Exercise 2

1)

The solutions x1 and x2 is shown after running my matlab code, which are stored in the variable x1 and x2 of my scrip.

2)

relative_error1	7.3469e-15
relative_error2	4.6811e-23

Relative_error1 is for using l1 norm

Relative_error2 is for using l2 norm

3)

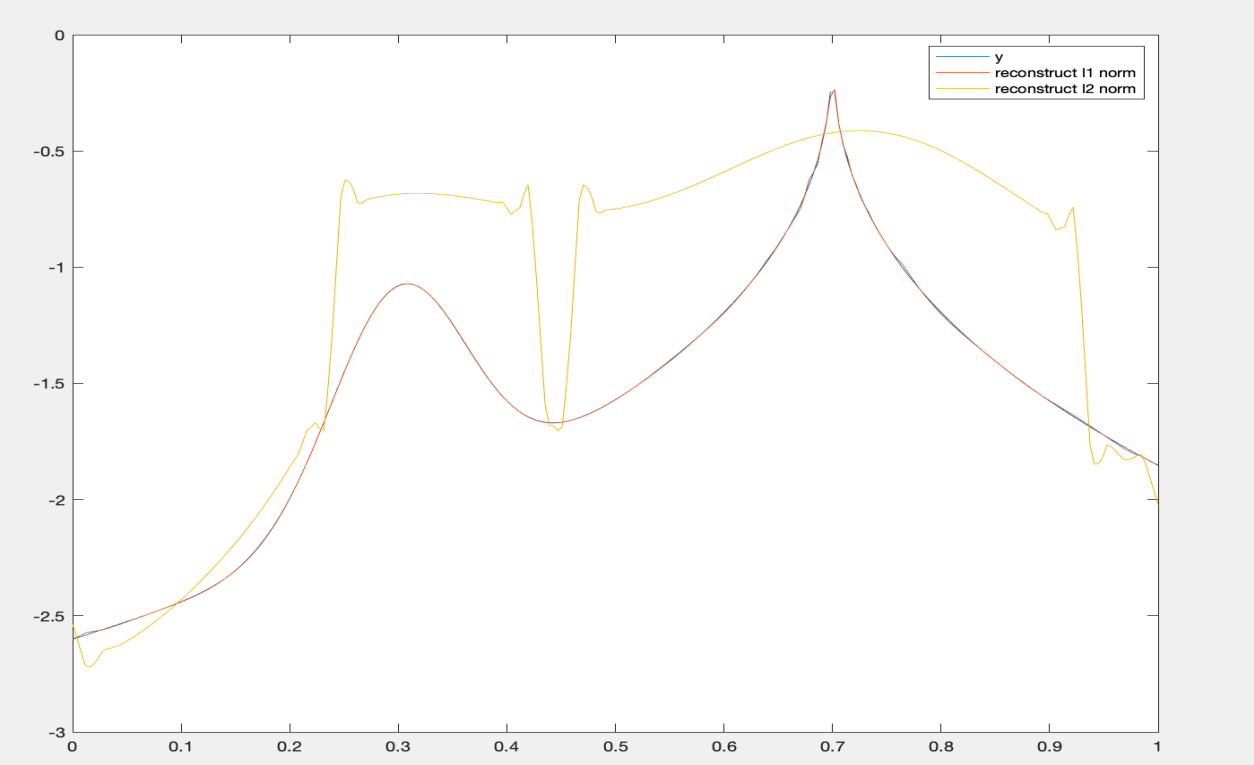
x1_5_accuarcy	1.0000
x2_5_accuarcy	0.8961
x1_5_error	5.9822e-06
x2_5_error	0.1039

X1_5_accuarcy is the accuracy result when using l1 norm and keep 5 % largest entries

X2_5_accuarcy is the accuracy result when using l2 norm and keep 5 % largest entries

