Guillermo Vargas

Lab 7

1. I can see that the images in their original bands, look very similar at a glance. There are locations, especially at the edges of craters, where a difference in reflectance is noticeable. Using a false color image, I can see that my conclusion of the similitude of the bands was correct. A color change is barely noticeable. There is though information within the whole image, but it is not a large variety of it.

3. In my case, according to the value I obtained from the percentage variance calculations, it seems that band 6, the last band has the most variance. **I noticed that my code flips the band of principal component. Which means that band 6 of the principal component should be band 1 as it is on the notes**. The last 3 of the bands, 4 to 6, are the ones that have the highest percentage of the variance. The bands that are the most correlated are the first 2, this is because the variance is very low.

   The following table shows the percentage variance of the 6 different principal component bands.

   ```
   percent_total_variance_matrix =

       0.6476
       1.9348
       2.7641
       7.4083
      12.7643
      74.4809
   ```

4. The PC band with the highest eigenvalue is band 6 in my case **(which appears to be flipped)**. This band resembles a lot band 1 from the original set. This probably means and it is inferred to by the loading factor matrix, that band 1 of the original image contains most of the highly varying data. It is interesting that the least correlated bands, seem to have the greatest detail in terms of topography and changes in illumination due to topography. The factor loading matrix helps to identify, which band of the principal component image to use for classification of chemistries, or for classification of geologic structures. *I realize that, only because a principal component band does not have **most** of the information, the band is not useful!*

5. Depending on the kind of analysis that I would want to do, I would choose differently. The PC band with the most information I would use for analyzing the multispectral information contained. If I wanted to analyze the topography or the shapes of the features present on the surface, I would use the PC band 1 *(in my case)* because it shows all those topographic features very well.

    The following images show the principal component with least and most information respectively, notice the clarity of the topographic features.