

Assignment 1

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Please look at the code submitted along-side. There are numerous comments describing what we are doing and answering/elaborating on some answers as well as having the necessary visualizations.

1. HDR Imaging (60 points)

(a) Develop RAW images (5 points)

Command used,

`./dcraw -v -4 -w -o 1 -T <image_name>`

Where,

`-v` : verbose

`-4` : linear 16-bit output

`-w` : use camera's given white balancing scales

`-o 1` : sRGB color space

`-T` : write output to tiff file

(b) Linearize Rendered Images (25 points)

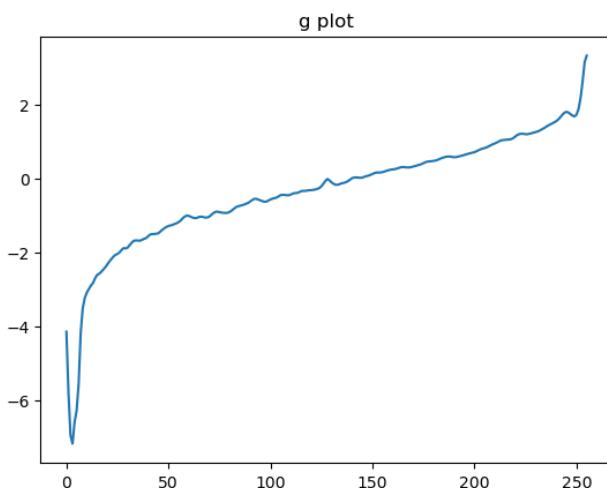


Figure 1: g-plot with rl = 10, and w = lambda x, zmin=0.05, zmax=0.95 : 0.01

(c) Merge Exposure Stack into HDR image (30 points)

Weighing Schemes :

For tiffs,

1) Uniform : 0.02, 0.98

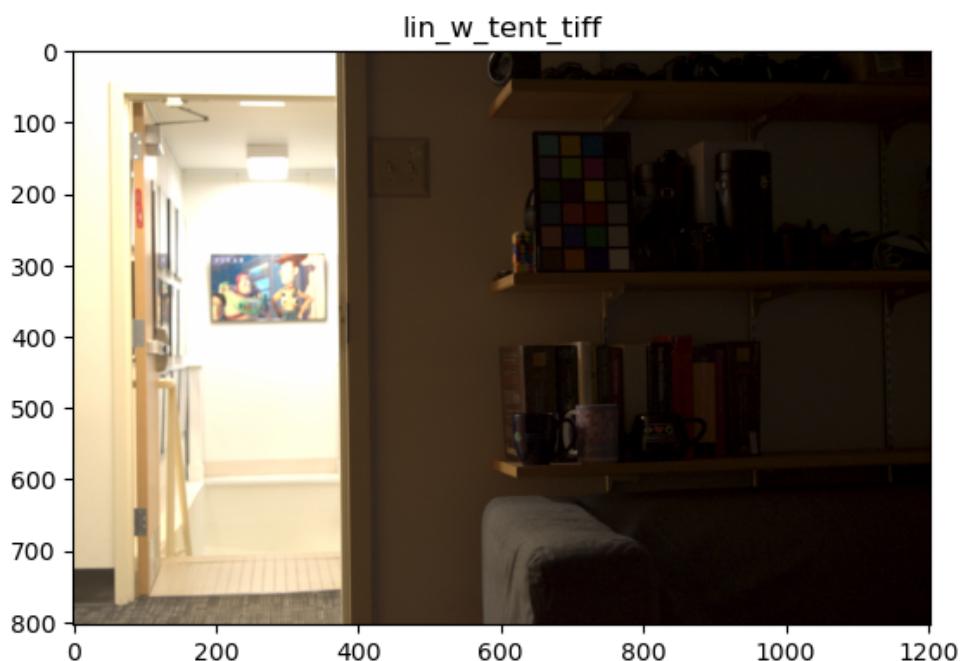
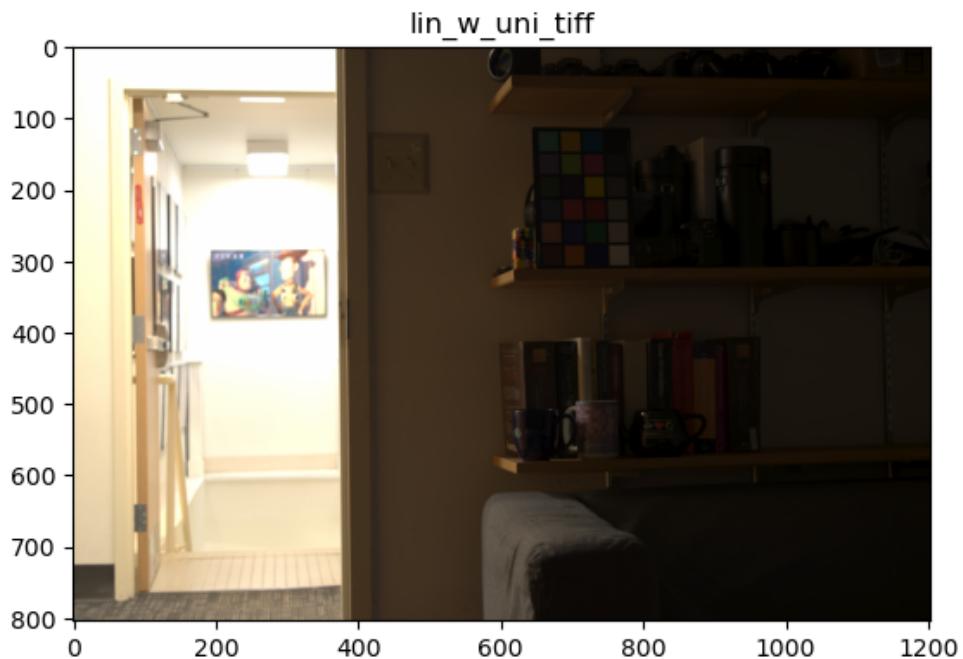
2) For gaussian and tent : 0.001, 0.999

