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```
tic;
```

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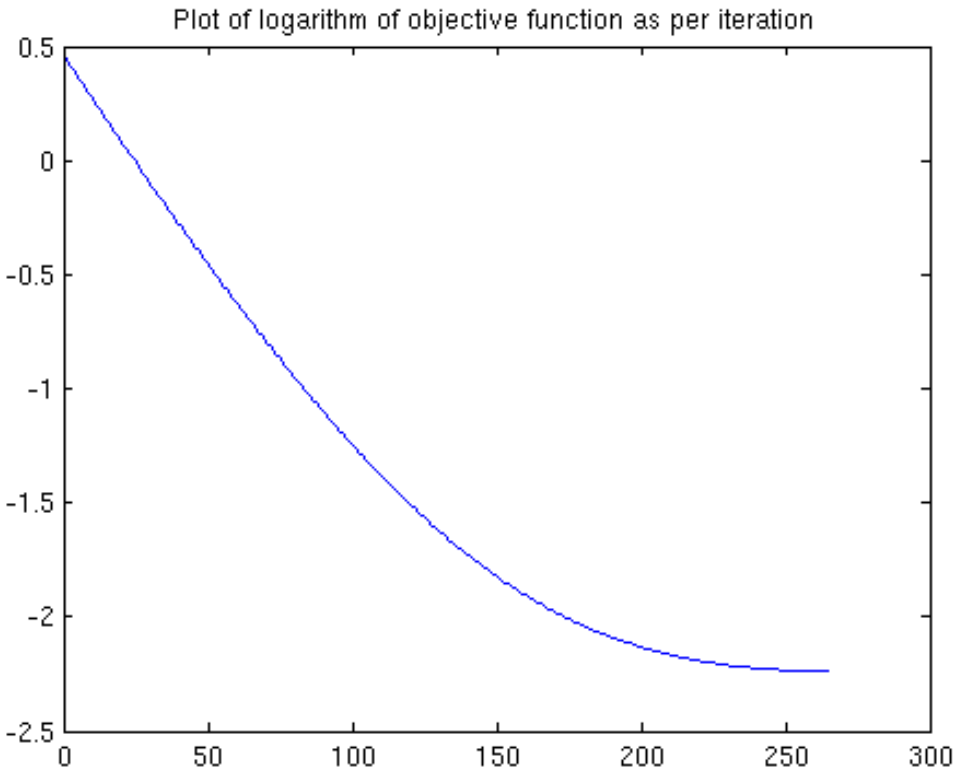
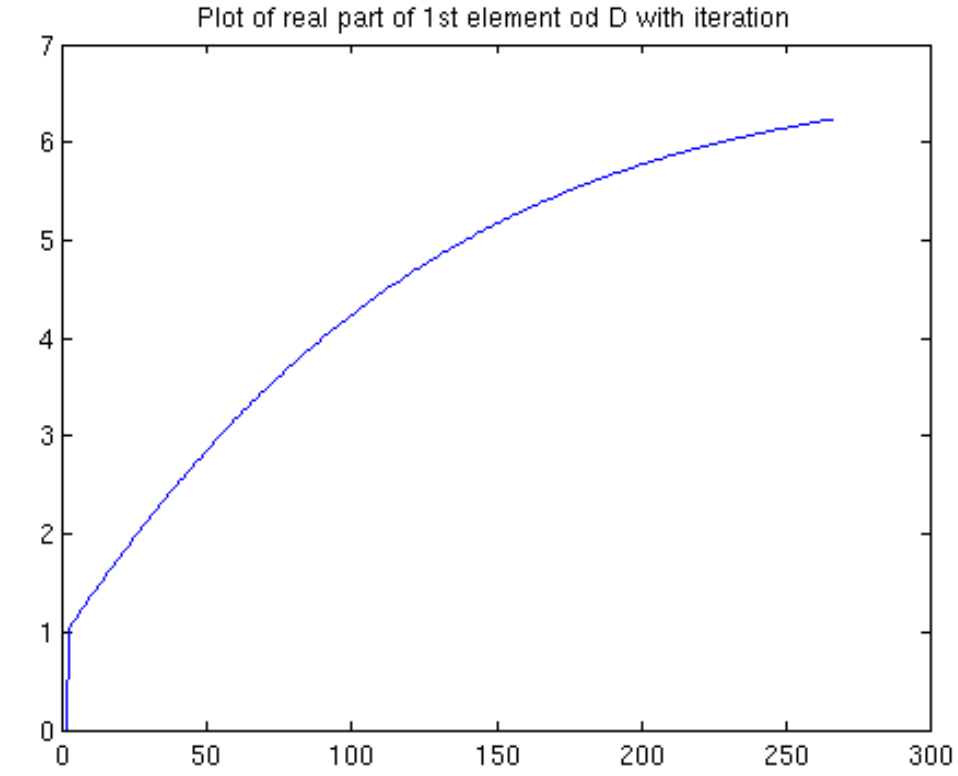
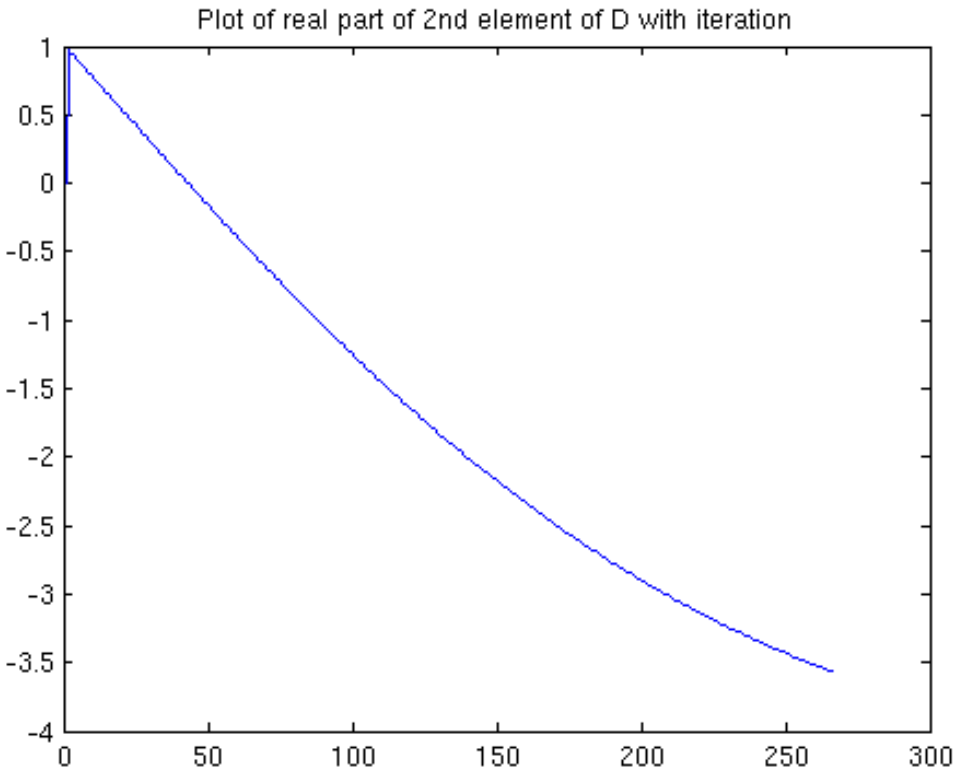
