

Sufficient Output

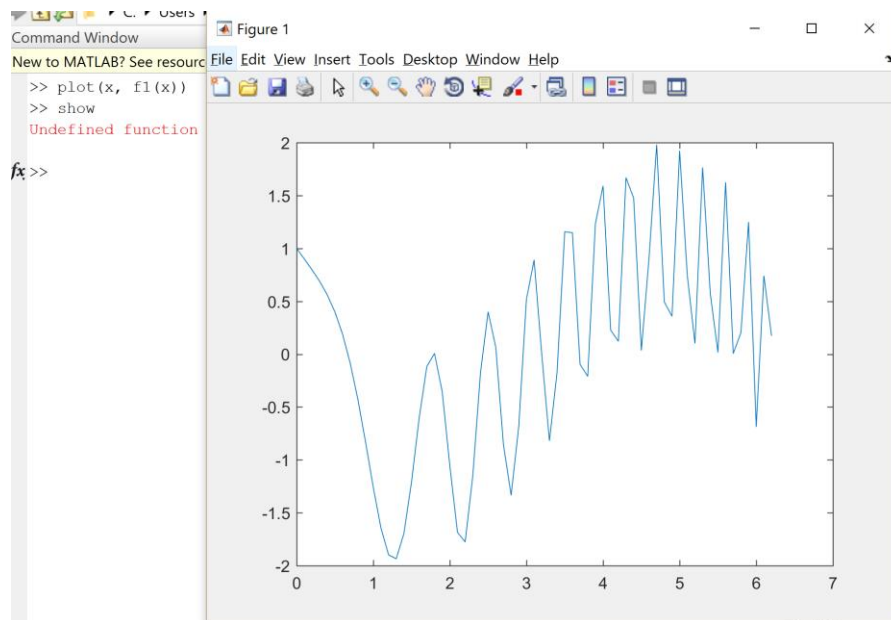
Q1

b1:

```
>> f1 = @(x) cos(2.*x.^2) - sin(x)
```

f1 =

$\cos(2x^2) - \sin(x)$



```
>> [b, iteration] = fzerotx(f1, [0,2*pi])
```

b =

0.6708

iteration =

10

```
>> [b, iteration] = fzerotx(f1, [1,5])
```

b =

2.4204

iteration =

11

Q1 b2

```
>> [b, iteration] = fzerotx(f2, [0,5])