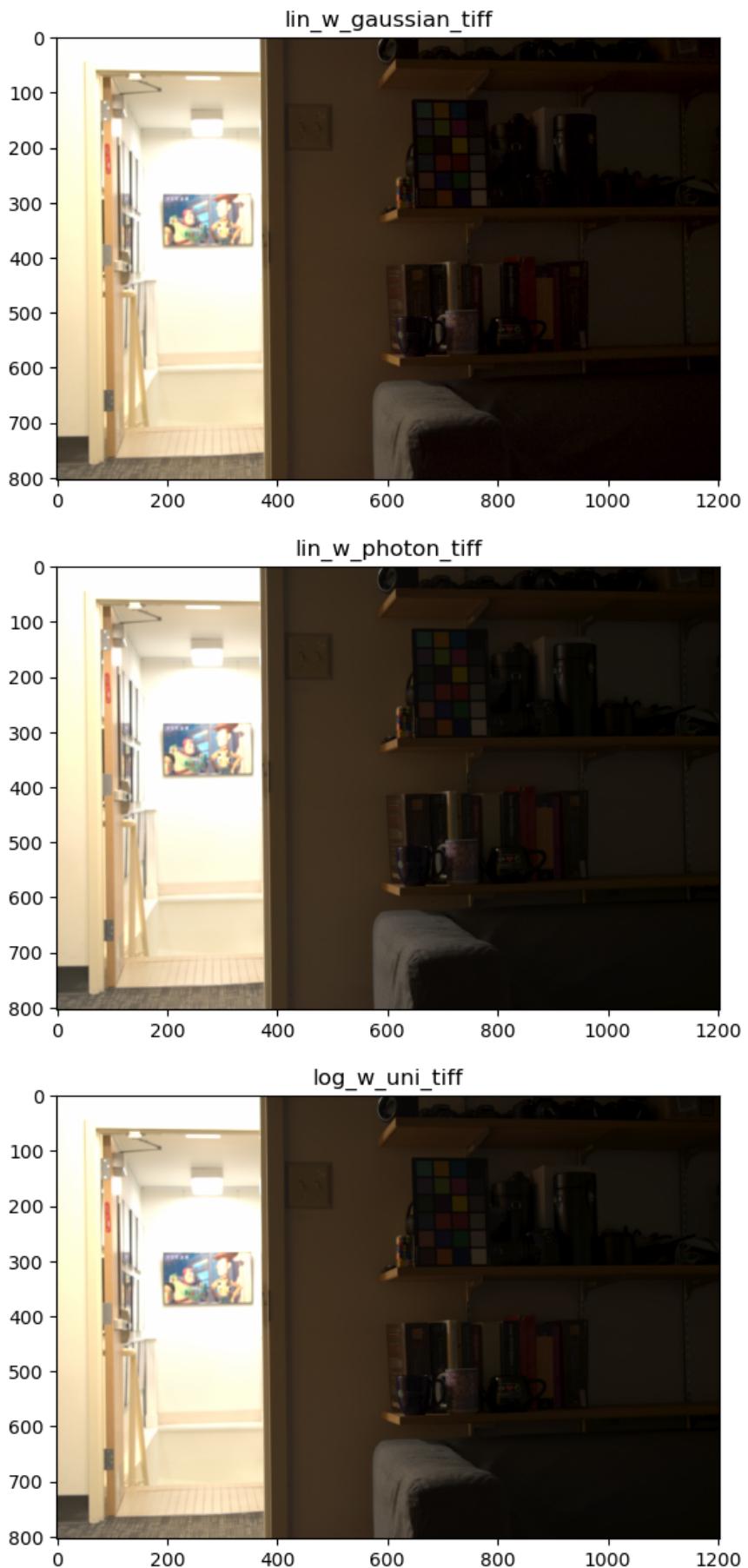
3) For photon : 0.02, 0.98

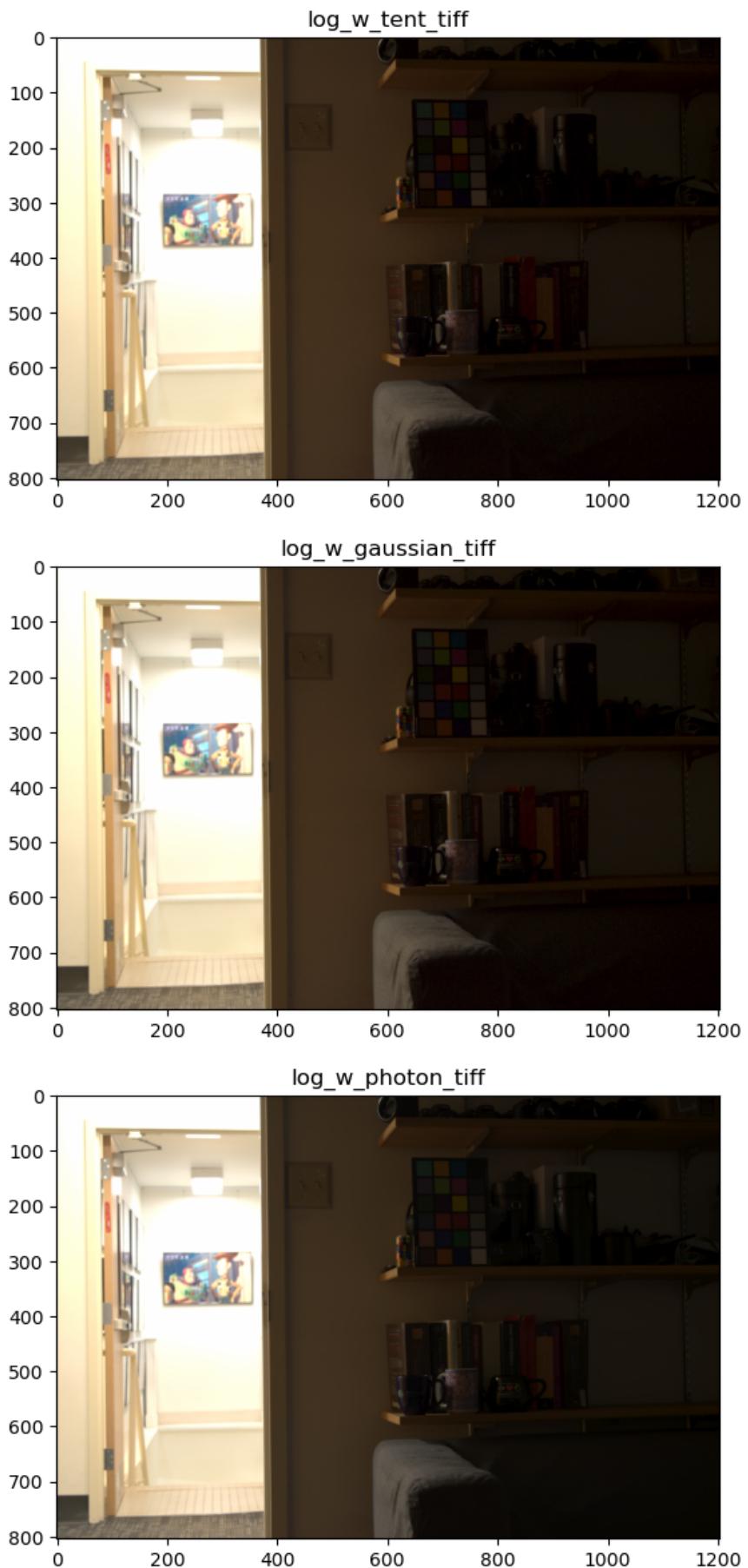
For jpeg,

