EnvSci 360 – Computer and Analytical Cartography
Spring 2017

- Lab 4 -

NOTE: For each ArcMap document (MXD) you create, set the data source options to store relative paths. (File > Map Document Properties > Check the Pathnames box). This way, if you save your MXD in the same folder with the data, the document will find the data if you copy the MXD and data to another location.

Exercise 1: Comparison of Choropleth Maps of 2010 Population Density in the Metropolitan Boston Area

Task: Create an **E-size (33"x44") layout** showing population density (people per square mile) in Metropolitan Boston, Massachusetts, using Block level data from the 2010 U.S. Census. The layout will have six data frames, each mapping the same data within the same extent (geographic area) and at the same scale, but with one of the following classification schemes in each frame:

- Natural Breaks
- Equal Interval
- Defined Interval
- Quantile
- Manual
- Standard Deviation

For each method (except Std. Deviation), use 5 classes and a graduated color scheme based on light to dark shading of one hue (i.e. light pink to dark red, with the darkest color representing the densest areas). For the Std. Deviation map, go with the default ArcMap symbology. Include a title on each data frame indicating the classification scheme being shown.

Note: When you first classify the data you may see a message warning you that the number of records exceeds the maximum sample size. To change the maximum sample size, click Classify, then Sampling, and enter 50000 in the Data Sampling box. Click OK.

Include a small block of text on the layout explaining your thought process for the manual classification map (i.e. why you chose those class breaks).

Remember, you are mapping population *density*, not raw numbers, so the data must be normalized. Normalize year 2010 population (POP100_RE) by area of land in square miles. You will need to add a field for this value. Look at the Item Description (metadata) for the Blocks and see what values are in the ALAND10 field. Use that field to calculate the "dry" square miles (non-water area), which is used by the Census to indicate the area where people live, since most do not live in lakes and ponds.

Along with the population density data in each of the six data frames, show:

- the boundaries of the towns in the study area, labeled with town name (do not show duplicate labels)
- the water bodies that fall within the study area

- the major highway routes, labeled with the appropriate shield symbol (Interstate, U.S., or State (use a white circle or square for State route markers)), based on the ADMIN_TYPE field. See http://www.mass.gov/itd/eotroads for help. You will need to clip these to the study area towns.

Also include a small locator map (a seventh data frame) showing where the metro Boston study area is in relation to the entire state, along with legends, titles, North arrow, scale bar and/or text, your name, date, source of data, and any other supporting elements you think would enhance the layout.

Note: format the population density legend labels to appear with no decimal points, to show thousands separators, and do not pad with zeros. (In the Layer Properties > Symbology tab, right-click any label and choose Format Labels).

Download the data for this map at http://faculty.www.umb.edu/michael.trust/data360/lab4ex1.zip.

Export the layout as a PDF named **Lab4_Map1_*yourname*.pdf** and email it to me at michael.trust@umb.edu.

Exercise 2: Choropleth and Point Maps of Uninsured Population Compared to Minority Populations in Texas

Task: Create an **8.5 x 11-inch** color map layout with two data frames, each focused on the extent of the state of Texas. Both data frames should be the same size and at the same scale.

Download the data for this map at http://faculty.www.umb.edu/michael.trust/data360/lab4ex2.zip.

Symbolization should be as follows:

- For the percent of the population that is uninsured (for health insurance), symbolize the Texas counties polygon layer based on the UINPCT99 field, using a light-to-dark purple shading scheme. Use 4 class breaks: Under 20%; 20%-25%; >25%-30%; Above 30%
- For the total number of Blacks and total number of Hispanics, symbolize the counties using graduated symbols. Use red circles in 5 classes: Less than 20,000; 20,001-40,000; 40,001-80,000; 80,001-240,000; More than 240,000. One map should use the HISPANIC field, the other the BLACK field.

The final layout will include two data frames, each showing the same choropleth map of the percent of the population that is uninsured. On one map show the point symbols for the Hispanic population atop the shaded polygons, and on the other show the point symbols for the Black population atop the shaded polygons.

Include a title, legend, scale bar, North arrow, your name, and the date. Since the symbols for the shaded polygons and the graduated points are the same for both maps, you can use one legend for the entire layout that applies to both data frames.

Export the map as a PDF file named **Lab4_Map2_*yourname*.pdf** and email it to me at michael.trust@umb.edu.