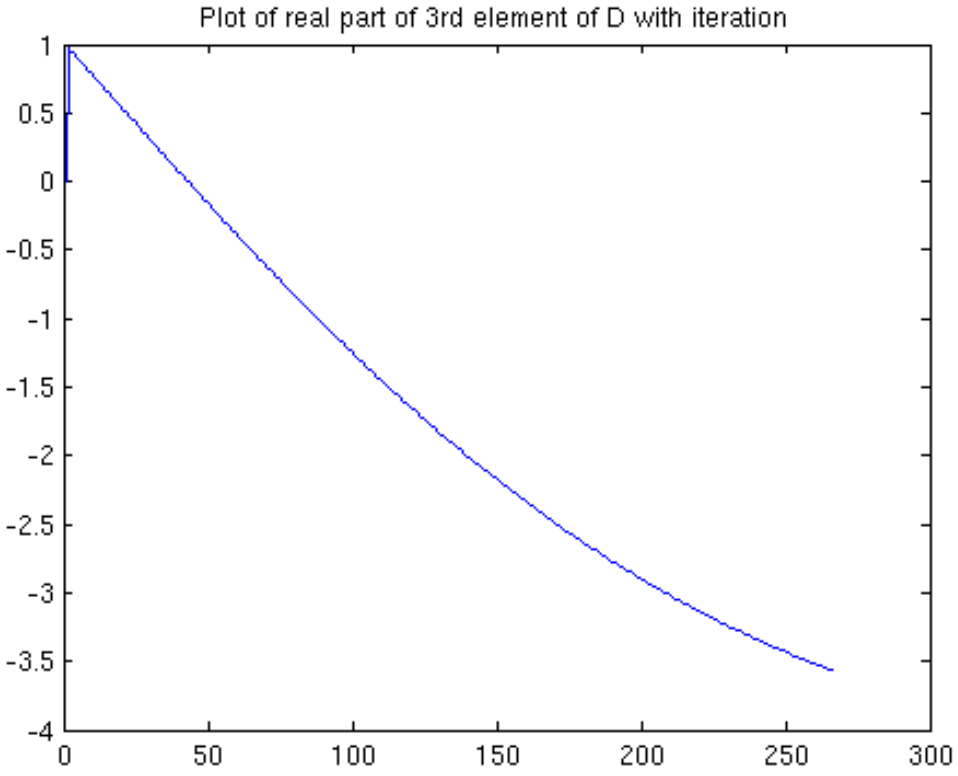
```
% Part A function will give the output of D matrix estimate
% The input is the initial condition of L matrix
% Here the inital condition is that L = [1,0;1,1] and D = LL'
% Have applied Levenberg-marquadtt method for optimization