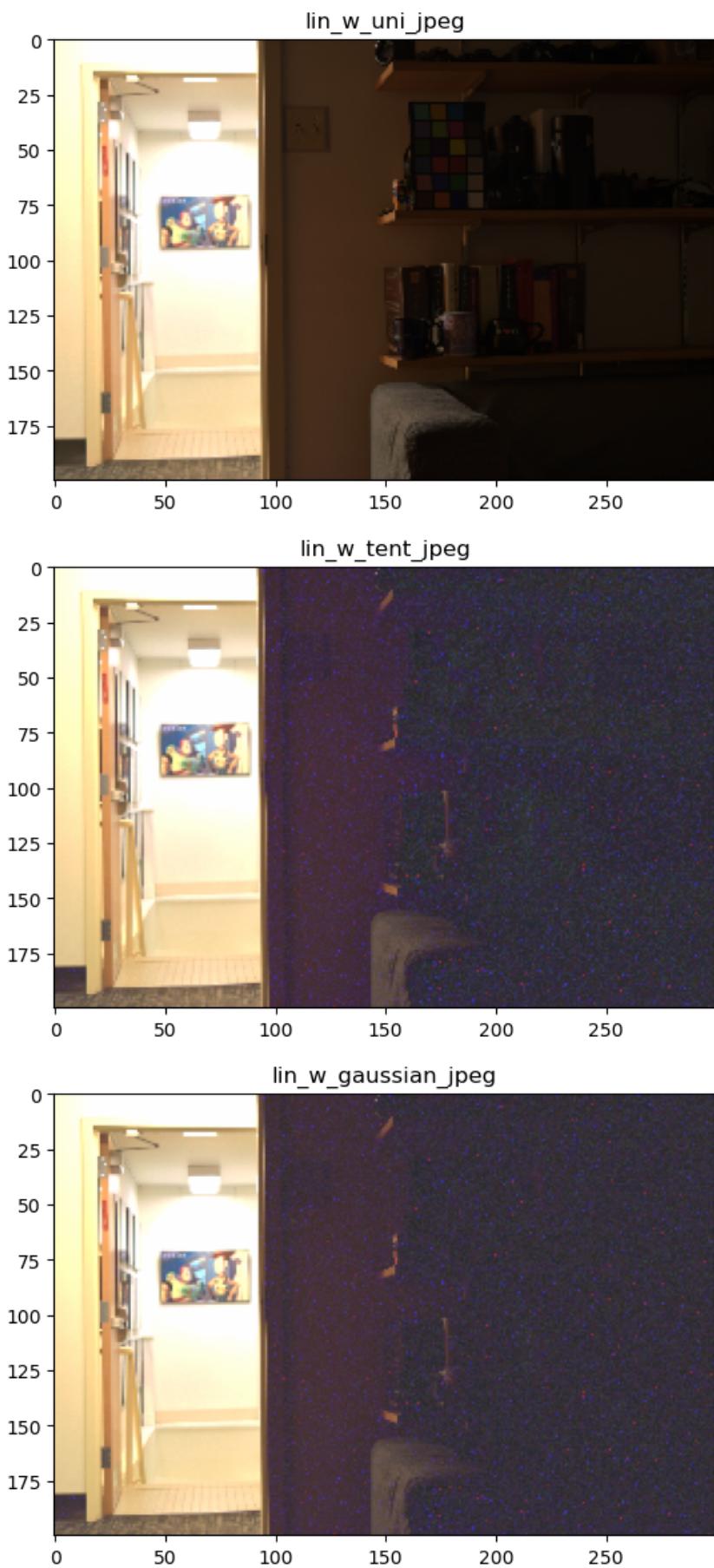
- 1) Uniform : 0.05, 0.95
- 2) For gaussian and tent : 0.001, 0.999
- 3) For photon : 0.05, 0.95

