```
% Load entire mat file contents into a structure.
%%%% Code starts %%%%
%image = load("data.mat");
function[r0,c]= project_1226347696(image)

%1st question
figure(1);
imshow(image);


%2nd question

figure(2);
[U,S,V] = svd(single(image));
[r , column]=size(S);
for i = 1: r
    sample = norm(S(i,i)/S(1,1));
    dummy(i) = sample;
    rank(i) = i;
end
semilogy(rank,dummy);

%3rd question
for i = 1: r
    sample = norm(S(i,i)/S(1,1));
    if sample < 0.01
        r0 = i;
        break;
    end
end

%4th question
c = [];
[U,S,V] = svd(single(image));
First_Two_Rows_U = U(:,1:2);
First_Two_column_S = S(1:2,1:2);
First_Two_column_V = V(:,1:2)';
figure(3);
subplot (2,3,1);
imshow(First_Two_Rows_U*First_Two_column_S*First_Two_column_V,[] )
figure1 = imshow(First_Two_Rows_U*First_Two_column_S*First_Two_column_V,[] );
[rows , columns ]=size(image);
m = rows;
n = columns;
two_com = (2*(1+m+n)/(m*n))*100;
c(1)= two_com;
title( ["The compression value percentage of","rank 2 is :"  +two_com] );

First_Ten_Rows_U = U(:,1:10);
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First_Ten_column_S = S(1:10,1:10);
First_Ten_column_V = V(:,1:10)';
subplot (2,3,2);
imshow(First_Ten_Rows_U*First_Ten_column_S*First_Ten_column_V,[] )
figure2 = imshow(First_Ten_Rows_U*First_Ten_column_S*First_Ten_column_V,[] );
[rows , columns ]=size(image);
m = rows;
n = columns;
ten_com = (10*(1+m+n)/(m*n))*100;

c(2)= ten_com;
title( ["The compression value percentage of","rank 10 is :" ,ten_com] );

First_f_Rows_U = U(:,1:50);
First_f_column_S = S(1:50,1:50);
First_f_column_V = V(:,1:50)';
subplot (2,3,3);
imshow(First_f_Rows_U*First_f_column_S*First_f_column_V,[] )
figure3 = imshow(First_f_Rows_U*First_f_column_S*First_f_column_V,[] );
[rows , columns ]=size(image);
m = rows;
n = columns;
fifty_com = (50*(1+m+n)/(m*n))*100;

c(3)= fifty_com;
title( ["The compression value percentage of","rank 50 is :", fifty_com] );

First_100_Rows_U = U(:,1:100);
First_100_column_S = S(1:100,1:100);
First_100_column_V = V(:,1:100)';
subplot (2,3,4);
imshow(First_100_Rows_U*First_100_column_S*First_100_column_V,[] )
figure4 = imshow(First_100_Rows_U*First_100_column_S*First_100_column_V,[] );
