Written homework HW6 — Gabe Noriega

1) Differences in applying a bilateral filter vs Standard linear convolution filter.

- Bilateral Filter:
  - Bilateral filter is a non-linear edge-preserving smoothing filter. this takes in spatial and intensity differences between pixels, this makes it more expensive, and a big part due to calculating a normalizing factor for each pixel

- Standard linear convolution:
  - applys linear transformation to each pixel in the image, returns a weighted sum of neighboring pixel values, this does not consider intensity, making it faster.

2) Potential problems of mapping to [0, 1]
- loss of detail (compression)
- Artifacts
- contrast (from compression)
- clipping

3) What is a pixel?
to me a pixel is the smallest unit in an image. this unit contains information that when combined, makes an image.

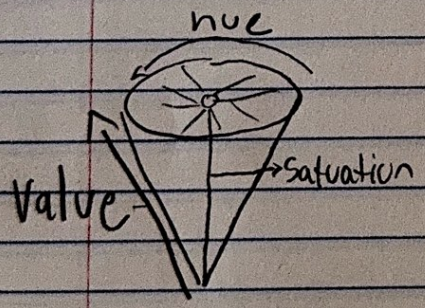
4) Kernels:

a) $H_a = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ - edge detection kernel
- highlights vertical edges

b) $H_b = \begin{bmatrix} 1 & 2 & 1 \\ 1 & 2 & 1 \\ 1 & 2 & 1 \end{bmatrix} \frac{1}{12}$ - blurring / smoothing
- low-pass filter
- reduce high-frequency

c) $H_c = \begin{bmatrix} -1 & -1 & -1 \\ 0 & 0 & 0 \\ 1 & 1 & 1 \end{bmatrix}$ - horizontal edge detector

5) HSV - hue, Saturation, Value



hue - type of color
Saturation - intensity of color
Value - brightness