# Geo 340 – Lab 4 (80 points)

**Introduction to ArcGIS(and ArcMap, ArcCatalog, ArcWhatever…)**

This lab we’ll let you get your feet wet with the tools that make up ArcGIS. The ArcGIS software is installed in our classroom, in the Bauman labs, on some library computers, and on most of the computers in geology classrooms (in the Almy Image Processing Lab, particularly). You may not be able to access it from other places on campus.

Please follow the directions below and answer the questions as you go.

**Preparation:** Go to the course web site and download the file called Lab 4 Data. This is an installer. You should extract it somewhere you can find it easily. Don’t put it on your desktop; it is big, and it may cause problems with your roaming profile on some computers, and it may be harder to find on your desktop from within Arc.

**Tasks and Questions:**

1. Run ArcMap. You should be able to run this from the Windows start menu. It may take a long time to come up. This is OK.
2. Once ArcMap is up, pick “New Map” to create a new map area to play with. Make it a blank template.
3. Add some data to your map using **File🡺Add Data** or the big yellow + button on the toolbar. Add the data file ***emidalat*** in the ***Chap1*** folder in the data you just downloaded. Then add ***emidastrm.shp***.
4. What kind of data is emidalat (Raster or vector? Spatial or attribute?)? (2 points)
5. What kind of data is emidastrm (Raster or vector? Spatial or attribute?)? (2 points)

Click on the grayscale color bar on the left side of the screen and change the display of ***emidalat*** to some colored scale. Make it prettier.

Click with your right mouse button on ***emidastrm***. Pick “Open Attribute Table…” from the pop-up menu. Look at the tables.

1. Click on the square to the left of one of the rows. What happens on the map? (2 points)
2. What does each row in the table represent? (3 points)
3. Click with your right mouse button on the LENGTH field header at the top, and sort the data by length. Where is the longest segment on the map? (3 points)
4. How long is the 7th shortest segment? (2 points)
5. These shapes are called **polylines**. Are these vector or raster data? How do you know? (3 points)
6. Click on the 3rd shortest segment, and zoom in on it on the map. You may not have the zooming tools visible; if not, then right-click on the toolbar at the top and activate the “Tools” toolbar. This should give you zoom buttons to work with. How many points are used to define this stream segment? You may need to zoom in pretty far to tell. (3 points)
7. Pick the Identify tool (letter I in a blue circle). Click on some of the cells in the emidalat raster layer. Each should have two values, Stretched value and Pixel value. Click around the map at the extremes of these data (e.g. the brightest and darkest if you’re using grayscale) – what’s the range of these two values?

Pixel Value

Stretched Value (2 points)

1. What does the “stretched value” mean? How do you think it is it calculated? (3 points)
2. Right-click on the emidalat layer and choose Properties, then the Symbology tab. It should be displayed as a Stretched range to start. Switch it to Classified and see what happens. What recent representation of data (i.e. last week’s lab) does this remind you of? (2 points)
3. Switch the classification scheme to “Defined Interval” and classify the raster data set with 100 foot divisions. Do a screen capture (hit PrintScreen) and paste here or into a new Word document or into e-mail. (4 points)

Let’s play with some other types of spatial data. Start a new map project. From the **usa** folder in the data set you downloaded, add the ***states.shp*** file. Then add the data file ***stdemog***, which is in the Tables folder in USA.

Right-click on the **states** item at the left, pick “Joins and Relates”, and join the States shapes to the **stdemog** file based on the **StateFIPS** field. This associates all the values in the demographics file with the shape information of the state – **you’ve just linked spatial and attribute data!** Woohoo!

1. Double-click on the **states** item to get the Properties window. Pick the Symbology tab, and change the display to Quantities🡺Graduated Colors. Pick one of the fields and make a graduated map of the demographic values. Do a screen capture (hit PrintScreen) and paste into a document or into e-mail. (5 points)
2. Now make a dot-density map of population in 1990. Make each dot represent 200,000 people. Print it out and attach it here, or do a screen capture (hit PrintScreen) and paste into a document or e-mail. (5 points)
3. Make a two-layer map. You’ll need to add in two copies of the states layer to do this.

Layer #1: Use “graduated colors” shading to color the states by their number of mobile home housing units normalized to total housing units. Do this with 10 categories using the Jenks natural breaks classification.

Layer #2: Use “graduated symbols” to make circles in the states. For this one, show vacant housing units normalized to total housing units. Do this with 10 categories using the Jenks natural breaks classification.

Send me an image copy of this map as above (10 points).

Do you see any relationship between these two statistics? Describe any relationship, and speculate on reasons for any connections you see. (5 points)

What additional data set might be useful to investigate further? (3 points)

**Canada project**

1. Find a shapefile for Canadian provinces online and import it into Arc. (6 points)
2. Find data for population for the provinces and join it. Make a shaded map of population by province. (7 points)
3. Find data for GDP for the provinces and join it. Make a shaded map of GDP by province. (8 points)
4. Make a shaded map of GDP normalized to (i.e. divided by) population by province. (5 points)

Turn in all three maps from #20-22 with your lab.