ELE 882 Assignment 2 Analysis Questions

1. The linear transform function is used for simple transformations since the transform involves a straight line. One example of this to make an image darker or brighter, the transform occurs higher if the image is to be brighter and lower if the image is to be darker. Another example of this is getting the negative of an image where the image can be solved for the negative slope. The power law transformation uses the value of gamma to enhance images, this gamma value uses the n-th root or n-th power to show the new curve of an image. This curve does not follow a linear progression and enhances differently using the gamma as the new curve. Finally, the logarithmic transform help enhance the dark pixels of the image into a lighter state. This is used on dark images to enhance the lightness of the image.
2. Histogram equalization is useful for contrast adjustment using the images histogram to equalize the cdf to provide better contrast on an image. Histogram equalization might fail when an image has a large low intensity background. This is because when an image has this background, the equalized histogram will cause the background to increase contrast greatly causing the image contrast to overwhelm the image.
3. If the input image is 8-bpc then Imin – Imax = contrast where contrast is 255 and if the image is a floating point image then Imin – Imax = contrast / 255.
4. A situation where a LUT should not be used is when the use of a transform can be use instead. The transform uses math to calculate the new values of image processing and do not create issues found in LUT such as banding and possible gamut issues.
5. When processing an image with a higher bit depth, the more possible colors it can store creating a more accurate representation of the image to be modified. The floating-point values may provide better accuracy when processing higher bit-depth images.
6. By definition, 16-bpc contain more information than 8-bpc. When comparing the amount of data shown in a 16-bpc and an 8-bpc, a 16-bpc has 65536 tonal values compared to the 256 tonal values found in 256. This allows the images to not posses the same issues found in 8-bpc images such as banding since there are more color values possible to display.
7. When brightening a low light image, the new image will look noisier than the original image. This is because when applying a brightness-enhanced filter, the filter also applies to the previous noise that was seen in the image, therefore, the previous noise will become more prevalent with the higher the brightness shift causing the image to appear more noisy.

