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% Question 3

clear, clc

% Loading in test data
load('A1.mat')

% Computing the SVD of A to retrieve the singular values
[U, S, V] = svd(A);
A_sz = size(A);
A_sv = zeros(1, A_sz(1));

% Filling a linear matrix, A_sv, with the singular values
for i = 1:A_sz(1)
    A_sv(i) = S(i, i);
end

% Finding maximum and minimum singular values
A_sv_range = [max(A_sv), min(A_sv)];

% Amount of singular values from question
image_sv = [2 6 10 15 20 30 50 100];

A_sizes = zeros(1, length(image_sv));

% Creates new matrix filled with specified number of singular values
% from the array, image_sv, and displays the new figure. A_sizes holds
% the storage required for each figure
for j = 1:length(image_sv)

    new_mat = zeros(A_sz(1), A_sz(2));

    for k = 1:image_sv(j)
        new_mat(k, k) = A_sv(k);
    end

    new_A = U * new_mat * V';

    A_sizes(j) = 100 * image_sv(j)/A_sz(1);

    figure(j)
    colormap(gray(256));
    image(new_A);
end

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