```

b =

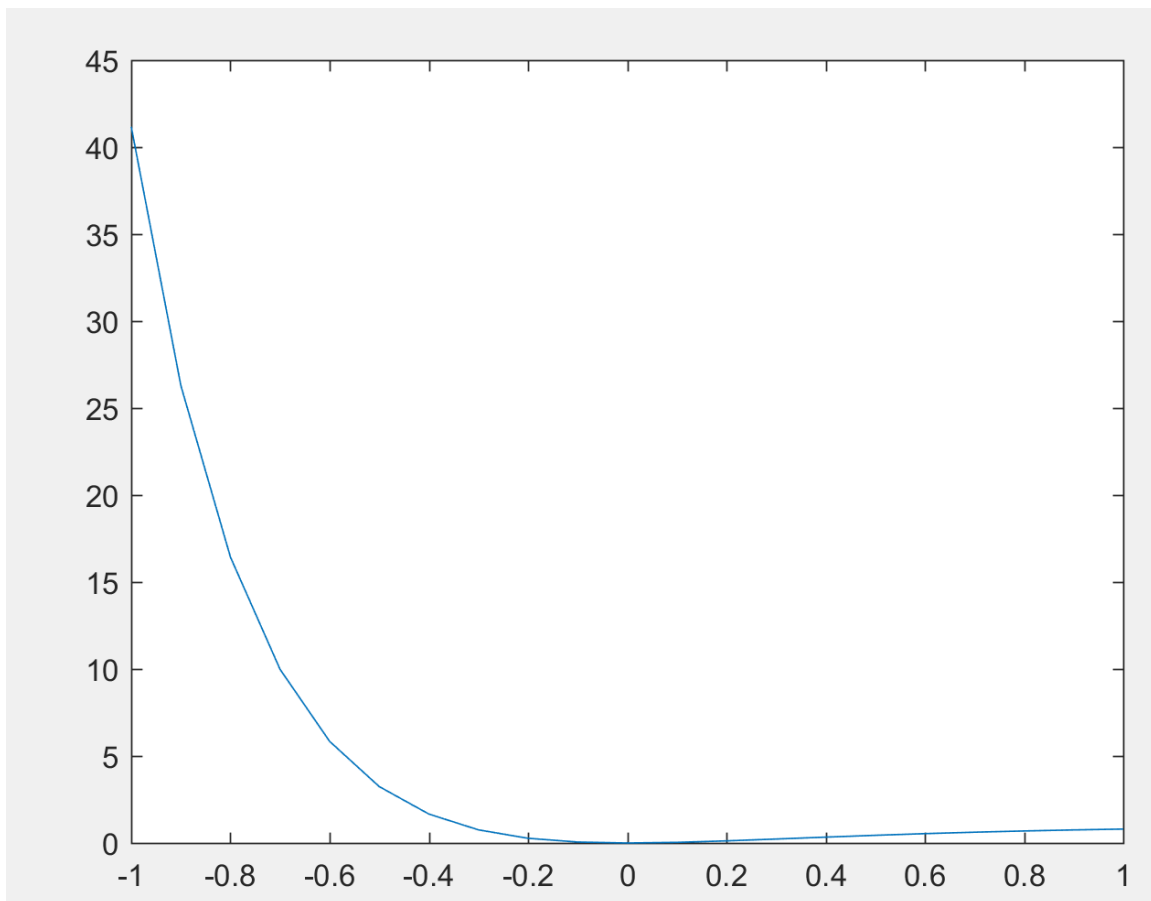
```
3.141592653589792e+00
```

iteration =

```
64
```

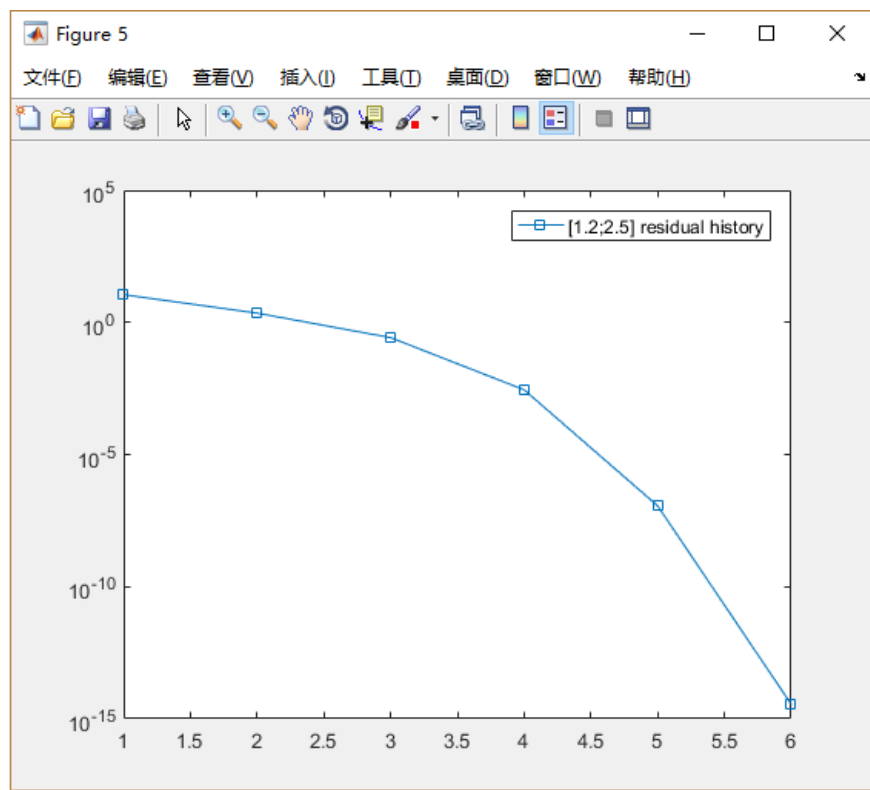
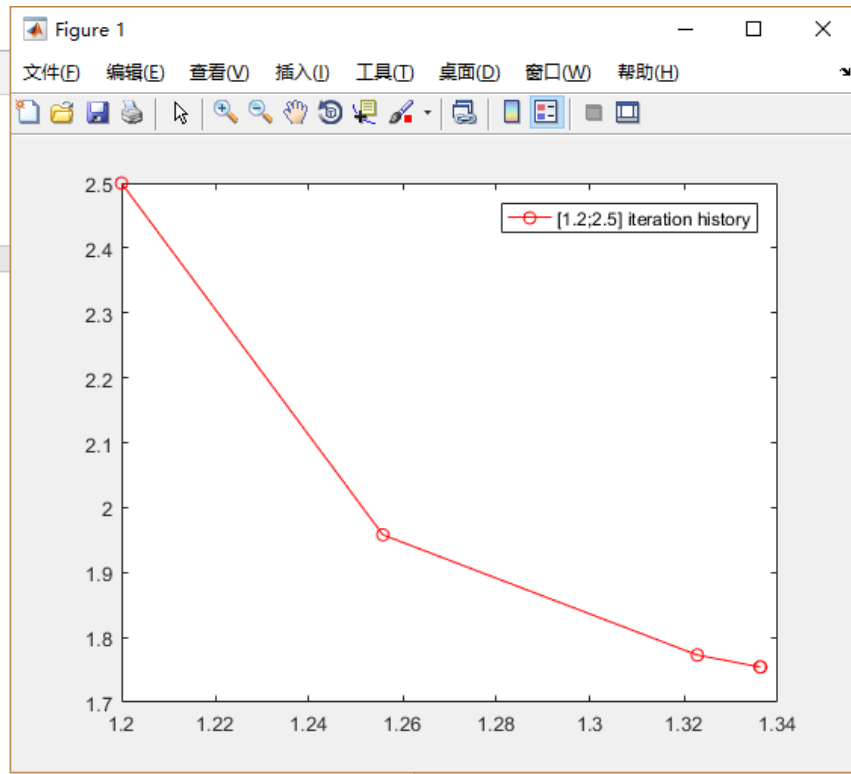
Q1b3

```
>> [b, iteration] = fzerotx(f3, [-1,1])  
Error using fzerotx (line 29)  
Function must change sign on the interval
```



