Homework #3
Due Su 9/21

Be sure to show all your work for credit. You must turn in your code as well as output files (**code attached at the end of the report**).

Please generate a report that contains the code and output in a single readable format using Latex.

0. Getting Started

   - Download the homework images from the class website.
     `http://www.ee.unlv.edu/~b1morris/ecg782/hw/hw03`

1. (GW 4.4)

2. (GW 4.12)

3. (GW 4.32)

4. (GW 4.39)

5. (GW 4.43)

6. Spatial Domain Filtering

   The following question operates on the `city.jpg` image. Peform color filterng by processing each of the RGB channels separately.

   (a) Perform image smoothing using a 7×7 averaging filter and a Gaussian filter with $\sigma = 0.5$ and 3. Compare the outputs.

   (b) Perform edge enhancement using the Sobel operator (Matlab's default parameters). Repeat using the Laplacian and Laplacian of Guassian operators. Compare the outputs

7. Frequency Domain Filtering

   The following question operates on the `city.jpg` image. Peform color filterng by processing each of the RGB channels separately.

   (a) Find the Fourier transform of the image. Be sure to center the frequencies.

   (b) Perform image smoothing in the frequency domain using the filters defined in the previous problem. Compare the output images from the two methods (spatial and frequency) and the time for operation.

   (c) Perform edge enhancement using the filters defined in the previous problem.

   (d) Define a lowpass filter in the frequency domain with radius of $1/4$ the height. Show the result. Repeat with a similar sized Guassian and compare the results. Give the σ parameter you used and show the output transform image.

   (e) Repeat with a rectangular filter with the same dimension as the ideal lowpass. Compare the results between the ideal filter and the rectangular approximation.