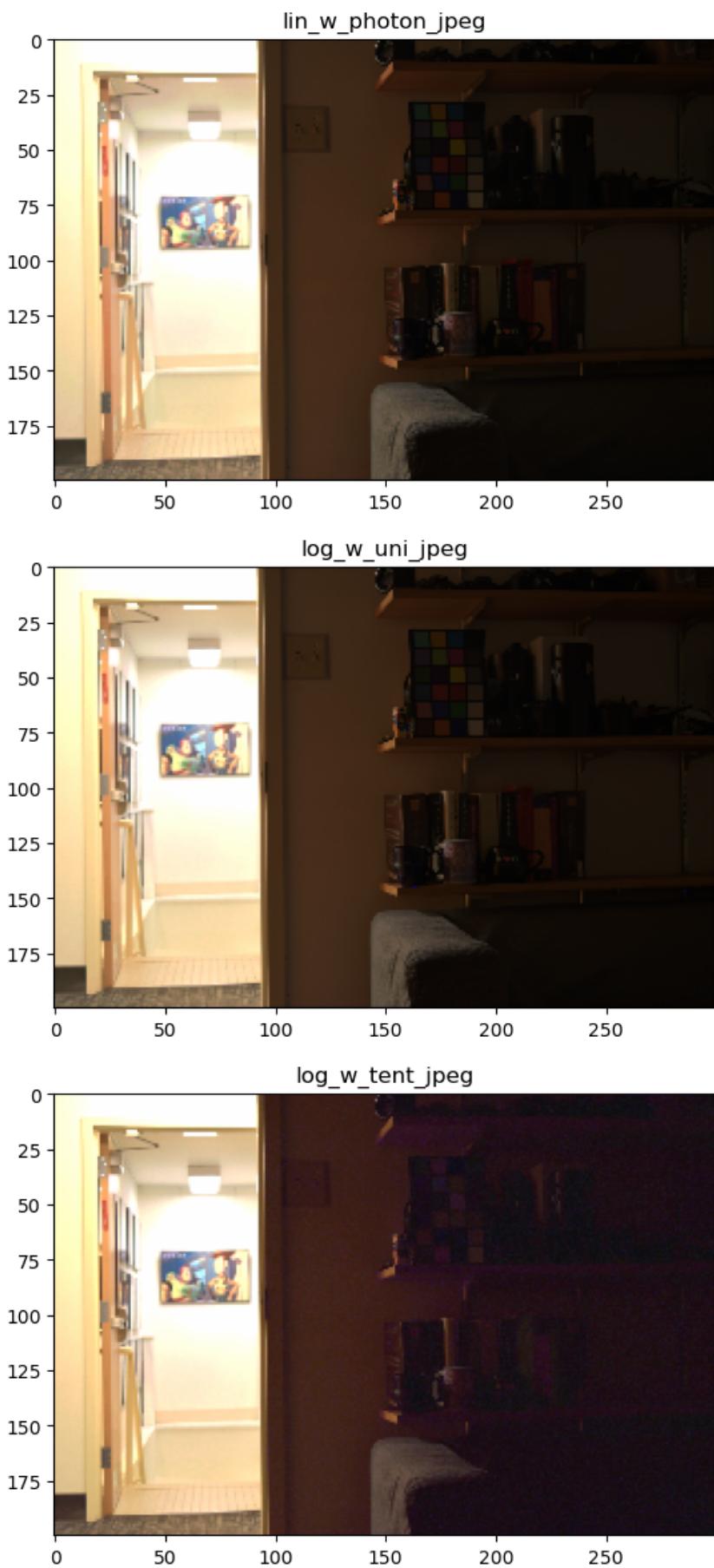
We've created 16 images which are displayed below,