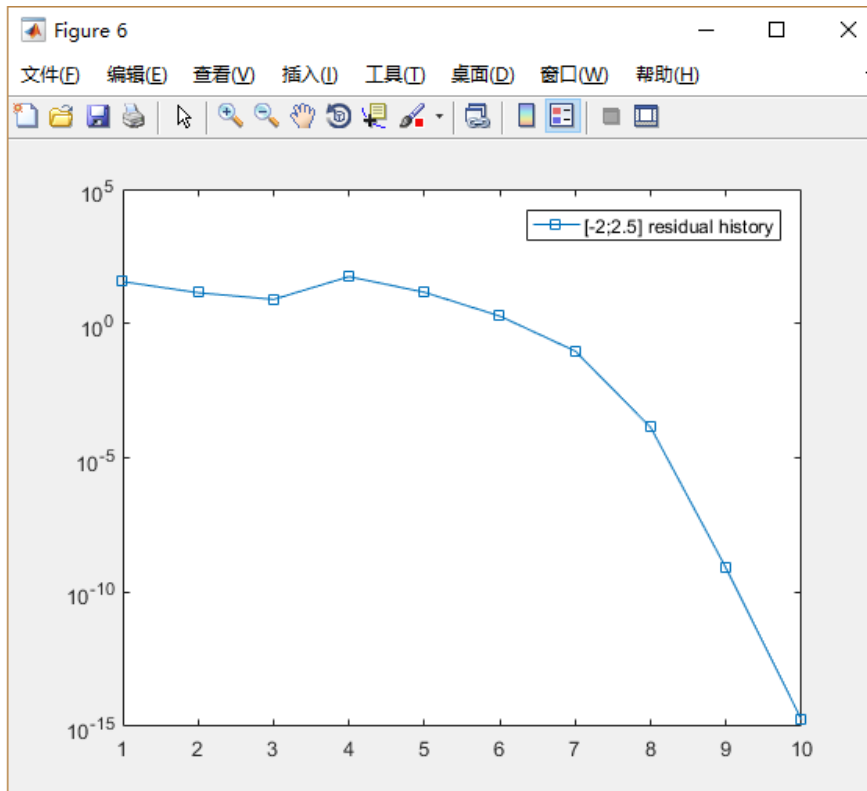
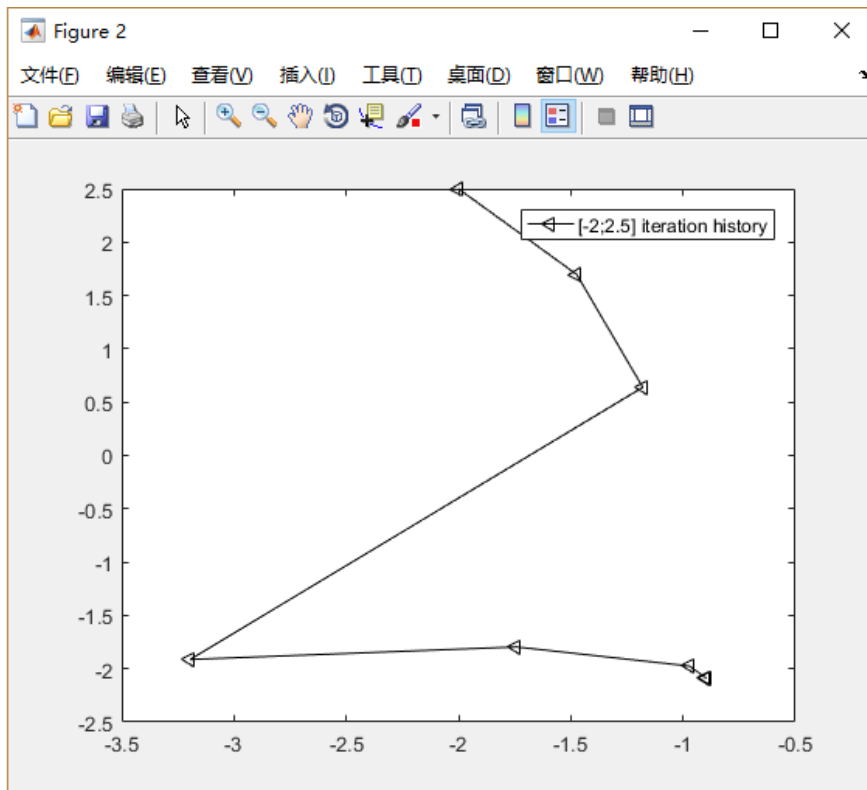
Q3c Sufficient Output (convergence history is referred as residual history)

