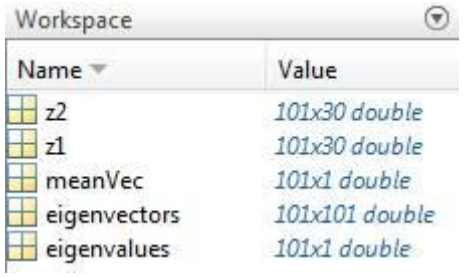
271 Assignment 2

```
>> load z1.dat
>> load z2.dat
>> [eigenvalues, meanVec, eigenvectors] = pcaprelim(z1)
```



1

capture90.m

```
1   function [count] = capture90(eigenvalues)
2
3   tm=sum(eigenvalues)
4   index=1;
5   count=0;
6   tot=0;
7
8   while (((eigenvalues(index)+tot)/tm)<0.93)
9       tot=tot+eigenvalues(index);
10      index=index+1;
11      count=count+1;
12  end
```

```
>> [count] = capture90(eigenvalues)

tm =

   1.1535e+03


count =

     3
```

Z1 needs 3 principal components

2

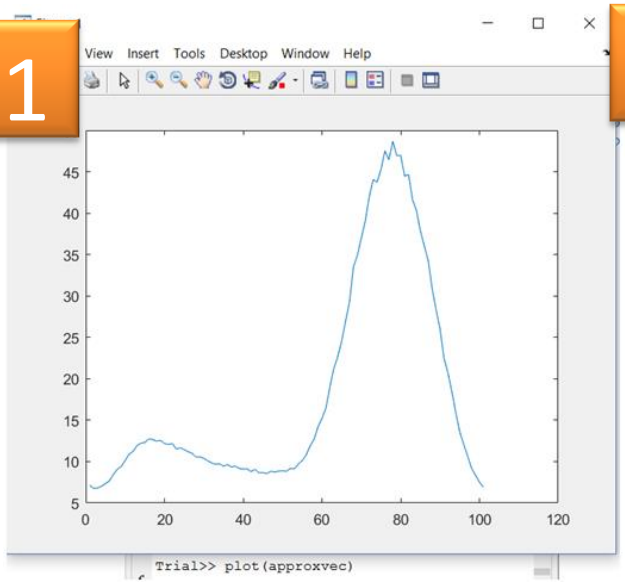
```
>> [count] = capture90(eigenvalues)

tm =

   3.1471e+03


count =

     2
```

Z2 needs 2 principal components

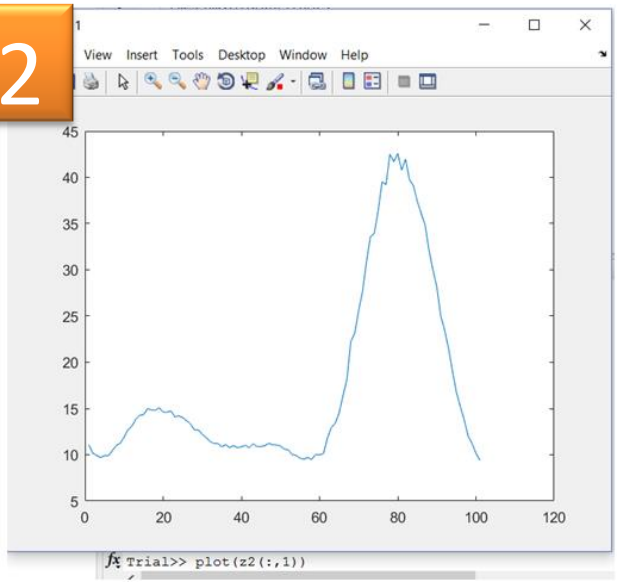
My results show that Z1 needs 3 principal components and Z2 needs 2 principal components. This means that Z1 needs more principal components compared to Z2 to “capture” most of the variation from the mean signal.