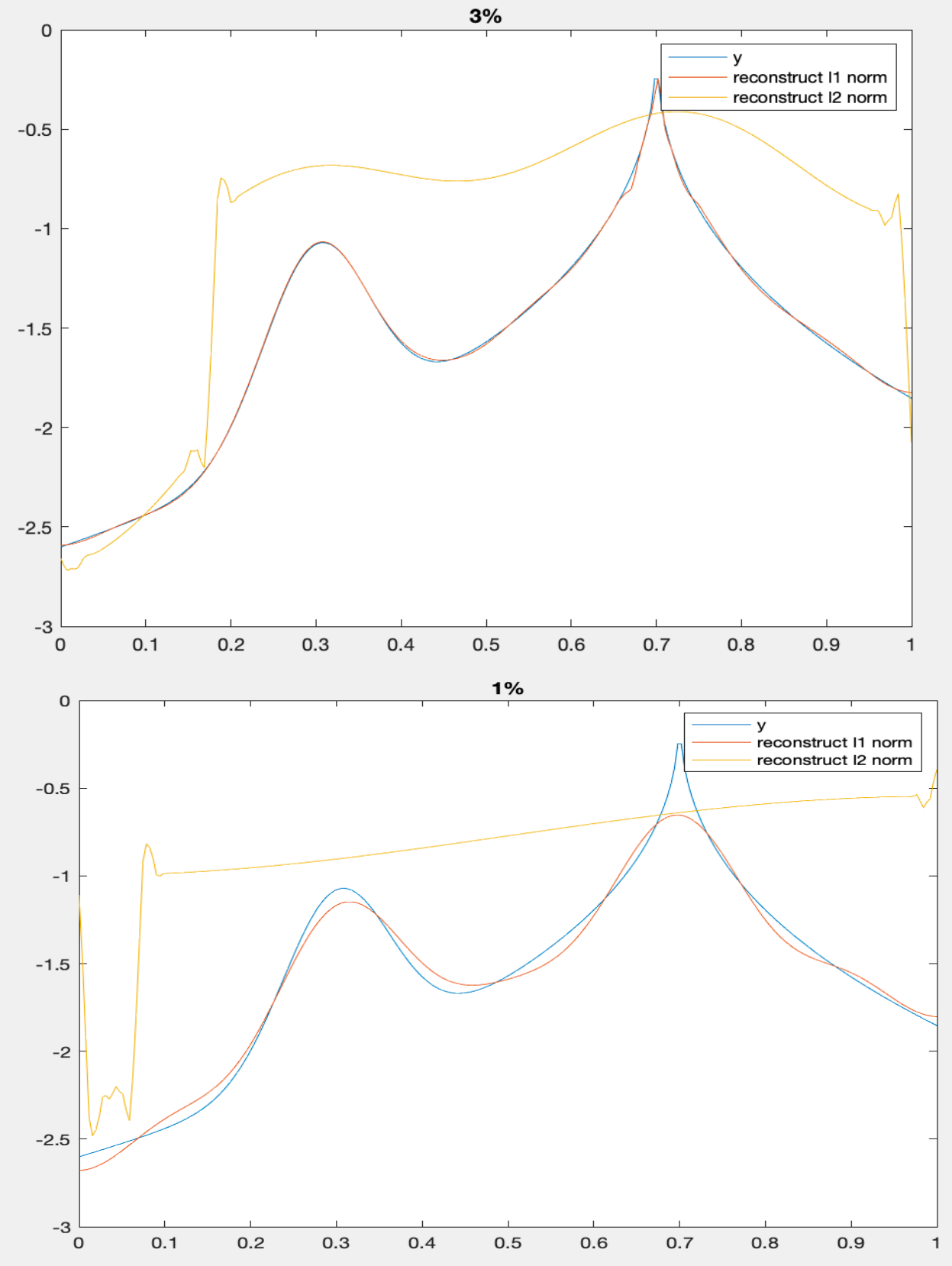
X1_5_error is the relative error result when using l1 norm and keep 5 % largest entries

X2_5_error is the relative error result when using l2 norm and keep 5 % largest entries



Because the reconstruction for using l1 norm get almost the same plot as the original y, it is not easy for you to see the difference between them.

4)


3%
y
reconstruct l1 norm
reconstruct l2 norm
0
-0.5
-1
-1.5
-2
-2.5
-3
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1%
y
reconstruct l1 norm
reconstruct l2 norm
0
-0.5
-1
-1.5
-2
-2.5
-3
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

x1_3_error 5.6305e-05
x1_1_error 0.0019
x2_3_error 0.1561
x2_1_error 0.2484

X1_3_error is the relative error result when using l1 norm and keep 3 % largest entries
X1_1_error is the relative error result when using l1 norm and keep 1 % largest entries
X2_3_error is the relative error result when using l2 norm and keep 3 % largest entries
X2_1_error is the relative result when using l2 norm and keep 1 % largest entries

x2_percentage... 5.7639e-05

When I keep around 18.1% of the entries of x2, the relative error of using l2 norm will reach the result of x1 3% “compression rate”.