Initial guess $x_1 = [1.2, 2.5]$



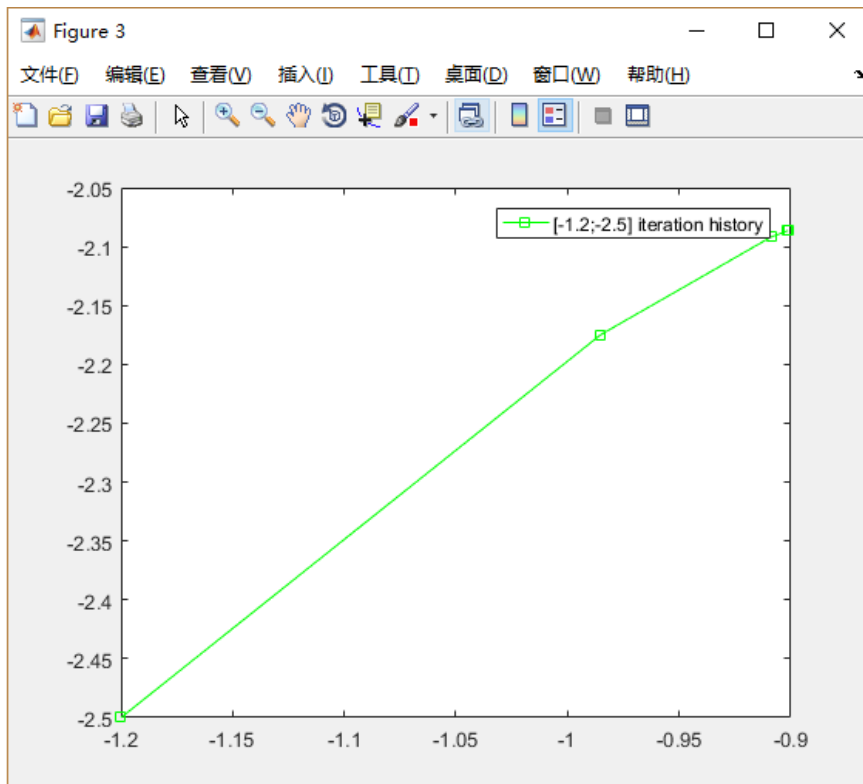
Graph Index:
Q3c1

Initial guess $x_2 = [-2, 2.5]$

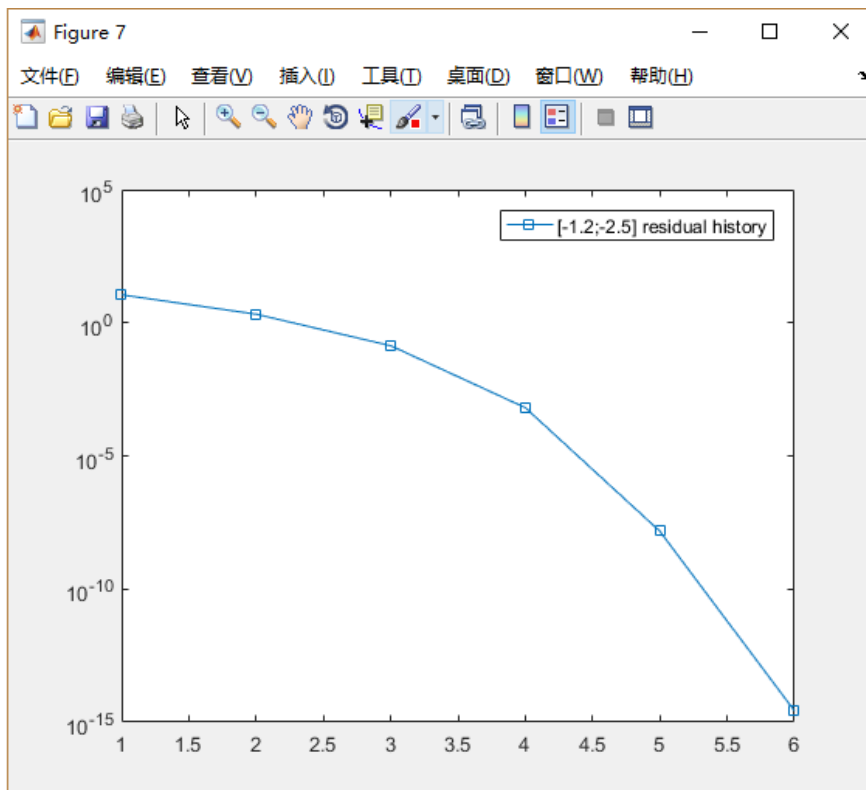


Graph Index:
Q3c2

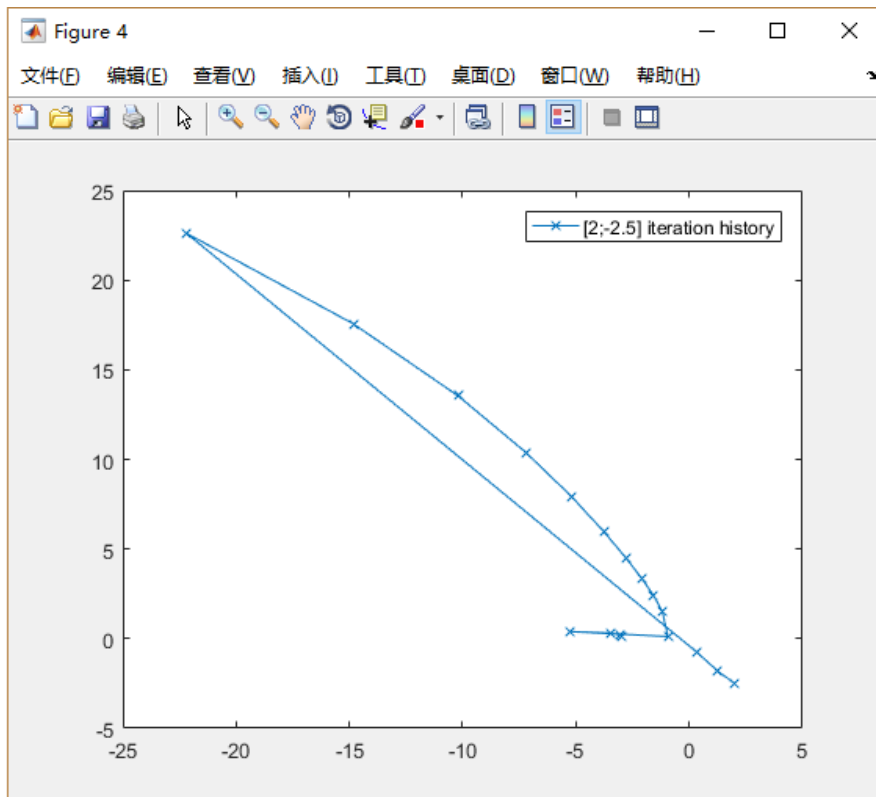
Initial guess $x_3 = [-1.2, -2.5]$



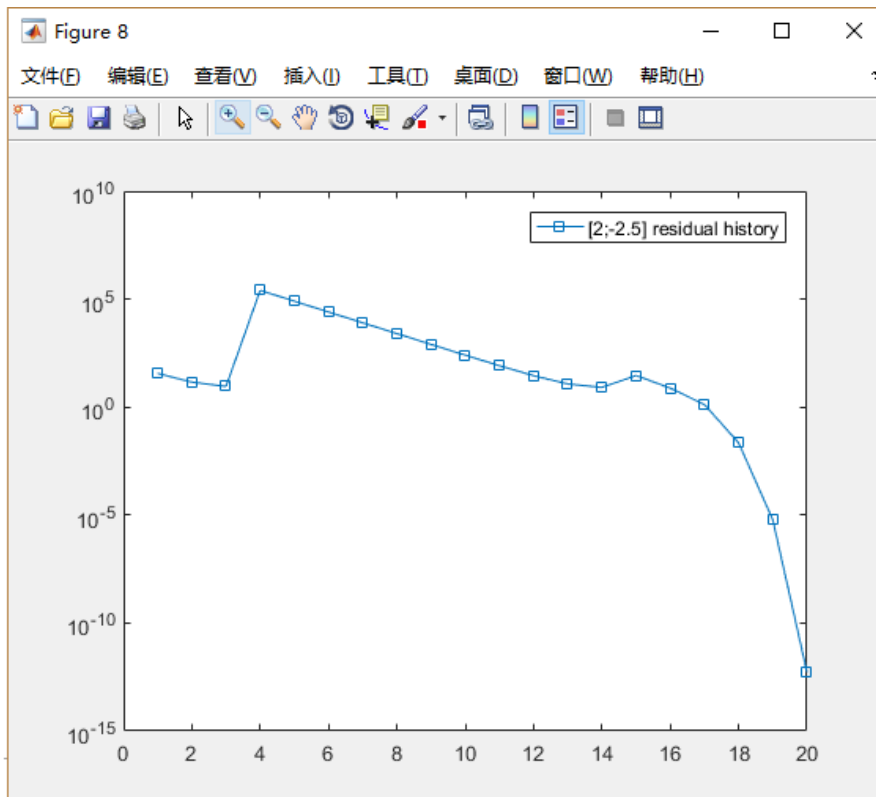
Graph Index:
Q3c3



Initial guess $x_4 = [2, -2.5]$

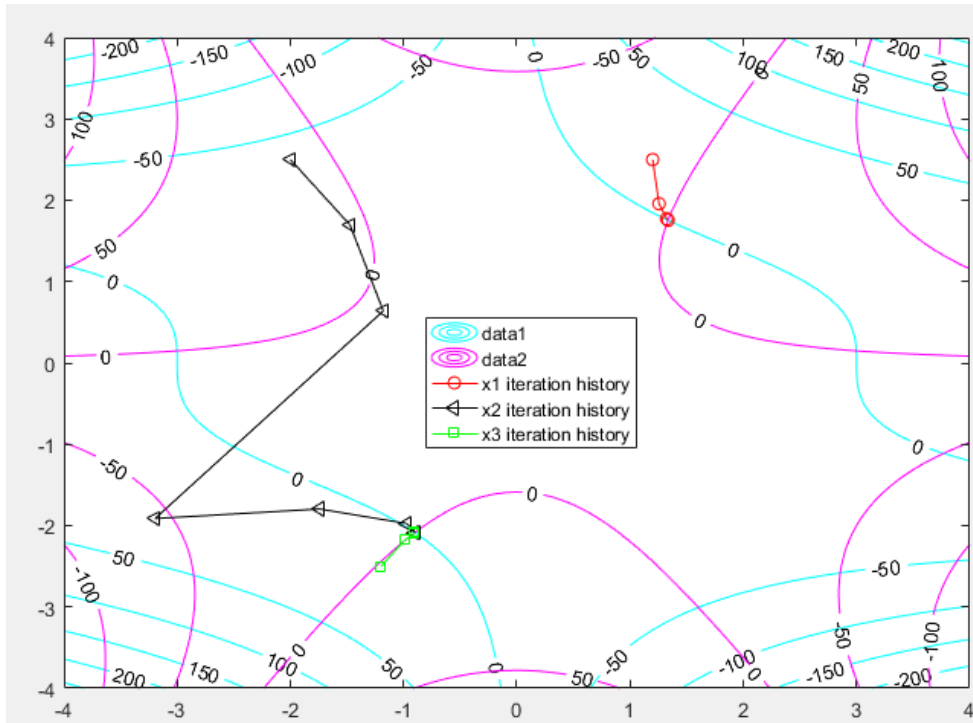


Graph Index:
Q3c4

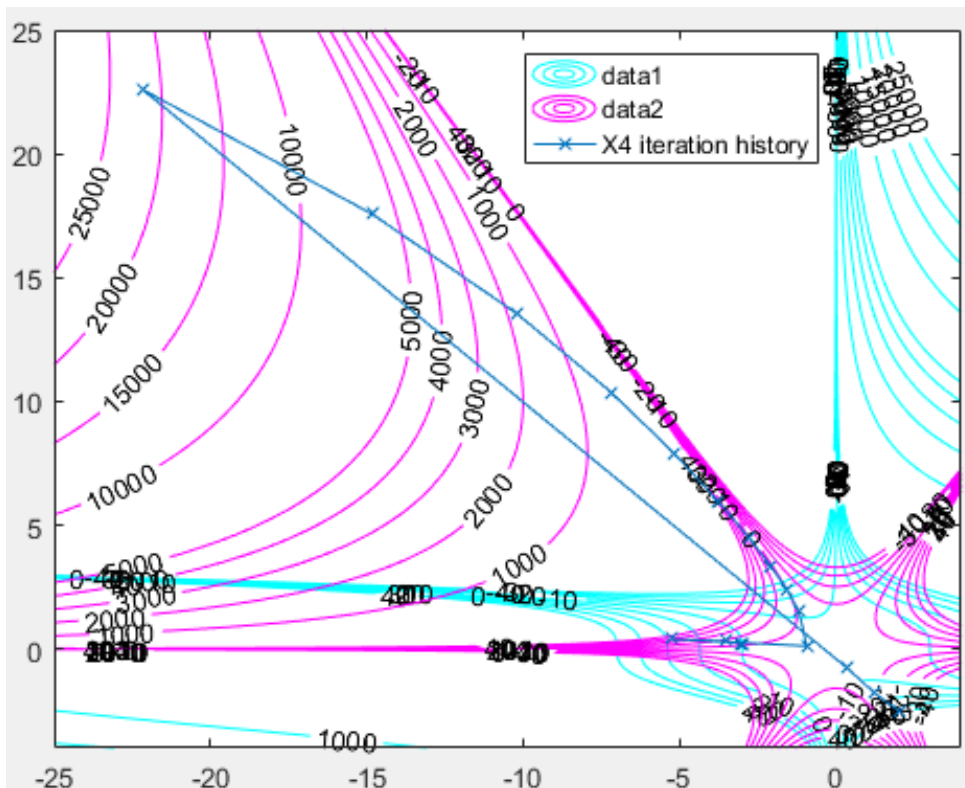