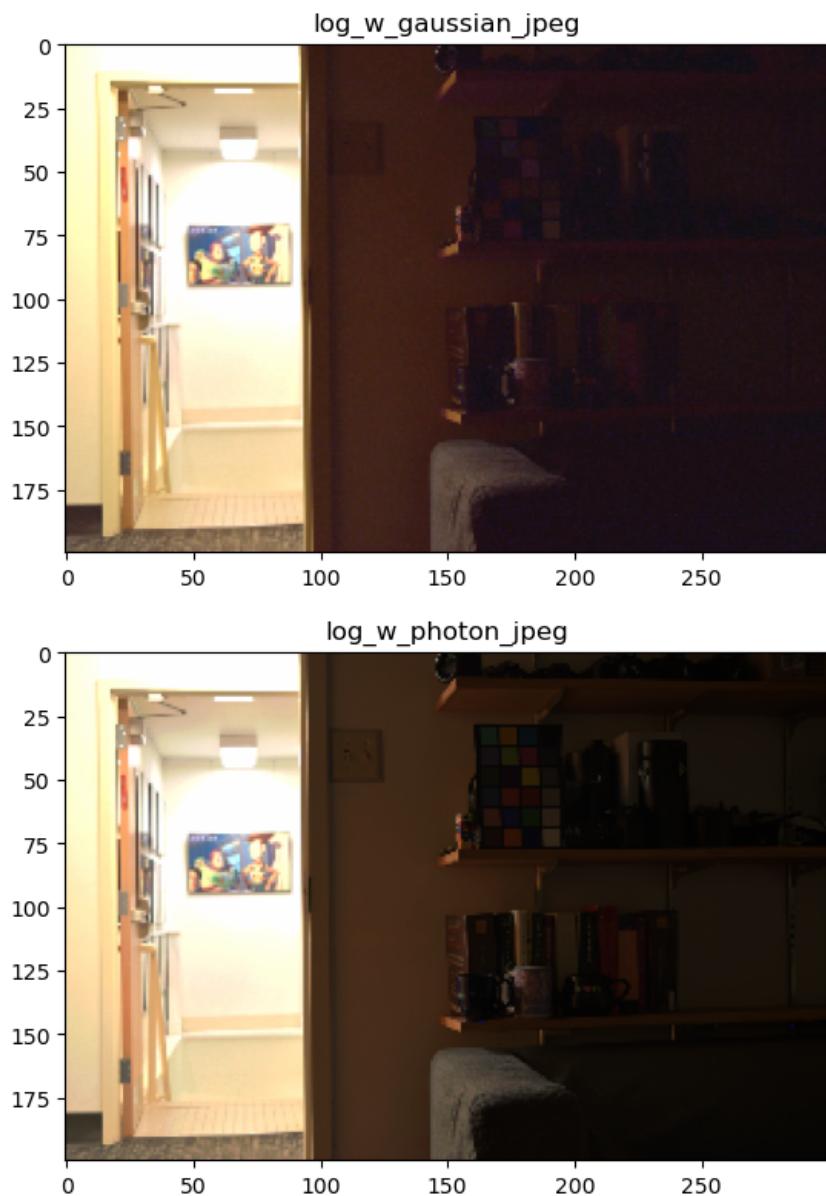










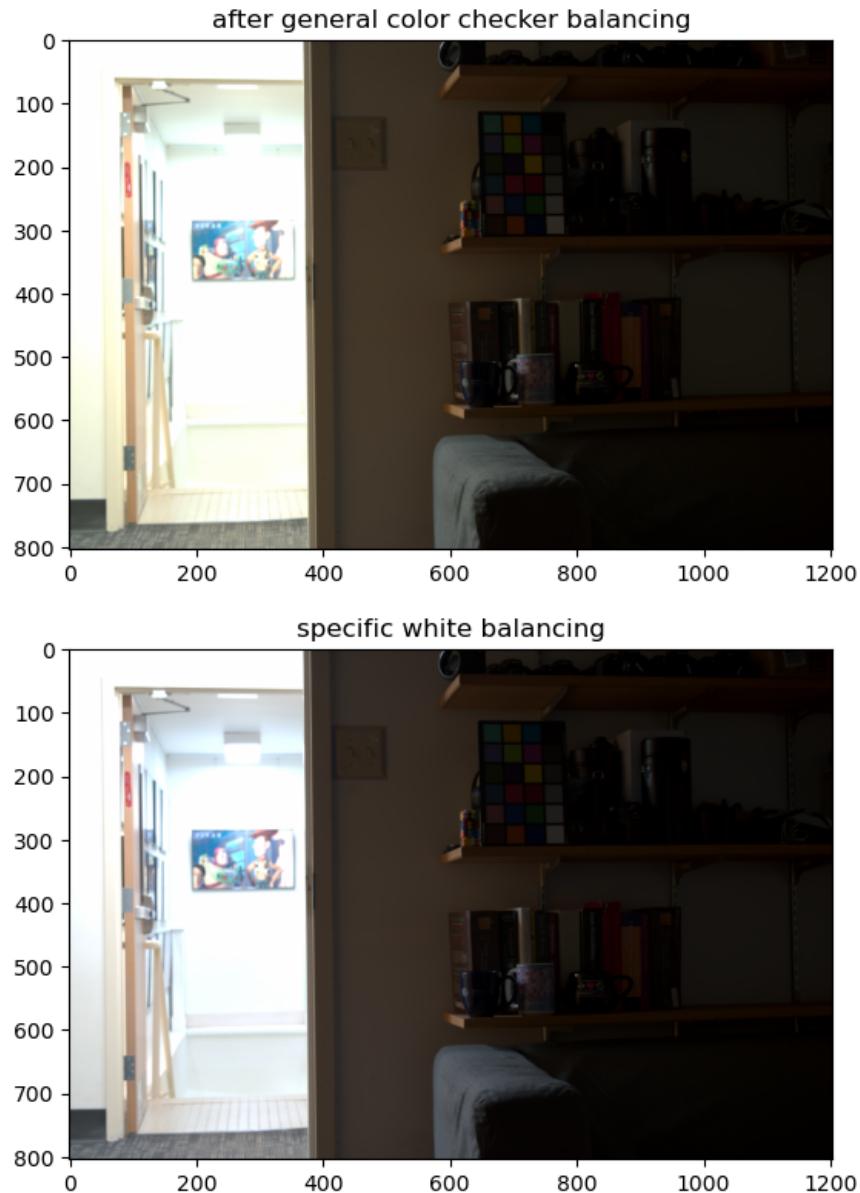


Out of all the above, most of the jpeg images seem to have unnaturally warmer tones(which can be accounted for in color correction), and likely have jpeg artifacts too in addition to approximate linearization. Because of this we narrow down to the tiff produced images.

Out of all the tiffs I prefer linear merge with uniform weighting and linear merge with photon weighting. Even though all the