Directions:

Situation: After collecting Behavioral data for some Bamboo Lemurs (*Prolemur Simus*) near your field station near Kianjavato, Madagascar you now need to bring the data into a mapping software so you can visualize and analyze the behavior of some of the individuals you encountered.

ESRI Login Information
> **Username:** ZABiogeo1819
> **Password:** Zooacademy1819!

Ask: The Value of Maps

> **?**   What type of information can we learn from maps that we can't from other types of data visualizations?
> **?**   What complications will there be in mapping out behaviors for individuals in the wild?
> **?**   Along with the location of a species what other types of information might you want to record about a species you encounter in the wild?

Acquire: Adding Data to a Map

> ➜ Download the Dataset prolemur_simus_E2_2017.csv from the Website and open it once you are able
> **?**   What type of information does the table contain?
> **?**   Why might formatting this information into a map make it easier to read?
> ➜ Open up the ArcGIS mapping softward by going into arcgis.com and login using the ESRI login information listed above.
> ➜ Once in click on **Map** along the top bar to open up a blank map
> ➜ Immediately save your map by left clicking on the ⊟ Save ▾ button along the top bar and then selecting **Save As**. Enter **Prolemur_Simus_[Last Name]** as the title. Enter in a few tags regarding your project, and then come up with a short summary to detail what your map is showing.
> ➜ Take some time to explore the new map and practice changing between different **Basemaps** by left-clicking on the ⊞ Basemap button in the top bar.
> ➜ Turn on the **Imagery with Labels** basemap and then search for Kianjavato using the Search Bar in the upper-right side of the map
> ➜ Use the scale options in the upper-left of the map to zoom in and zoom out to get a sense of where Kinajavato is in Madagascar
> **?**   What does the terrain appear to be like? How much of a human presence does there seem to be?
> ➜ Navigate to the **Content** section by clicking on the **Home** drop down menu in the upper-left of the screen
> ➜ Once in the My Content section select the option to **Add Item From my Computer** using the dropdown menu under the ✛ Add Item ▾ button
> ➜ Choose the **Prolemur_Simus_[Last Name]** file that you downloaded earlier in this section and then make sure it has the same title and give it a couple related tags, then make sure the check box to Publish as a hosted layer are selected.
> ➜ Check that Latitude and Longitude and properly matched in the Coordinates table before selecting **Add Item**
> ➜ Once the Data is uploaded select that you would like to **Open in Map Viewer**

Explore: How can Data be Mapped?

➔ Once the data is added to the map take a minute to navigate around by panning and zooming to gain your bearings with the data set is clustered

➔ In the **Change Style** menu try changing **Attribute 1** to change how the data is being displayed. Especially be sure to examine the **Behavior** and **Individual** data visualizations. For the Behavior use the key to the right to examine what behaviors are actually being shown.

➔ Set the attribute to show as **Individual** and then select the **Options** Menu for option 2.

? Which Individual has the most records? The Least?

➔ Click on the red circle next to Dobby's name to open up the style menu for that particular Lemur's data. Select **Shape** and change Dobby's dot to a Red star that is 24 pixels big. Once that is done select the **OK** button to close the style menu then **Done**.

? How does changing the styleization for different symbols make the map easier to read?

? How might you explain the clustering of lemurs? What factors may influence where data is recorded and where it is not?

Behavior	GAU	Auto-grooming
	GB	Being Groomed
	GM	Mutual Grooming
	G	Grooming
	A	Aggression
	A-	Agression; Agressor loses and moves away without being displaced
	A+	Agression; Agressor wins and the other individual moves away
	A0	Agression; Tie between the two animals. Neither moves away
	BA	Biting - actor
	BR	Biting - recipient
	CA	Chasing - actor
	CR	Chasing - recipient
	DIA	Displacing - actor
	DIR	Displacing - recipient
	FIA	Fighting - actor
	FIR	Fighting - recipient
	SM	Scent Marking; no longer used as of October 07, 2014
	SMA	Scent Marking (Arm)
	SMT	Scent Marking (Tail)
	SMC	Scent Marking (Chest)
	X	Bark Biting/X-marking
	M	Moving
	P	Playing
	R	Resting
	DR	Drinking
	F	Feeding
	GP	Geophagy
	D	Defecating
	MA	Mating
	OOS	Out of Sight
	U	Unknown
	PU	Push
	N	Nursing
	~G	Behavior performed on ground

Analyze: How can you analyze Movement Behaviors?

➔ In the Content Menu mouse over your layer and open up the **Cluster Menu** by selecting the 🔘 button

➔ Take some time to alter the slider in the Cluster Menu and left-click on some of the circles as they change

? How is the information being altered with clustering? Base on how the map is changing what do you think the cluster map is actually doing to the data?

? How does data clustering help us better understand the behaviors of our bamboo lemurs in the area?

➔ Before closing the **Cluster menu** deselect the box that allows for Enabling Clustering.

➔ Open the **Filter Menu** by hovering your mouse over your layer in the Contents menu and selecting the 🔽 button

➔ In the Filter Menu change the expression so that it reads **Individual is Dobby** and then select **Apply Filter**

? What has changed in the way the data is being visualized?

➔ Make an Outline around Dobby's range based on these observations by selecting the ➕ Add ▾ menu along the top bar and then selecting **Add Map Notes** – change the name to Dobby's Range and select create.

➔ Using the Area tool draw an outline map around the area where dobby has been observed.

? How are the Outline map and Dot map of Dobby's range helpful in understanding the Bamboo Lemur's Behavior?

➔ Add another Filter by opening the Filter Menu and selecting **Add Another Expression** and then changing the top drop down so that it reads *Display Features in the layer that match all of the following expressions*.

➔ Change the expression to filter down so that it in shows when Dobby is exhibiting the resting behavior then apply filter.
➔ In the Cluster Menu apply the maximum amount of clustering to identify Dobby's top resting sites.

Act: What are the Next Steps? (To be completed as Google Form)
? How could these maps be helpful as researchers continue to do their work on studying the behavior of Bamboo Lemurs in Madagascar?
? What would be a way to expand the usefulness of this information? Or of this study?

Final Map Example: