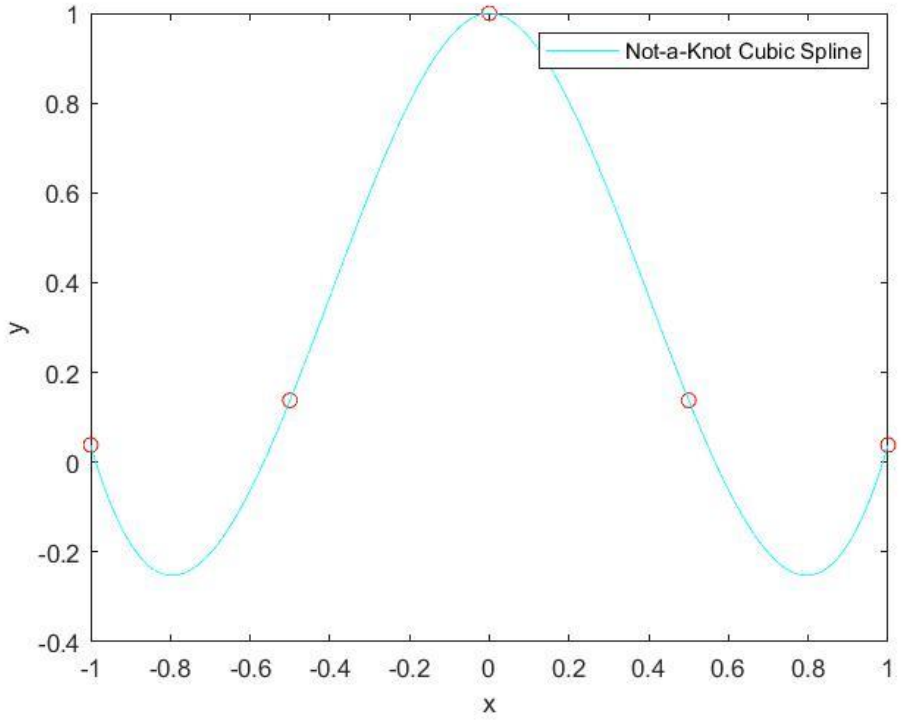
1.Natural

```
Interpolated values of y* at given x*
Natural Cubic Spline:
-0.8000 -0.0363
-0.2000 0.7716
0.2000 0.7716
0.8000 -0.0363
2.7286 8.1857 7.8179 2.3992 in [-1.0000,-0.5000]
2.7286 8.1857 7.8179 2.3992 in [-0.5000,0.0000]
2.7286 8.1857 7.8179 2.3992 in [0.0000,0.5000]
2.7286 8.1857 7.8179 2.3992 in [0.5000,1.0000]
u(1) = -0.367843 u(2) = 1.678586 u(3) = 7.817871 u(4) = 18.050014
u(5) = 32.375014
v(1) = 0.000000 v(2) = 8.185714 v(3) = 16.371429 v(4) = 24.557143
v(5) = 32.742857
```



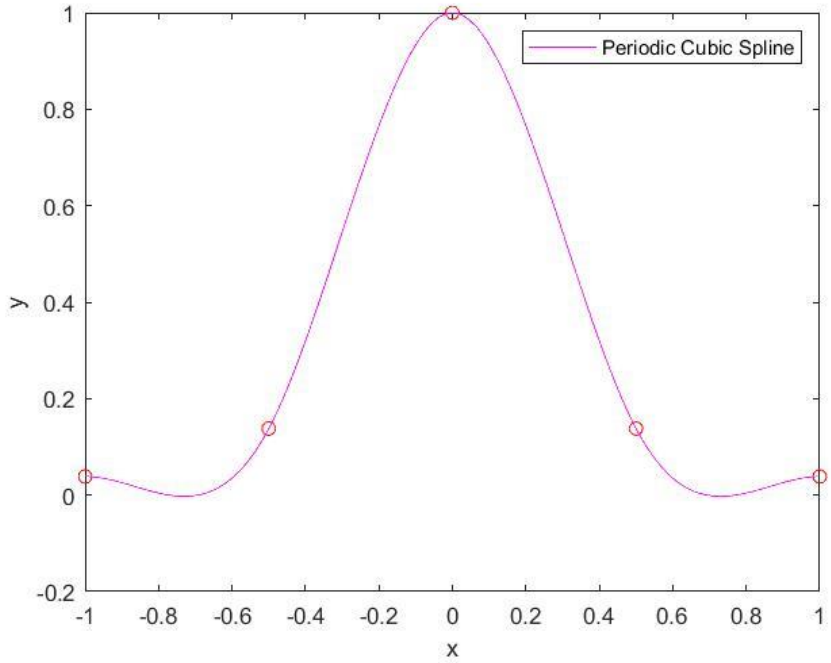
2.Not a Knot

```
Interpolated values of y* at given x*
NotaKnot Cubic Spline:
-0.8000 -0.2520
-0.2000 0.8024
0.2000 0.8024
0.8000 -0.2520
1.7658 7.5438 11.3481 5.6085 in [-1.0000,-0.5000]
1.7658 7.5438 11.3481 5.6085 in [-0.5000,0.0000]
1.7658 7.5438 11.3481 5.6085 in [0.0000,0.5000]
1.7658 7.5438 11.3481 5.6085 in [0.5000,1.0000]
u(1) = 1.557750 u(2) = 5.128606 u(3) = 11.348125 u(4) = 20.216306
u(5) = 31.733150
v(1) = 4.493050 v(2) = 9.790375 v(3) = 15.087700 v(4) = 20.385025
v(5) = 25.682350
```