images look very similar I prefer these due to their slightly different colors, and because they look sharper in a sense. Out of these two we randomly select the photon weighted scheme.

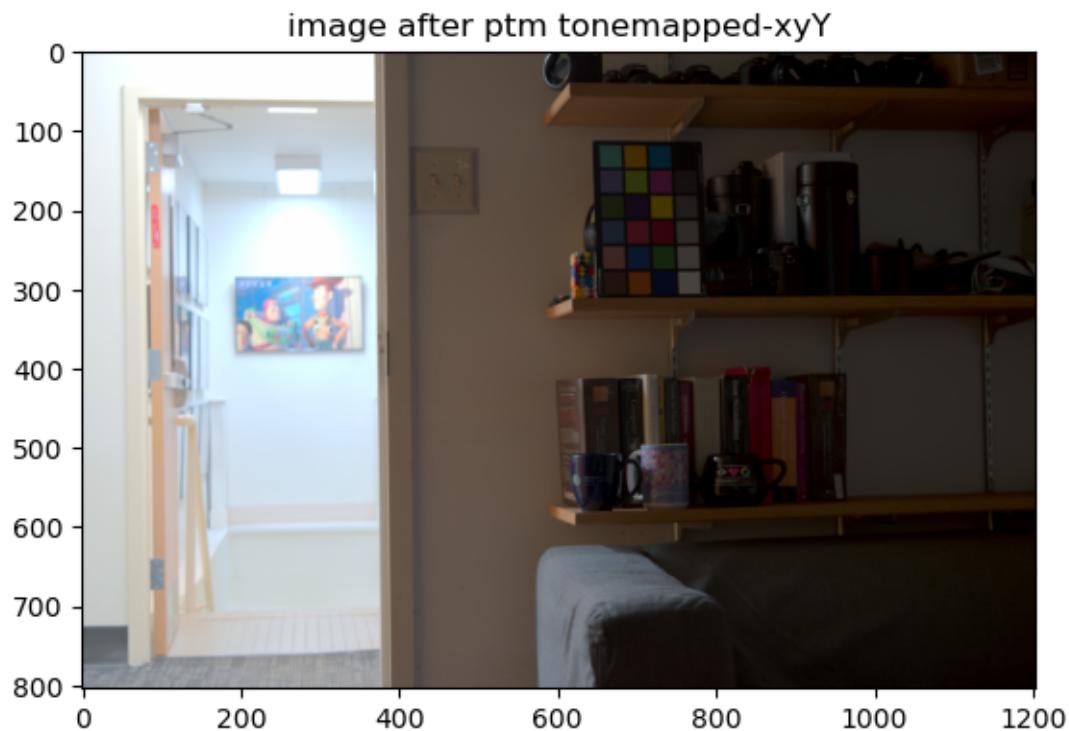
2. Color Correction and White Balancing

I prefer the image after color correction and white balancing as I believe the colors look most natural. We've gotten rid of the general warm lighting in the image, and it now looks much cooler and enjoyable to watch.



