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Grade	
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Image Analysis I – Image Processing and the Ring Nebula

Pre-Lab Quiz

Record your team's answers as well as your reasonings and explanations.

1.

2.

3.

4.

Part 1: Measuring the Height of the Danforth Chapel

labimage → *Terrestrial (R, G, B filters)*

1. Under "Color", click "Combine Color" and determine the mixing ratio of your red, green, and blue filter images that produces the most realistic image.

Note: You can adjust the contrast using the screen stretch tool (ctrl+h).

Filter	R	G	B
Value			

2. Explain how you judged that the image looked "realistic".

3. What is the angular size ("height") of the chapel in pixels? Use the information window (ctrl + i) and set the mode to "area".

4. If the pixel scale of the image is 4' (arcminutes) / pixel, what is the angular size of the chapel in degrees?

Note: $1^\circ = 60' = 3600''$ (arcseconds).

5. Determine the height of the Danforth chapel in meters if the photographer measured their distance from the chapel and it was 46 meters away. You will need to use the Small Angle Formula. Show your work and include units in your answer.

Part 2: The Ring Nebula (M57)

labimage → *Nebula* → *Ring Nebula M57 (R, V, B filters)*

1. Make a tricolor image of the Ring Nebula. Note the following
 - For the green color, select the "V" filter image.
 - Click the "Align" option in the "Combine Color" window.
 - ◆ Set the "Align Mode" to "Auto – star matching" and click "OK"

The last part will align the stars, which are slightly offset from one image to the next.

Filter	R	G	B
Value			

2. Why are the inner and outer regions different colors?

3. What type of star is at the center of this planetary nebula and what is its surface temperature?

4. If a typical planetary nebula is 1 light year in diameter, how far away is the Ring Nebula located in light years? Show your work and include units in your answer.

Note: The pixel scale of the image is 0.73" / pixel.

Part 3: The Andromeda Galaxy (M31)

- Go to telescope.live and click SIGN IN at the top, logging in with the email and password provided
- At the left click My Data Archive
- Click an image for the Image preview, and then click NEXT -> or CLOSE
- Click to select your RGB images in your exposure time on the left, and then click DOWNLOAD above
- Click OK and then click the download icon in the bottom left when PREPARING DOWNLOAD (zipping) is done
- Click in the bottom left when the download is complete
- Click on the Processed folder, drag your images to the Desktop, open MaxIm DL 6, and then drag your images into the newly opened MaxIm DL window

1. Make a tricolor image of the Andromeda Galaxy as in Part 2 and note your filter weights below.

Filter	R	G	B
Value			

4. If a typical galaxy is 0.1 million light years in diameter, how far away is the Andromeda Galaxy located in Mly? Show your work and include units in your answer.

Note: To find your pixel scale, note the telescope that observed your image in under TELESCOPE on the My Data Archive page. Then, click Telescope Network at the left and browse through to find your TELESCOPE and its Pixel scale.