[rows , columns ]=size(image);
m = rows;
n = columns;
hun_com = (100*(1+m+n)/(m*n))*100;

c(4)= hun_com;
title( ["The compression value percentage of","rank 100 is :",  hun_com] );

First_r0_Rows_U = U(:,1:r0);
First_r0_column_S = S(1:r0,1:r0);
First_r0_column_V = V(:,1:r0)';
subplot (2,3,5);
imshow(First_r0_Rows_U*First_r0_column_S*First_r0_column_V,[] )
figure5 = imshow(First_r0_Rows_U*First_r0_column_S*First_r0_column_V,[] );
[rows , columns ]=size(image);
m = rows;
```
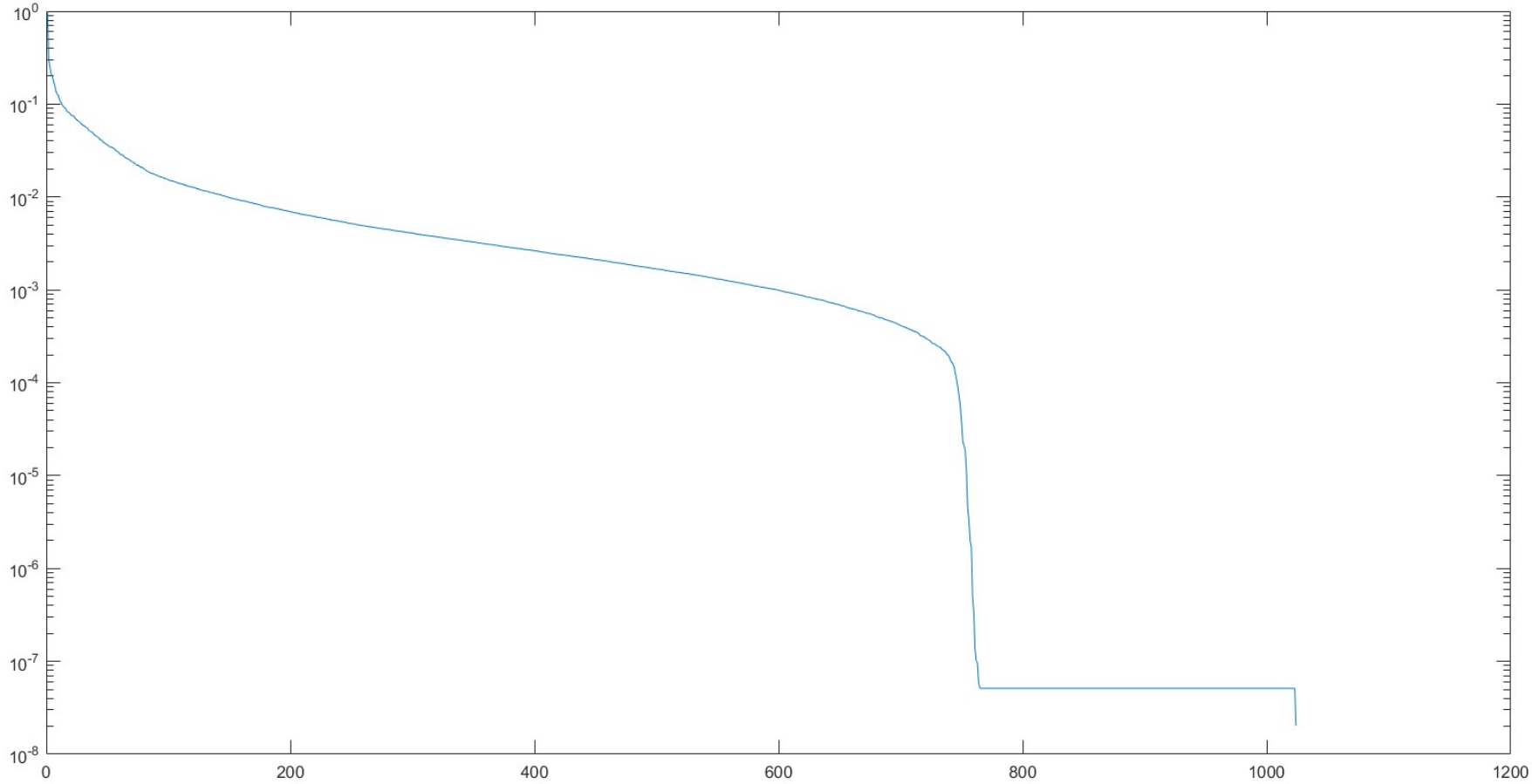
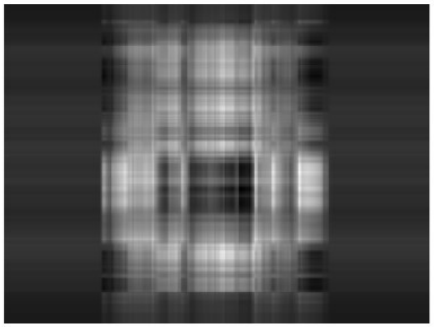

```
n = columns;
r0_com = (r0*(1+m+n)/(m*n))*100;

c(5)= r0;
title( ["The compression value percentage of","rank r0 is :",  r0] );

subplot (2,3,6);
axis off
text(0.1,1,'The quality of rank 2 is worse for the given image');
text(0.1,0.85,'The quality of rank 10 is low for the given image');
text(0.1,0.7,'The quality of rank 50 is moderate for the given image');
text(0.1,0.55,'The quality of rank 100 is better for the given image');
text(0.1,0.4,'The quality of rank r0 is best for the given image');
text(0.1,0.2,'The quality of rank r0 will only be best if compression value');
text(0.1,0.1,'is greater than rank 100 for the given image');
```

```
>> image=load("data.mat").image
```

```
>> [r0,c]= project_1226347696(image)

r0 =

   149


c =

    0.3420    1.7099    8.5494   17.0988  149.0000

>>
```


10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
10^{-7}
10^{-8}
0
200
400
600
800
1000
1200

The compression value percentage of rank 2 is :
0.34198



The compression value percentage of rank 10 is :
1.7099

The compression value percentage of rank 50 is :
8.5494

The compression value percentage of rank 100 is :
17.0988

The compression value percentage of rank r0 is :
149

The quality of rank 2 is worse for the given image

The quality of rank 10 is low for the given image

The quality of rank 50 is moderate for the given image

The quality of rank 100 is better for the given image

The quality of rank r0 is best for the given image

The quality of rank r0 will only be best if compression value is greater than rank 100 for the given image