3. Photographic Tonemapping (20 points)

The rgb tonemapping creates great colors for the bright-background, but this comes at the cost of a



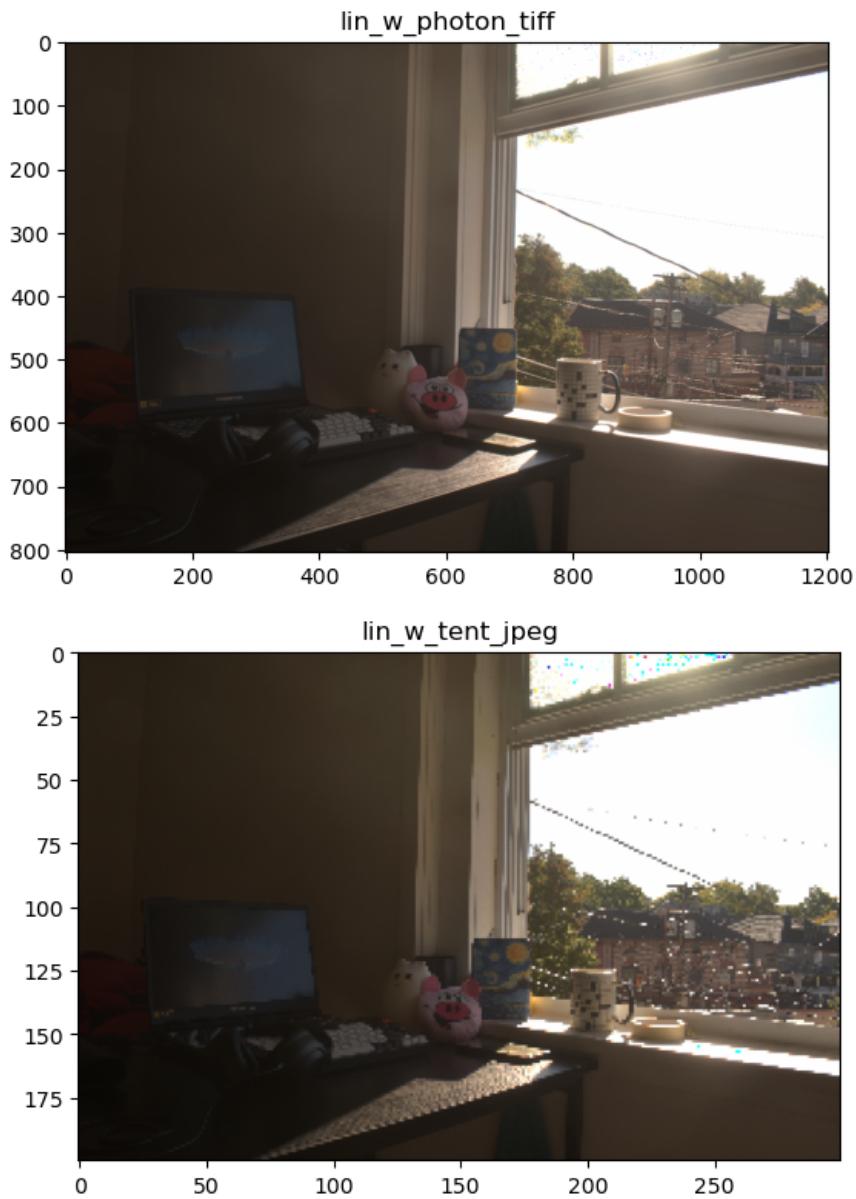
much dimmer foreground. The colors in general lack a pop, but I believe this does still look natural. The xyY tonemapping creates a much more brighter foreground, and this alone takes the cake for me. The colors in the background do seem to have an artificial pop to them, but to me this is worth the price.

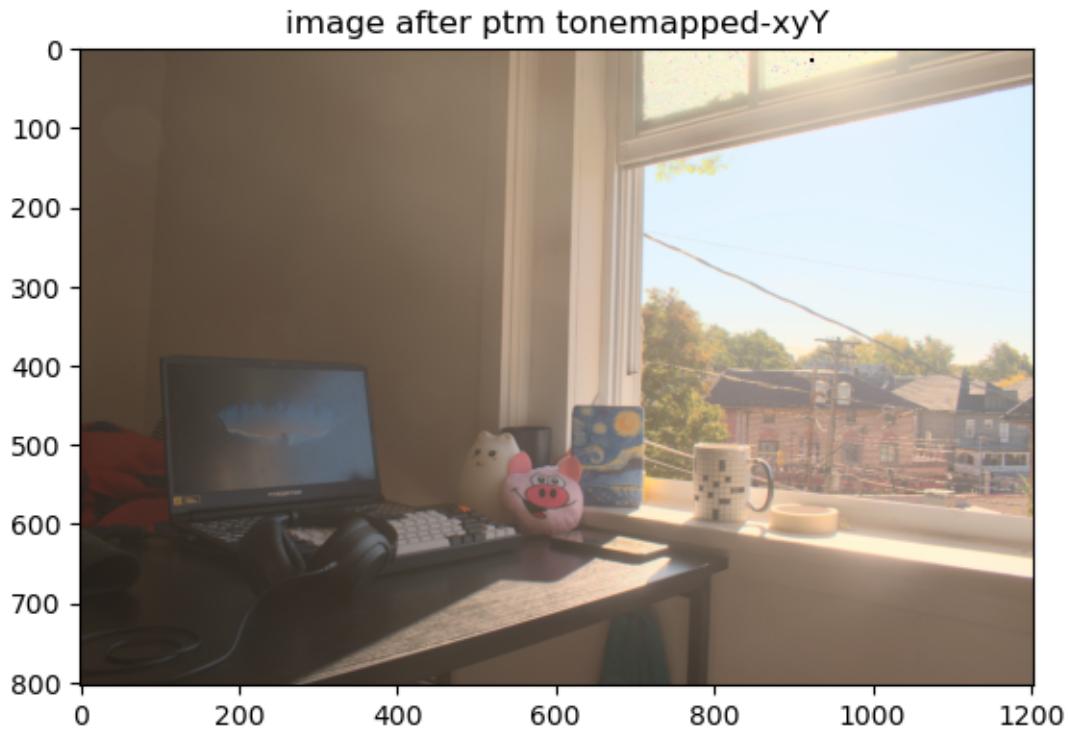
4. Create and tonemap your own HDR image (50 points)

