EE 456 Digital Image Processing

Homework #3

1. Apply the following filters to "lena_gray.jpg" image in the **frequency domain**.
   a. 15x15 Average filter
   b. 15x15 Gaussian filter
   c. Any Sharpening filter

   Use the following procedure in MATLAB (similar to one we did in the class):
   - Find the FFT transform of the image,
   - Find the FFT transform of the filter (you need to extend the size of the transformed filter so that its size becomes the same as transformed image size)
   - Multiply the transformed image and transformed filter element by element.
   - Find the inverse FFT transformation of the filtered image.
   - For every filter submit the following:
     o Source code
     o Original image and its FFT transform
     o Filter and its FFT transform
     o Filtered image in frequency domain
     o Filtered image in spatial domain.

2. Use the following procedure in MATLAB (similar to one we did in the class) to reduce the periodic noise on the background of "periodicNoiseCar.png" image:
   - Find the FFT transform of the image,
   - Display the FFT transformed image and use Figure's data tip feature to find the row and column numbers (coordinates) of the noise frequency components.
   - Create a filter that gives zero output in locations where the noise frequency components are located.
   - Apply this filter in the frequency domain and find the filtered image in spatial domain.
   - Submit the following:
     o Source code
     o Original image and its FFT transform
     o Filtered image in frequency domain
     o Filtered image in spatial domain.

Notes:

1. Use subplot function to show your images and other plots, so that they look visually organized.

2. Submit your file as a single PDF file.