LAB #3 — REPORT

38 points possible

All materials must be uploaded to Gradescope by 10 am on Thursday, February 10, 2022 (see submission instructions in lab instructions).

NAME:

At the end of the lab, you should have created the following items in your working directory:

- This report, edited and filled out

- Copies of your journal files

- imp\_cal.pro (must also be pasted at the end of this report)

- rover\_raw.tif + sky\_raw.tif

- rover\_nobadpixels.tif + sky\_nobadpixels.tif

- rover\_nodark.tif + sky\_nodark.tif

- rover\_final.tif + sky\_final.tif

1. Raw images

(a) Paste “rover\_raw.tif” and “sky\_raw.tif” below [2 pts]

(b) What potential problems do you observe in these images? List at least two. [2 pts]

2. Bad pixel correction

(a) Evaluate the quality of your corrected image. Did your program fix the obvious bad pixels? Did it overcorrect the image? [1 pt]

(b) Paste “rover\_nobadpixels.tif” and sky\_nobadpixels.tif” below [2 pts]

(c) How many "bad" pixels did you replace in each of the six raw images? [2 pts]

Rover\_red:

Rover\_grn:

Rover\_blu:

Sky\_red:

Sky\_grn:

Sky\_blu:

3. Dark current correction principles

(a) What are typical DN values for the raw images, and how does the bias value compare to these values? [1 pt]

(b) For this filter wheel system, why is there only one dark\_lab image, and not one for each R/G/B image? [1 pt]

(c) What do you think might cause the dark current to increase toward the top of the image? [1 pt]

(d) Do you detect any evidence of frame transfer smear (i.e., "electronic shutter effect") across the raw images, and in which direction (horizontally or vertically)? [1 pt]

(e) What is the average percent increase in DN across the image due to frame transfer smear? [1 pt]

4. Remove the dark current

(a) Paste rover\_nodark.tif and sky\_nodark.tif below. [2 pts]

(b) Did the dark model correct the frame transfer smear that you measured in the last part? How can you tell? [2 pts]

(c) Describe any residual patterns or artifacts that remain in the images after this step in the processing (experiment with stretching on the sky images). [2 pts]

5. Flatfield correction

1. Why is the flatfield image divided out of the scene while the dark current is subtracted? [1 pt]

(b) Paste rover\_noflat.tif and sky\_noflat.tif below. [2 pts]

(c) Take a look at your flat-field corrected images. Describe some of the improvements. Was anything made worse? If so, please elaborate. [3 pts]

6. Responsivity correction

(a) Thinking back to lecture, why is the responsivity at blue wavelengths so much less than at red wavelengths? [1 pts]

(b) Paste rover\_final.tif and sky\_final.tif below. [2 pts]

7. The reveal!

(a) What color is the Martian sky? [1 pts]

(b) What color are the rover wheels (and why)? [2 pts]

8. Paste the text from your final version of imp\_cal.pro below. [6 pts]   
***This step is required to receive points on this lab.***