Gerrymandering Project

**02/09**

1. Decided to go with city council districts shapefiles Gustavo shared after learning that Census does not provide city-level data. Census MSAs (metropolitan areas) or places are different from cities.
2. Created a for loop that (1) reads each city’s council districts shapefile; (2) dissolves districts polygons; (3) removes unnecessary holes in the dissolved city boundary; and (4) assign it as a new object named “*cityname*\_city\_boundary.”
   1. i.e.) Before vs after removing unnecessary holes in New York
3. Created a for loop that (1) imports each city’s tract AND block-level demographics shapefiles; (2) filters tracts and blocks within the city boundary; (3) and assign them as new objects, named “*cityname*\_tracts\_boundary” and “*cityname*\_blocks\_boundary,” respectively.
   1. I have finished writing this loop, but intersection is not working yet because different levels of boundary files (city, tract) currently have different datum and projection. To make the intersection function work, I have to make sure all the boundary files have the same datum and projection.

**Next steps:** (1) ~~Fix Houston and Austin geometry issues;~~ (2) ~~Make sure all cities’ boundary files and Census datasets have the same datum and projection~~; (3) add partisanship data.

**02/09**

1. Fixed Houston and Austin geometry issues. Running the ‘st\_union’ function on city council districts yielded the error message: “*Error in s2\_geography\_from\_wkb(x, oriented = oriented, check = check) : Evaluation error: Found # features with invalid spherical geometry*.”
   1. **Cause:** This error happened due to a change in the backend engine for unprojected coordiates from GEOS to s2. GEOS treats projected coordinates as planar (i.e. two points lie on a line of infinite max length) while s2 is more "correct" (two points lie on a great circle of circumference of 40 075 kilometers)
   2. **Two Solutions Available:**  sf\_use\_s2(FALSE) vs st\_make\_valid
      1. ‘sf::sf\_use\_s2(FALSE)’: Turns off the s2 processing
      2. ‘sf::st\_make\_valid()’: Make an invalid geometry valid
   3. I chose ‘st\_make\_valid’ because I believe there are some reasons the package has changed its geoprocessing approach to s2. Also, the second option is as simple as running the first one.
2. Made sure all cities’ boundary files and Census datasets have the same datum and projection. Cities’ boundary files had their own CRS, while Census datasets had the same CRS of “+proj=longlat +datum=NAD83 +no\_defs.” So I converted all cities’ boundaries’ CRS to that.
3. Created a for loop that (1) reads each state’s precinct returns shapefile; (2) resets the datum and projection; and (3) assigns it as a new object named “*statecode*\_state\_precinct\_returns.”
4. [In Progress] Create tract- and block-level spatially-weighted demographic and partisanship data.
   1. **Issues**: Codes take too long to run, especially block-level ones.

Next Steps: (1) find a way to optimize my codes – filter relevant counties first; (2) try QGIS and see how it works.