# BMEN 4370 MidTerm Review Exercises

Instructions: Work on these problems in class and prepare to discuss the answers. You will not need to turn this in.

1. Scale the kidney.tif image down by a factor of 4, then resize back up by a factor of 8 (more pixels than original image) using imresize() with the options ‘lanczos3’ and ‘bicubic’. Create a 2x2 subplot with the original image, the downsized image, and the two upsized images. Which interpolation do you like better, why (point to regions that are enhanced/less degraded)?

Study which interpolation method is more accurate by downsizing by 4, then upsizing by 4, and taking the difference of the result compared to the original image. (You may need to trim the original for this.)

I liked lanczos3 better, because it made the image seem sharper while maintaining small edges while bicubic blurred some of the edges.

1. Write a function imPad\_replicate(image, rows\_to\_pad, cols\_to\_pad) to create *replicate* padding around an input image of a given width. Suggestion: use repmat() to repeat the row or column, use cat() to assemble.
2. Write a function *w* = gaussKernel (m, sigma, K) that uses Eq 3-55 to generate a normalized Guassian lowpass kernel of size *m x m*. Also, create mesh plots of the kernel. if *K* is not included in the functional call it should default to 1.

[Eq. 3-55]

Using your function, create kernels of size 11x11, 21x21 and something bigger and try smoothing an image of your choice. In the text, they suggest a kernel spans 6 sigma, so choose sigma accordingly. Which kernel works best for the image you selected?