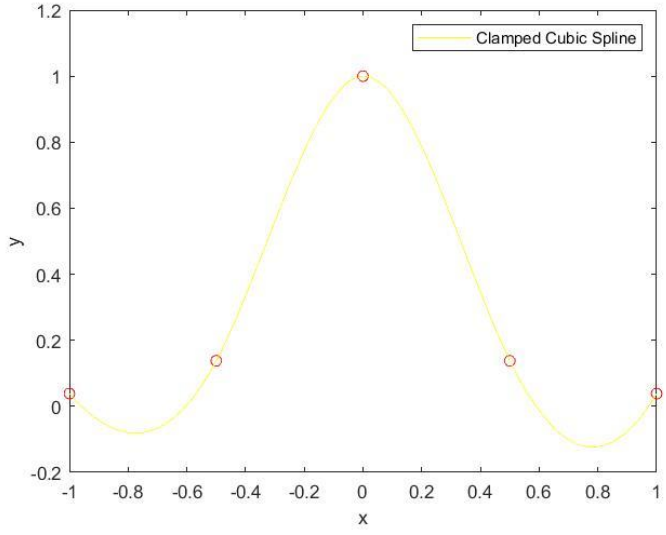
3. Periodic

```
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
2.9098 8.3065 7.1533 1.7951 in [-1.0000,-0.5000]
2.9098 8.3065 7.1533 1.7951 in [-0.5000,0.0000]
2.9098 8.3065 7.1533 1.7951 in [0.0000,0.5000]
2.9098 8.3065 7.1533 1.7951 in [0.5000,1.0000]
u(1) = -0.730350 u(2) = 1.029094 u(3) = 7.153275 u(4) = 17.642194
u(5) = 32.495850
v(1) = -0.845850 v(2) = 7.883625 v(3) = 16.613100 v(4) =
25.342575 v(5) = 34.072050
```