[D,L,objfunction,D1,D2,D3,D4] = partA(1,1,1);

D
% we need to plot
figure;
plot(objfunction);
title('Plot of logarithm of objective function as per iteration');
figure;
% If we require the whole complex number to be plotted we can just remove
% the real from all Di's
plot(real(D1));
title('Plot of real part of 1st element od D with iteration');
figure;
plot(real(D2));
title('Plot of real part of 2nd element of D with iteration');
figure;
plot(real(D3));
title('Plot of real part of 3rd element of D with iteration');
figure;
plot(real(D4));
title('Plot of real part of 4th element of D with iteration');
```

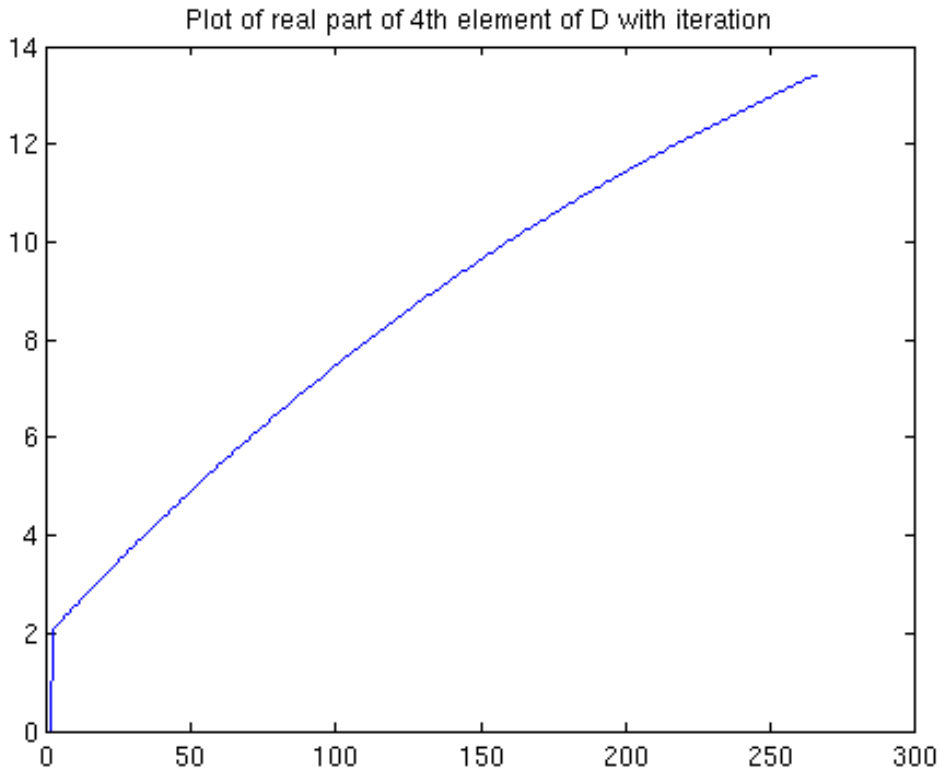
```
D =

   6.2328            -3.5671 - 0.5313i
  -3.5671 + 0.5313i  13.4155
```


Plot of logarithm of objective function as per iteration
0.5
0
-0.5
-1
-1.5
-2
-2.5
0
50
100
150
200
250
300


Plot of real part of 1st element od D with iteration
7
6
5
4
3
2
1
0
0
50
100
150
200
250
300


Plot of real part of 2nd element of D with iteration
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
-3.5
-4
0
50
100
150
200
250
300


Plot of real part of 3rd element of D with iteration
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
-3.5
-4
0
50
100
150
200
250
300



Part B

```
%We take the SVD of the L matrix and find the eigenvector
%corrosponding to the maximumum eigenvalue of LL', which is the coloumn
% of the matrix U

[U,S,V] = svd(L);
Princ_maximus = U(:,1);  % The final direction along which the diffusion is maximu
Princ_maximus
```

```
Princ_maximus =

   0.3836 + 0.0083i
  -0.9161 + 0.1162i
```

Part C

```
multi_factor = U(:,1)./U(:,2);
multi_factor

toc;
```

```
multi_factor =

   0.4154 + 0.0000i
  -2.4071 - 0.0000i

Elapsed time is 1.672179 seconds.
```

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