The plot of iteration history on the contour graph of the system of equation

For initial guess $x_1 = [1.2, 2.5]$, $x_2 = [-2, 2.5]$, $x_3 = [-1.2, -2.5]$

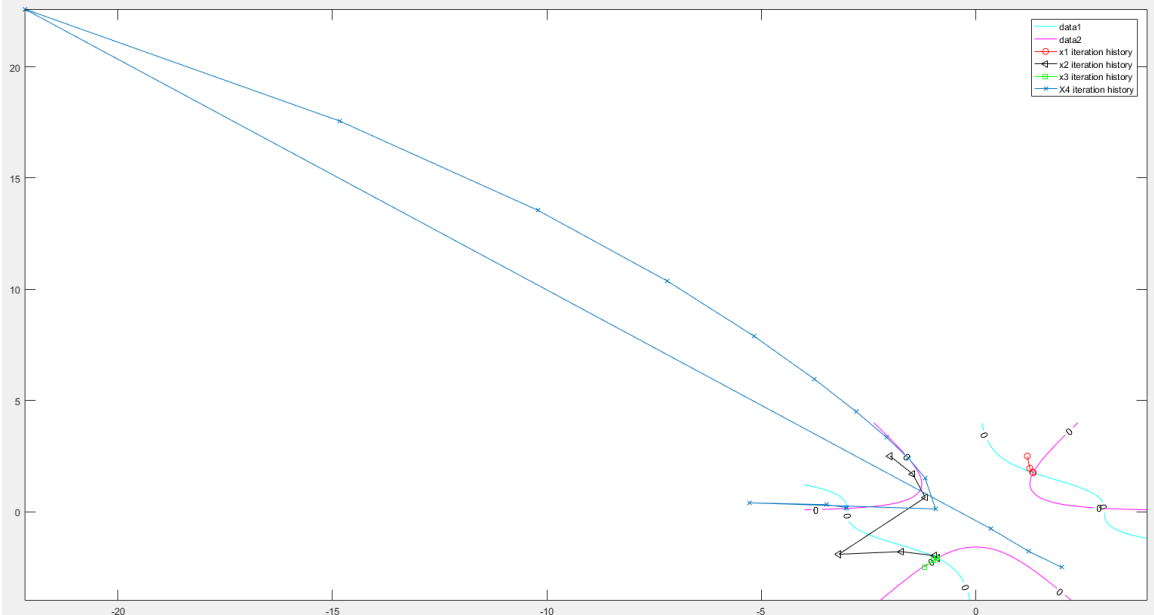


For initial guess $x_4 = [2, -2.5]$



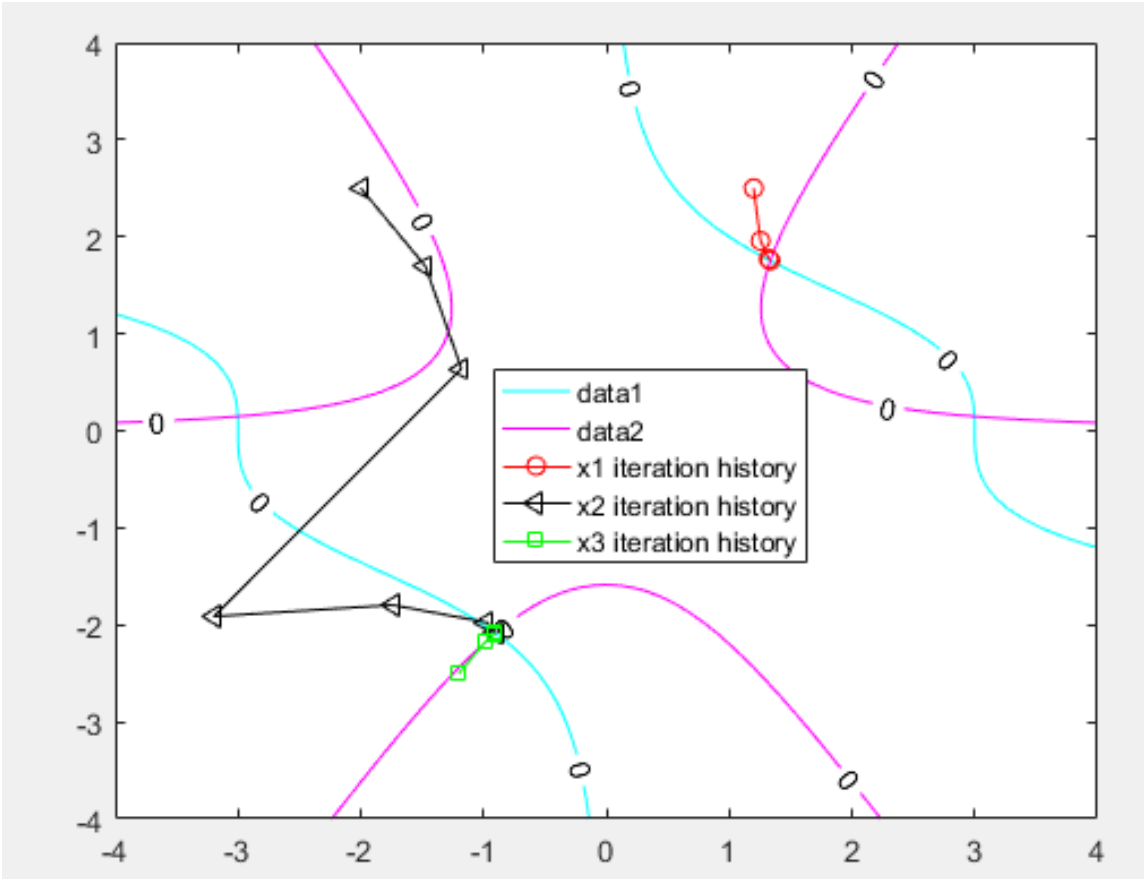
Graph
Index: Q3c5

Contour of equations system at level 0 with 4 initial guesses



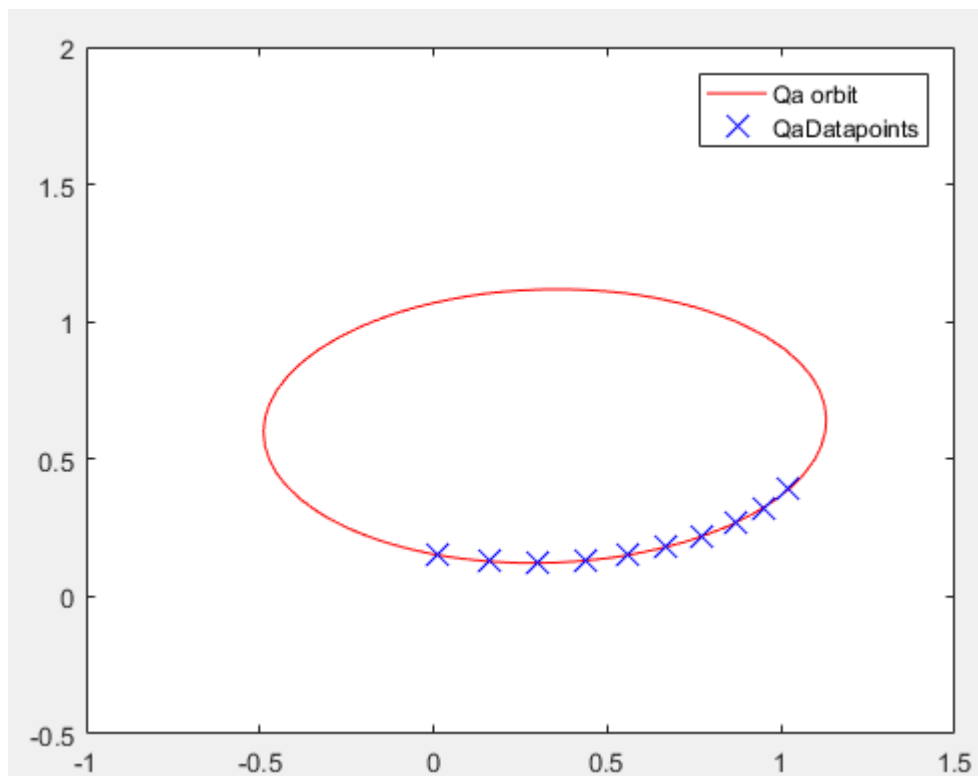
A Close up of x1, x2, x3 initial guess

Graph Index: Q3c6



