# Homework #6

(Digital Image Processing)

Due 06/15/2020 (Monday) at midnight
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**Topic: Image Restoration**
**Purpose: Understanding on Optimal Filters for Image Restoration.**
**Tools: Inverse Filter, Wiener Filter, and Constrained Matrix Inversion Filter**

**Project:**

From given 5 images, **original**, **realistic blurring** (made from moving 10 pixels in $x$ direction), **blurring with cylindrical boundary condition**, **realistic blurring with added Gaussian noise ($\sigma = 20$)**, and **blurring with cylindrical boundary with added Gaussian noise ($\sigma = 20$)** as in Figure 5.5 (p.414) and Figure 5.9 (p.418),

1. Apply **inverse filter** to 4 blurred images other than original to get the filtered output images as in Example 5.13 and 5.14 (pp.411~414) (Notice that image sizes are different each other. That means we can not compare the results directly pixel by pixel.)

2. Apply **Wiener filter** to same 4 blurred images to get the filtered output images by adjusting $\Gamma$ values properly as in Example 5.23 (p.433~435).

3. Apply **Constrained matrix inversion filter** to same 4 blurred images to get the filtered output images by adjusting $\gamma$ values properly as in Example 5.39 (p.464~467).

4. Discuss on the results and compare these filters.