Plots for Z2:

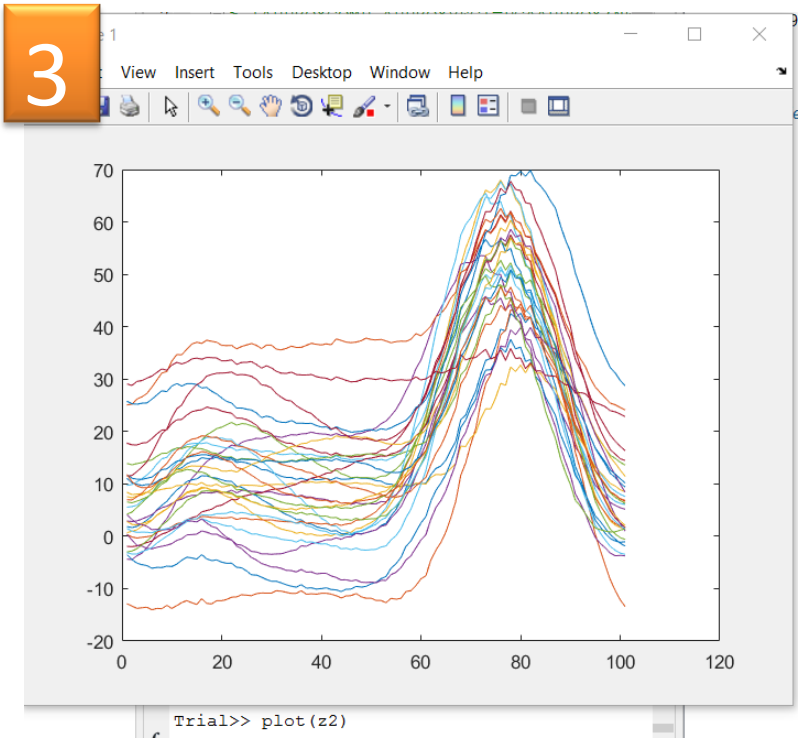
1



2



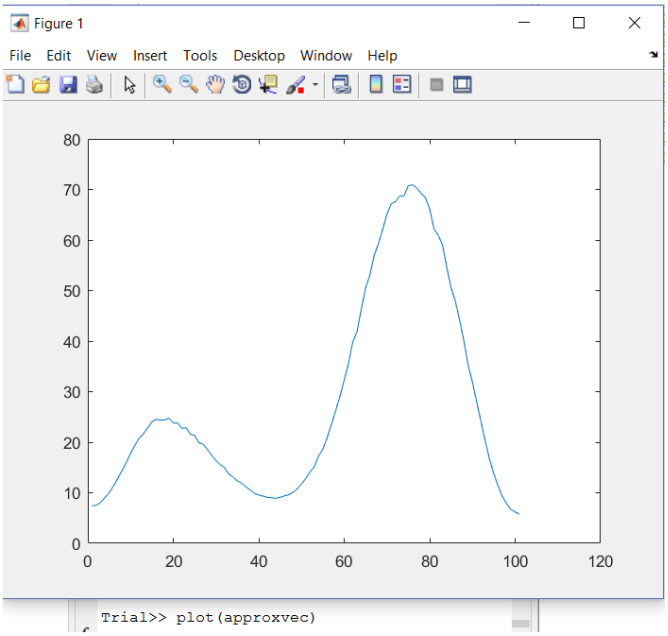
3

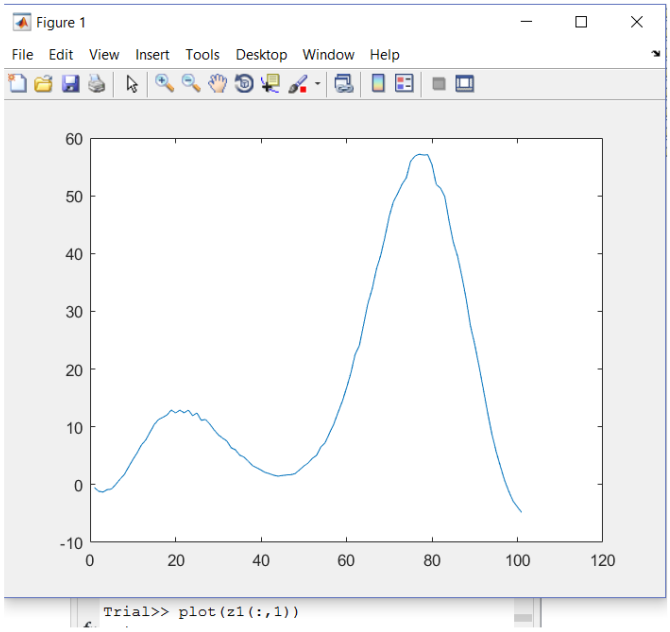


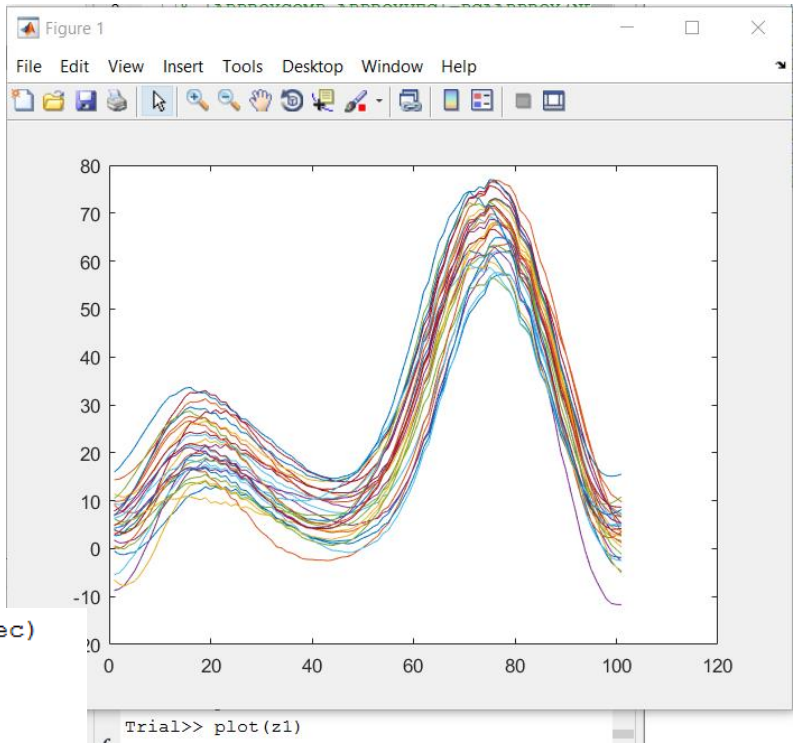
My results show that Z2 has more variation between its reconstruction and its original signal. Image 1 shows a plot of the reconstructed data of Z2. Images 2 shows a plot of the first column of the original Z2 data. Image 3 shows the entire original data of Z2. The user can see a huge variation in the shape of the third plot. Data before 60 on the x-axis has points ranging from around -15 to 40.

```
Trial>> (sum(z2(:,1)-approxvec))/101

ans =

   -0.5597
```

Plots for Z1:







Compared to Z2, my Z1 plots have a lot less variation between the reconstruction and the original signal of its first column. This is also seen in the entire z1 original plot. It has a more smooth shape with less variation.

```
Trial>> [absErr]= meanAbsErr(z1,approxvec)

absErr =

   -0.2241