Q4

A



Sa =

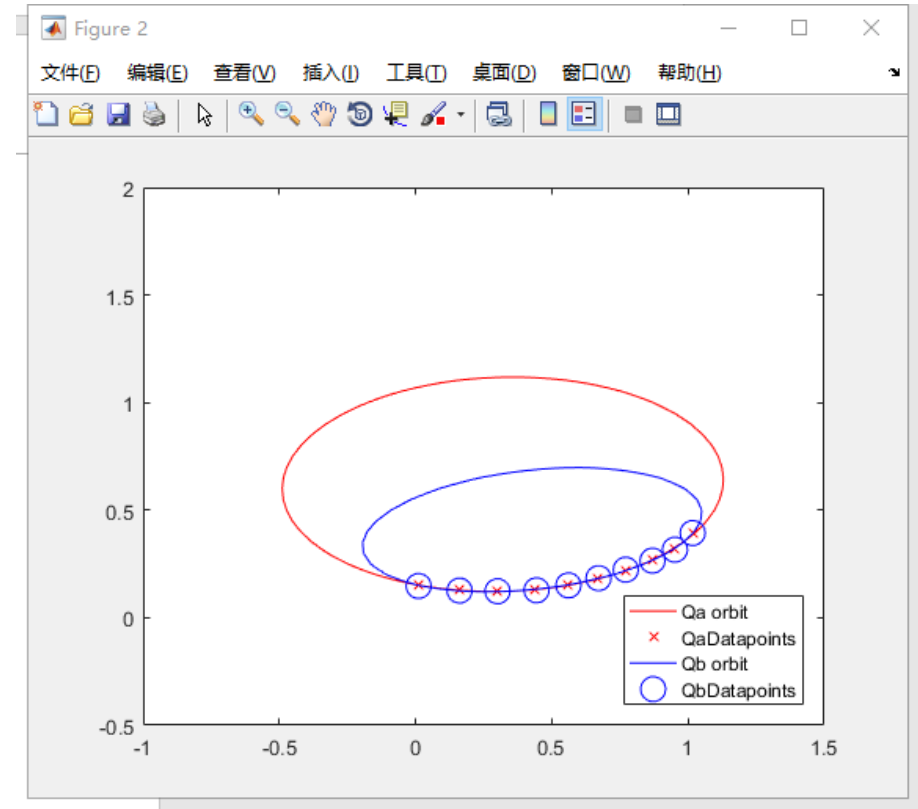
3.7860	0	0	0	0
0	0.9449	0	0	0
0	0	0.2089	0	0
0	0	0	0.0230	0
0	0	0	0	0.0055
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

ans =

-2.6356	0.1436	0.5514	3.2229	-0.4329
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Note: Because we will using $x^2 = by^2 + cxy + dx + ey + f$ to find the constant, so the row in **ans** is correspond to the value of [b c d e f], with a = -1. Whereas Matrix A = in the form $[y^2x * y x y 1]$

