# CS 4495: PS 0

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## Part 1 - Input Images

### ps0-1-a-1.png

### ps0-1-a-2.png

Images obtained from [The USC-SIPI Image Database]

## Part 2 - Color Planes

ps0-2-a-1.png

ps0-2-b-1.png

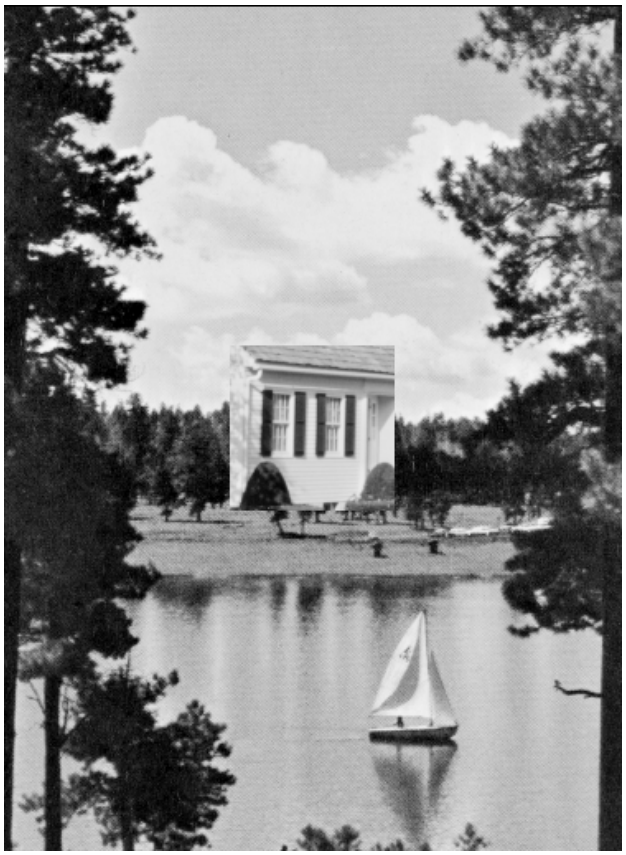
**ps0-2-c-1.png**

**D.**

The first image looks better/more like a monochrome image(green channel). This is because, as we can see the image is brighter, indicating that the green channel is present in a greater amount. We can verify this by looking at the stats.
Green Channel - Statistics: Min - 0, Max 237, Mean 157.554026, Stddev 49.847351
Red Channel - Statistics: Min - 2, Max 225, Mean 124.541807, Stddev 59.231484
As we can see, with a greater mean, the green channel is present “more” than the red channel. A case can be made for the red channel, as it has a higher standard deviation, indicating that there is greater variance in the amount that the red is present. Depending on the purpose of the Computer Vision algorithm, it can do better on either one. If we’re trying to reason about the overall characteristics of the image, greater abundance of the channel might be better. However, things like edge detection might possibly benefit from increased variance.

## Part 3 - Pixel Replacement

### ps0-3-a-1.png



## Part 4 - Arithmetic and Geometric Operations

### A. Statistics

Statistics: Min - 0, Max 237, Mean 157.554026, Stddev 49.847351

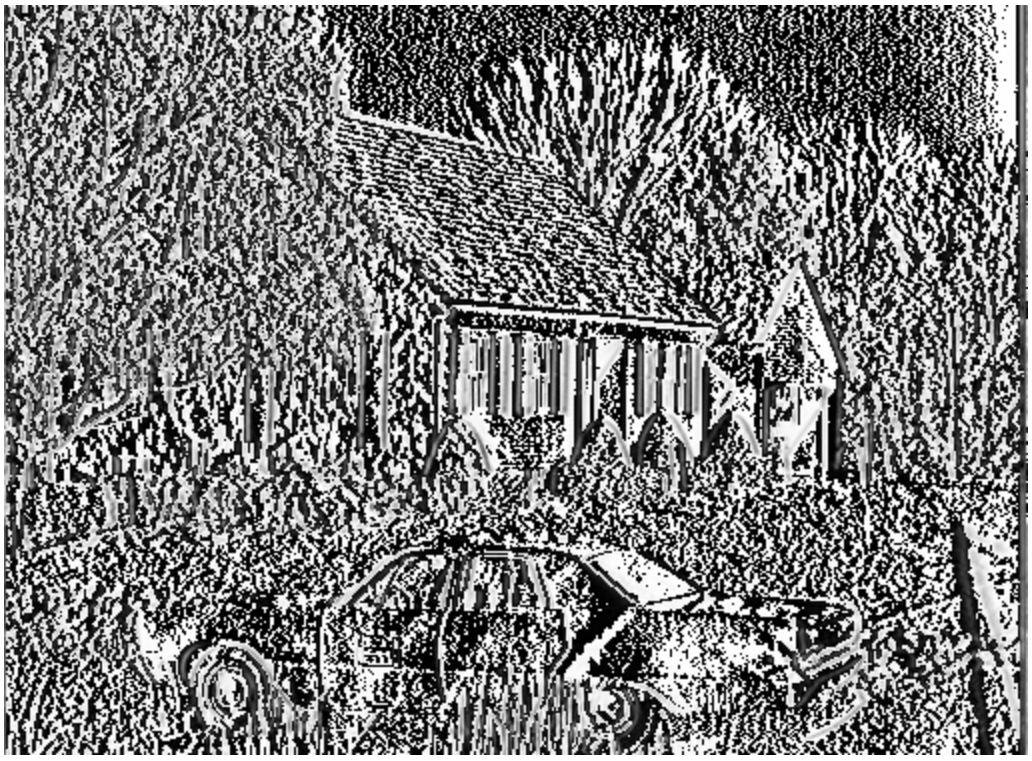
Code Used -

```
mean = img1_green.mean()
std_dev = img1_green.std()
minimum = img1_green.min()
maximum = img1_green.max()
```

ps0-4-b-1.png

ps0-4-c-1.png

ps0-4-d-1.png



Negative pixel values are nothing special, as a negative value would simply cause us to adjust our bounds for the maximum and minimum allowed values for the pixels. If we keep a fixed upper and lower bound, and then do computations, we need to set up walls, which would serve as boundaries. Anything below(such as negative values), would automatically be reduced to the minimum allowed value based on our bounds(and similar for addition up to maximum bounds).

ps0-5-a-1.png

Value of sigma used is 9.

ps0-5-b-2.png

## Part C

The image with noise applied the the blue channel looks better(ps0-5-b-2.png). For ps0-5-a-1.png(noise in the green channel), we can see that there are areas where the noise causes green spots. This makes sense, as added noise would cause the green value at those pixels to increase until they are visible to a very high extent/dominate at that point.
The noisy blue channel image looks better as the noise isn't as prominent on the overall image. Looking at the statistics for the 2 channels:
Green: Statistics: Min - 0, Max 237, Mean 157.554026, Stddev 49.847351
Blue: Statistics: Min - 4, Max 234, Mean 141.218078, Stddev 49.396004
We can see that the green channel is more prominent(higher mean). Thus less added noise is necessary to make the channel more evident in the overall image. Thus the same amount of noise applied the less prominent channel does not make it as evident(for instance even a blue value of 141 + 9 = 150 is overpowered by a green value of 157)