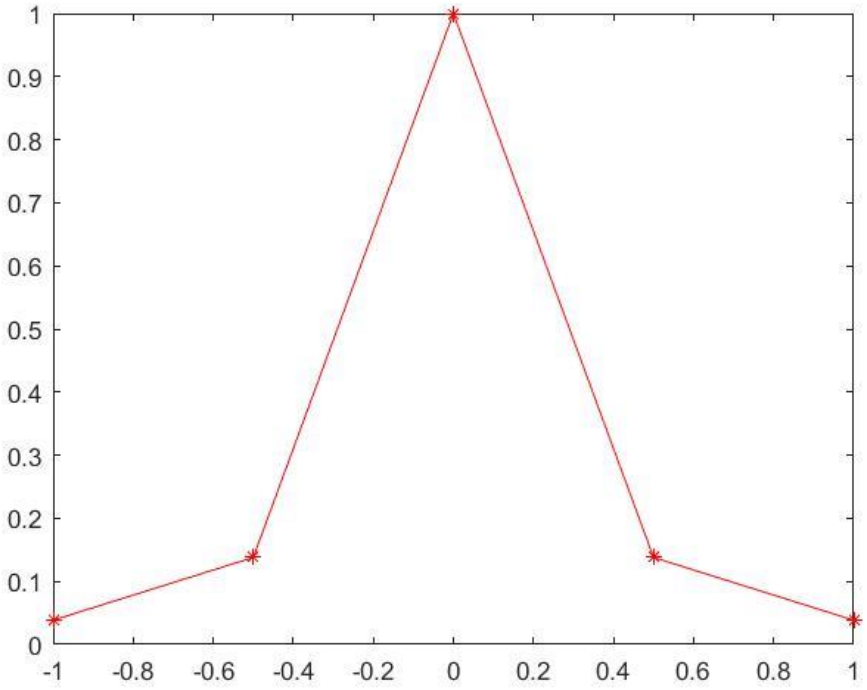
4. Clamped

```
Interpolated values of y* at given x*
Clamped Cubic Spline:
-0.8000 -0.0793
-0.2000 0.7748
0.2000 0.7868
0.8000 -0.1222
2.5125 7.9940 8.4792 3.0361 in [-1.0000,-0.5000]
2.5125 7.9940 8.4792 3.0361 in [-0.5000,0.0000]
2.5125 7.9940 8.4792 3.0361 in [0.0000,0.5000]
2.5125 7.9940 8.4792 3.0361 in [0.5000,1.0000]
u(1) = 0.028579 u(2) = 2.369496 u(3) = 8.479168 u(4) = 18.357596
u(5) = 32.004779
v(1) = 0.913079 v(2) = 8.450589 v(3) = 15.988100 v(4) = 23.525611
v(5) = 31.063121
```



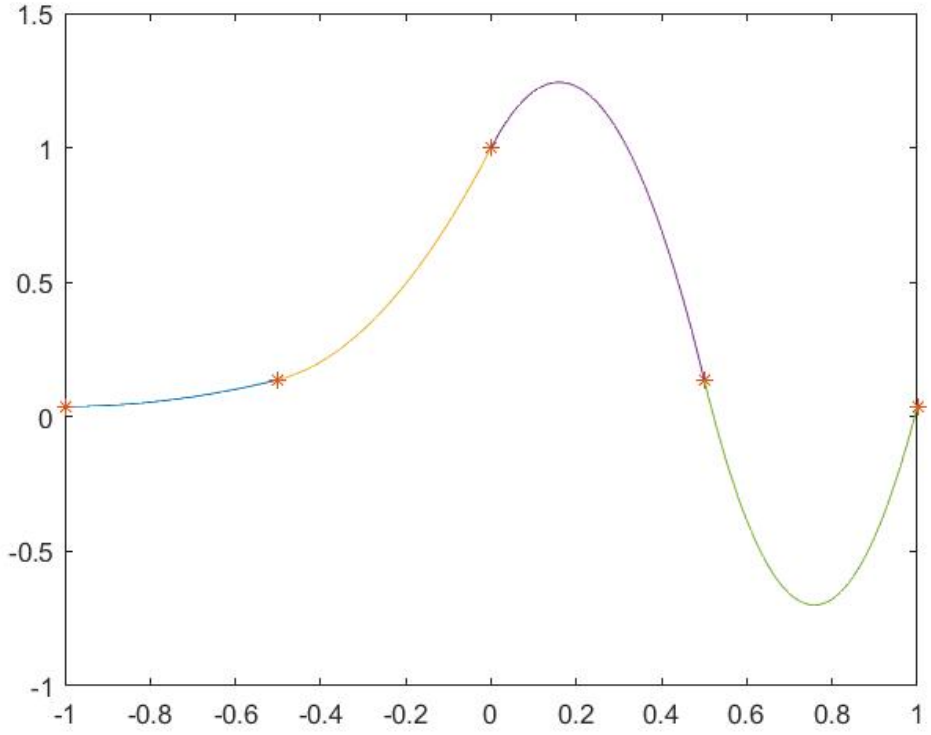
5. Linear

```
0.198800 0.237300 in [-1.000000,-0.500000]
1.724200 1.000000 in [-0.500000,0.000000]
-1.724200 1.000000 in [0.000000,0.500000]
-0.198800 0.237300 in [0.500000,1.000000]
```



5. Quadratic

```
0.397600 0.795200 0.436100 in [-1.000000,-0.500000]
2.653200 3.050800 1.000000 in [-0.500000,0.000000]
-9.550000 3.050800 1.000000 in [0.000000,0.500000]
12.600800 -19.100000 6.537700 in [0.500000,1.000000]
```


1.5
1
0.5
0
-0.5
-1
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1