We choose to run two hdr stacks through this pipeline to test our robustness to different environments. The first is of a scene on a desk, looking out the window on a sunny day. The objects inside the room are obviously much darker than what's outside. We'd like to see if we can capture color well both inside and outside our image, as well as features.

The second is of a dimly lit room with a single window with a tree visible through it. The dynamic range in this image is far greater, and we wish to see if we can capture both the features on the tree as well as our room.

In the first scene we pick tiff linear merged with photon weights and jpeg linear merged with tent weights. Visualizations from both along-side. I prefer the tiff here overall because its edges are sharper. Generally in b/w tiffs uniform and photon weights looked best to me, but I chose because it looked less noisy.





Overall the results are very satisfying, and I personally love the vivid pop in color.

In the second scene, we pick linear merge with photon weights on both tiffs and jpeg. We display a visualization of both of these here. Out of these we notice that despite this visualization of the jpeg generated image having more texture in the leaves, the edges in the image don't look very sharp (notice the window), and some of the highlights look very rough. Owing to this we choose the tiff generated image.

Our performance here is great as well. We can clearly see the texture of the leaves outside, as well as a branch. Additionally we can see many objects inside the room as well, and upon zooming in the full resolution image, can even read the text at the bottom of the desk.

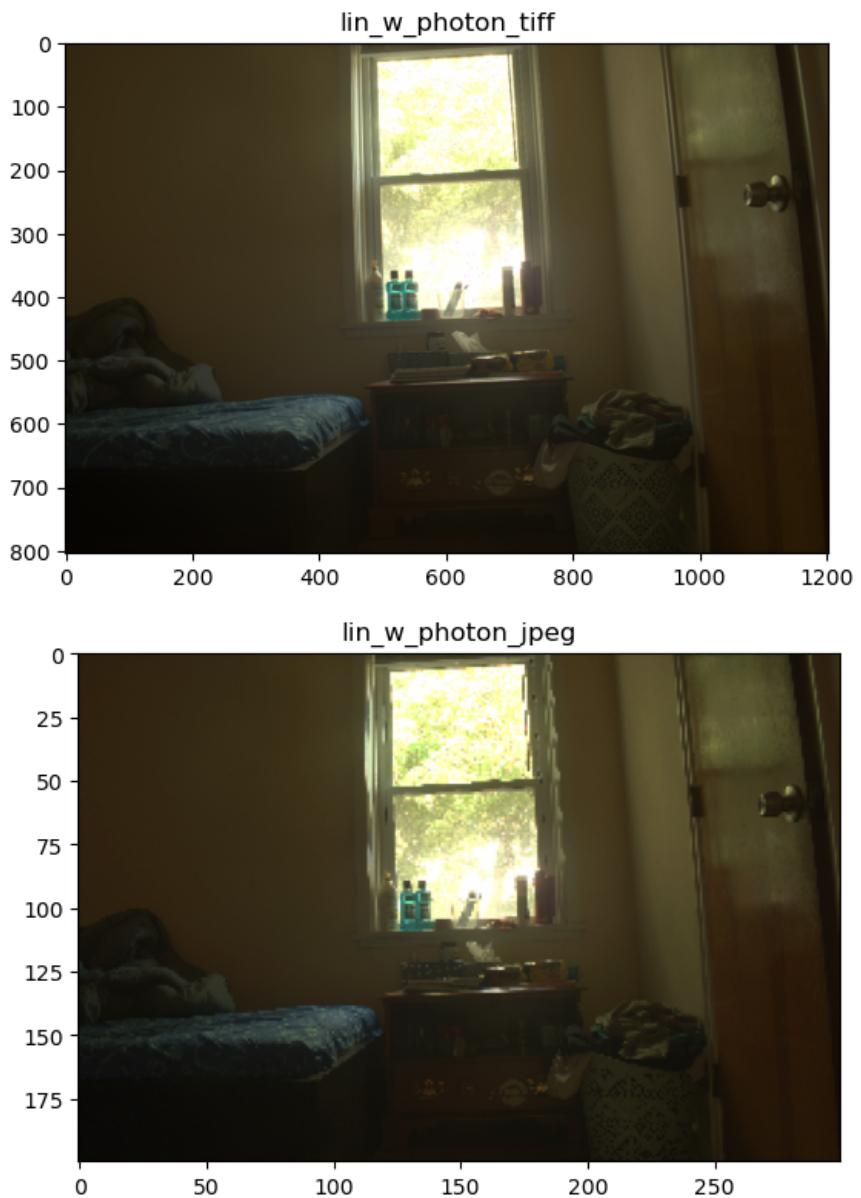


image after ptm tonemapped-xyY



5. Noise Calibration and Optimal Weights

