GEOG370, Spring 2023
Final Practical
Due: May 1, end of exam period

According to a study by Pew Research Center in 2018[1], 82% of Americans live within 10 miles of a hospital. Living further from the hospital is associated with poorer health outcomes and less access to care. Rural areas, especially, have faced challenges with access to hospitals, which is exacerbated by significant hospital closures in rural areas in recent years[2].

In this practical exam, you will identify areas of North Carolina that have limited access to hospitals and, in particular, look at the urban/rural breakdown of areas in the state that have limited access to hospitals. For this assignment, hospital access will be defined as being within 10 miles from a hospital.

You will submit a single .png map to Sakai. You will also submit a Word document or PDF with the answers to the questions at the bottom of the document.

Directions:
1. Using the data in "nc_censustracts_populationdensity.csv", create a new column in the .csv called "Classification". Using a simplified definition provided by the U.S Department of Agriculture[3], define census tracts with a population density (density_sqmile) of less than 500 people per square mile as "Rural" and all other census tracts as "Non-Rural".
    a. There are multiple ways to do this in Excel. You can either "Sort" the data, or you can use a formula (for instance, =IF(*fill in with cell number*<500, "Rural", "Non-Rural").
2. Prepare "nc_censustracts_populationdensity.csv" for a join. Identify the appropriate key column (column that matches a column in "nc_censustracts.shp") and make sure that the data is prepared for import into QGIS.
3. Import "nc_censustracts_populationdensity.csv" into QGIS and join it to "nc_censustracts.shp". A very small number of census tracts will have a NULL value. These census tracts have no population.
4. Add "Hospitals.shp" into QGIS and create a 10-mile buffer around hospital locations.
5. Using an additional geoprocessing tool, identify areas within the state that are **not** within 10 miles from a hospital.
6. Create a map of all areas within the state that are **not** within 10 miles of a hospital. Add symbology demonstrating the rural/non-rural classification of these areas.

[1] https://www.pewresearch.org/short-reads/2018/12/12/how-far-americans-live-from-the-closest-hospital-differs-by-community-type/
[2] https://www.nytimes.com/2018/10/29/upshot/a-sense-of-alarm-as-rural-hospitals-keep-closing.html
[3] https://www.ers.usda.gov/topics/rural-economy-population/rural-classifications/what-is-rural/

Map Specifications:
1. You must use a basemap and add appropriate map features (title, name, legend, north arrow, scale). Your legend should not have default layer names.
2. The map should not include the hospital locations or the buffers. It should just include the limited access areas (areas not within 10 miles of a hospital).
3. The symbology should include 3 different outputs, one for "Rural", one for "Non-Rural", and one for "NULL" or "All Other Values". The selected symbologies should be such that the basemap is still visible below the symbology. That will mean either adding some transparency for colors or using an outline or patterned fill.

Questions:
1) Describe the geoprocessing tools used in creating this map. Why did you select those geoprocessing tools?
    a. I used the buffer and difference tools to create this map. I used these tools because I needed to create a buffer to see the 10 mile radius around hospitals, and I used the difference tool because I needed to only keep the geometry for the areas of North Carolina that are further than 10 miles from a hospital.
2) Describe the pattern of limited hospital access across the state. Pay particular attention to the Rural/Non-Rural classification of these areas.
    a. The regions of the state with limited hospital access are almost entirely rural areas—there are a few urban census tracts on the outskirts of cities that are more than 10 miles from a hospital, but the vast majority of census tracts further than 10 miles from a hospital are rural.