B Qa means the original data and orbit. Singular values of Matrix A and constant for equation is recorded above. The original orbit and its data points is in red color. Here we only show the perturbed data's orbit, constant and their singular value for A.

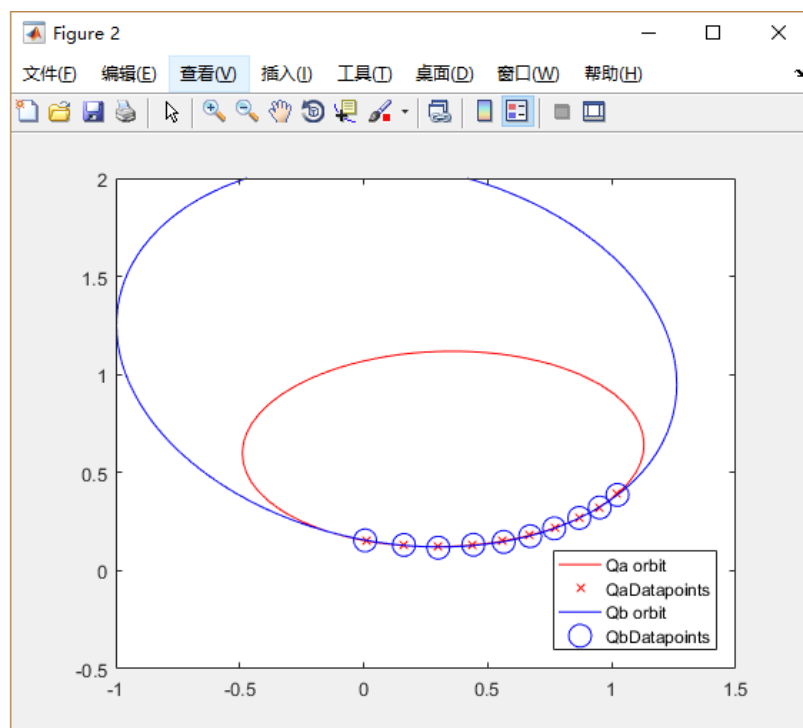


Sb =

3.7874	0	0	0	0
0	0.9430	0	0	0
0	0	0.2093	0	0
0	0	0	0.0224	0
0	0	0	0	0.0064
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