```

Z1 mean absolute error:

approxvec | absErr

30x1 double

	1	2	3
6	-3.9756		
7	4.6482		
8	-8.6602		
9	5.0940		
10	2.5650		
11	-4.6542		
12	-2.5649		
13	-10.1376		
14	3.6150		
15	-4.7850		
16	-5.6606		
17	-5.9685		
18	-1.1083		
19	1.3258		
20	-0.7658		
21	0.5631		
22	7.1266		
23	-0.7437		
24	-8.0378		
25	-1.5928		
26	-7.2494		
27	-3.2262		
28	-3.5799		
29	3.1412		
30	-0.2241		

Z2 mean absolute error:

approxvec | absErr

30x1 double

	1	2	3
6	7.4268		
7	10.4776		
8	-2.0928		
9	21.0932		
10	-4.1428		
11	-2.4847		
12	4.1566		
13	3.8611		
14	0.8756		
15	16.0869		
16	-1.4722		
17	5.7547		
18	-2.5356		
19	-2.1132		
20	-5.7941		
21	13.5548		
22	-6.4871		
23	0.3554		
24	-0.9742		
25	-5.4545		
26	-2.3688		
27	-4.2616		
28	12.8272		
29	3.0035		
30	-0.1198		

To conclude, Z1 data demonstrates the control group and Z2 data demonstrates the group with arthritis. This is because from the principal component analysis Z2 data shows a lot more variation and more error.