ans =

-4.6459	1.1415	0.3889	3.3106	-0.3985
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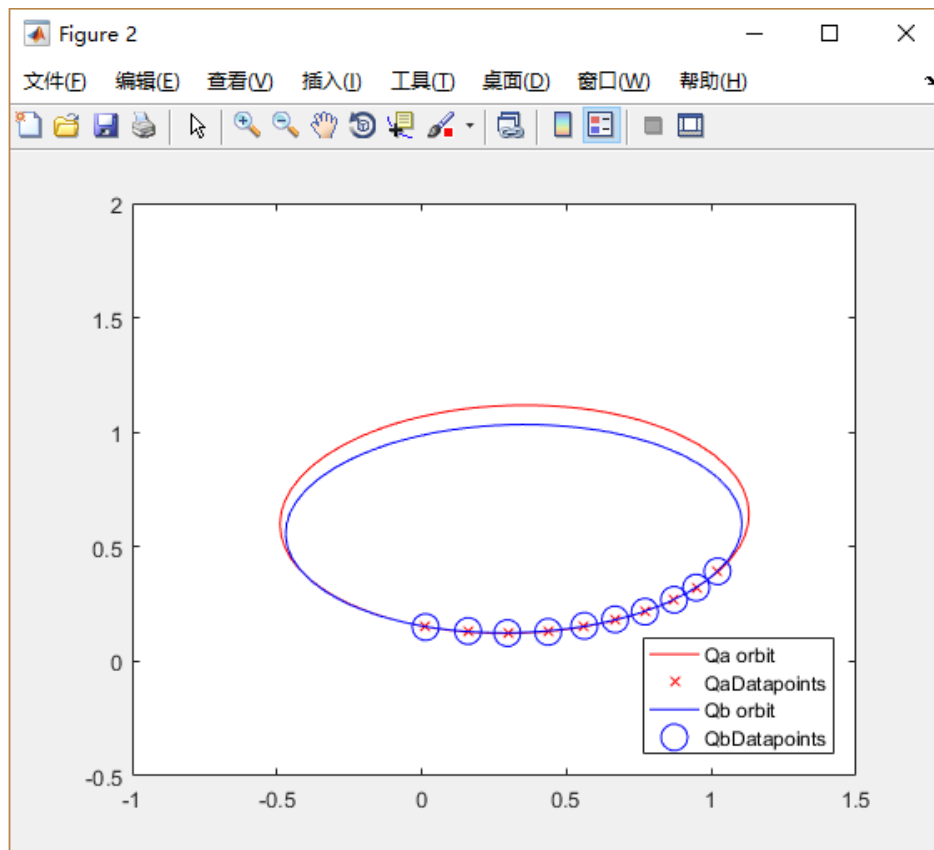


Sb =

3.7858	0	0	0	0
0	0.9455	0	0	0
0	0	0.2130	0	0
0	0	0	0.0248	0
0	0	0	0	0.0053
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

ans =

-1.3275	-0.3557	0.6567	2.9701	-0.4331
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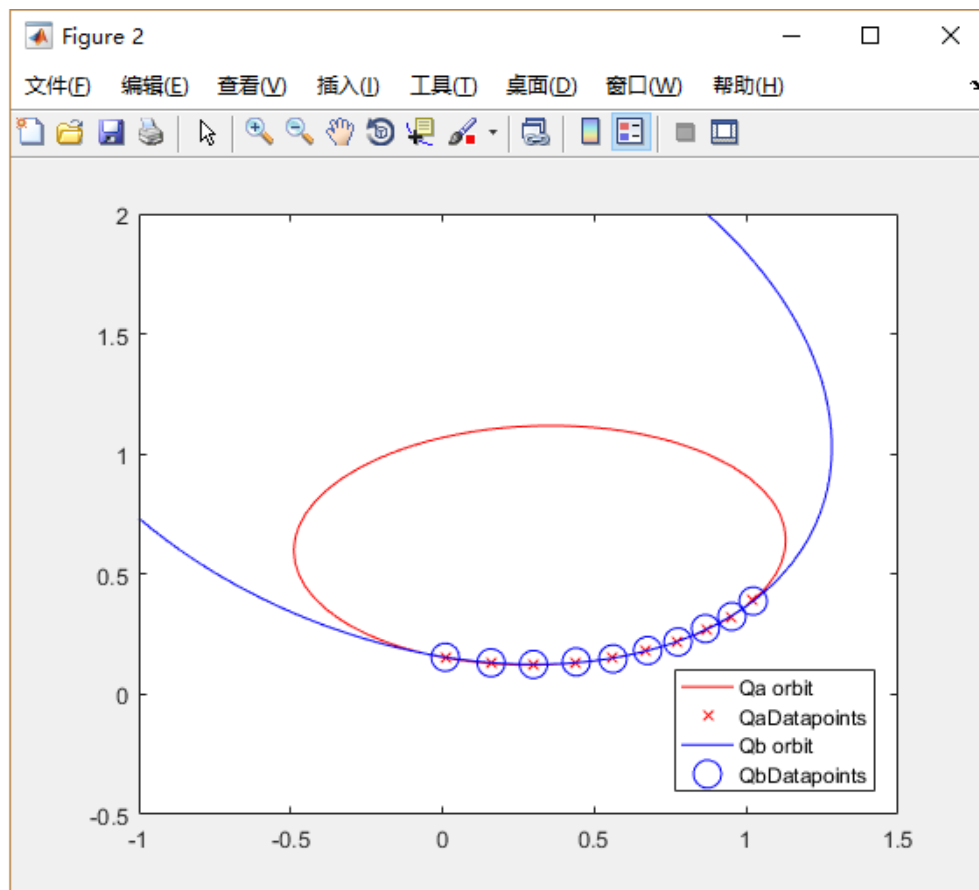


Sb =

3.7860	0	0	0	0
0	0.9452	0	0	0
0	0	0.2095	0	0
0	0	0	0.0220	0
0	0	0	0	0.0053
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

ans =

-2.9945	0.1585	0.5434	3.4177	-0.4559
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Sb =

3.7891	0	0	0	0
0	0.9462	0	0	0
0	0	0.2094	0	0
0	0	0	0.0230	0
0	0	0	0	0.0051
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

ans =

-1.1716	-0.6043	0.6799	3.1862	-0.4694
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