1. Source libraries

```
library("RSocrata")
library("tidyverse")
library(geojsonR)
library(geojsonsf)
library("plotKML")
library("ggplot2")
library("sf")
library("rgeos")
library(purrr)
library("plyr")
library(scales)
library(ggspatial)
library(viridis)
library(dplyr)

options(max.print=50000)
```

2. Import victims of homicides and shootings

```
victims_df <- read.socrata(
  "https://data.cityofchicago.org/resource/gumc-mgzr.json",
  app_token = "xEXuVLIzaFYLeOC8cBFb1Z9H0",
  email     = "pbhargava936@gmail.com",
  password  = "******"
)
```

3. Import population by census block

```
populationCensusBlock_df <- read.socrata(
 "https://data.cityofchicago.org/resource/5yjb-v3mj.json",
 app_token = "xEXuVLIzaFYLeOC8cBFb1Z9H0",
 email     = "pbhargava936@gmail.com",
 password  = "******"
)
```

4. Import population by zip code

```
chicagoPopln <- read.table(file = "C:/Users/PC-P14s/Desktop/createMaps/Chicago_Population_Counts.csv", sep = ";", header=TRUE)
```

5. Get high school and elementary school boundaries

```
highSchoolBoundariesMap_sf <- st_read("C:/Users/PC-P14s/Desktop/createMaps/Chicago Public Schools - High School Attendance Boundaries SY2021.geojson")

highSchoolBoundariesMap_sf <- highSchoolBoundariesMap_sf[-c(53), ]

elementaryBoundariesMap_sf <- st_read("C:/Users/PC-P14s/Desktop/createMaps/Chicago Public Schools - Elementary School Attendance Boundaries SY2021.geojson")
```

6. Get school points and filter them

```
schoolPoints_ORIG_sf <- st_read("C:/Users/PC-P14s/Desktop/createMaps/Chicago Public Schools - School Profile Information SY2021.geojson")

schoolPoints_REM_OPTIONS_sf <- schoolPoints_ORIG_sf[(schoolPoints_ORIG_sf$network!="Options"),]
```

```
schoolPoints_REM_CONTRACT_sf <-
schoolPoints_REM_OPTIONS_sf[(schoolPoints_REM_OPTIONS_sf$network!="Contract"),]

schoolPoints_REM_SELECT_sf <-
schoolPoints_REM_CONTRACT_sf[!grepl(paste(c("Hancock","Gwendolyn Brooks","King  Jr
College","Jones","Lane","Lindblom","Northside College","Payton","South Shore
Intl","Westinghouse","Whitney M Young Magnet High School","Jefferson","York"),
collapse="|"),schoolPoints_REM_CONTRACT_sf$long_name),]

schoolPoints_ATT_FALSE_sf <-
schoolPoints_REM_SELECT_sf[(schoolPoints_REM_SELECT_sf$attendance_boundaries=="false"),]

schoolPoints_NET_ATT_FALSE_sf <-
schoolPoints_ATT_FALSE_sf[grep("Network",schoolPoints_ATT_FALSE_sf$network),]

moreSchoolsToExcl <- c("Daniel Hale Williams Prep School of Medicine", "Walt Disney Magnet
Elementary School", "Consuella B York Alternative HS", "Louisa May Alcott College Preparatory HS",
"Thomas A Edison Regional Gifted Center ES", "Inter-American Elementary Magnet School", "Richard T
Crane Medical Preparatory HS", "Robert A Black Magnet Elementary School", "Annie Keller Regional
Gifted Center", "Edward Beasley Elementary Magnet Academic Center", "Suder Montessori Magnet ES",
"George Washington Carver Military Academy HS", "Disney II Magnet School", "Nancy B Jefferson
Alternative HS", "Disney II Magnet High School", "Albert R Sabin Elementary Magnet School")

schoolPoints_sf <- schoolPoints_REM_SELECT_sf[!grepl(paste(moreSchoolsToExcl,
collapse="|"),schoolPoints_REM_SELECT_sf$long_name),]

highSchoolPoints_sf <- schoolPoints_sf[(schoolPoints_sf$is_high_school=="true"),]

elementarySchoolPoints_sf <- schoolPoints_sf[(schoolPoints_sf$is_elementary_school=="true"),]



library("writexl")

write_xlsx(schoolPoints_sf,"C:\\Users\\PC-P14s\\Documents\\FinalSchoolList.xlsx")
```

7. Calculating population by tract and block group

```
populationCensusBlock_df$total_population <-
as.numeric(as.character(populationCensusBlock_df$total_population))

populationCensusBlock_df$CUSTOM_tract = substr(populationCensusBlock_df$census_block_full,1,11)
```

```
populationCensusBlock_df$CUSTOM_block_grp =
substr(populationCensusBlock_df$census_block_full,1,12)


chicagoPopln<-chicagoPopln[!(chicagoPopln$Year==2019),]
```

8. Import streets and 4 types of geospatial data

```
overlayStreets <- st_read("C:/Users/PC-P14s/Desktop/createMaps/Major_Streets/Major_Streets.shp")

blockGroup_sf <- st_read("C:/Users/PC-P14s/Desktop/createMaps/Cook County Block Group
files/tl_2010_17031_bg10.shp")

zipCode_sf <- st_read("C:/Users/PC-P14s/Desktop/createMaps/Boundaries - ZIP Codes.geojson")


censusBlock_sf <- st_read("C:/Users/PC-P14s/Desktop/createMaps/Boundaries - Census Blocks -
2010.geojson")

censusTract_sf <- st_read("C:/Users/PC-P14s/Desktop/createMaps/Boundaries - Census Tracts -
2010.geojson")
```

9. Saving populations by tract and block group in separate table

```
blockGroup_sf$GEO_tract = substr(blockGroup_sf$GEOID10,1,11)

onlyTractGEOIDs <- censusTract_sf$geoid10

chicagoBlockGroup_sf <- blockGroup_sf$GEO_tract %in% onlyTractGEOIDs


blockGroup_sf$present <- chicagoBlockGroup_sf

filteredBlockGroup_sf<-blockGroup_sf[!(blockGroup_sf$present==FALSE),]
```

```
populationCensusTract_df <- as.data.frame(xtabs(total_population ~ CUSTOM_tract, populationCensusBlock_df))

populationCensusBlockGroup_df <- as.data.frame(xtabs(total_population ~ CUSTOM_block_grp, populationCensusBlock_df))
```

10. Splitting victims into homicides and shootings

```
homicides_df <- filter(victims_df, primary_type != "NON-FATAL SHOOTING" & date >= "2016-08-01 00:00:00" & date <= "2021-07-31 23:59:59")

shootings_df <- filter(victims_df, primary_type != "NON-SHOOTING HOMICIDE" & date >= "2016-08-01 00:00:00" & date <= "2021-07-31 23:59:59")
```

11. Separating homicide and shooting locations and renaming them x y

```
homicides_pnts <- select(homicides_df, longitude, latitude)

shootings_pnts <- select(shootings_df, longitude, latitude)


names(homicides_pnts)[1] <- "x"

names(homicides_pnts)[2] <- "y"

names(shootings_pnts)[1] <- "x"

names(shootings_pnts)[2] <- "y"
```

12. Create a points collection for the coordinates

```
homicides_pnts_sf <- do.call("st_sfc",c(lapply(1:nrow(homicides_pnts), function(i) {st_point(as.numeric(homicides_pnts[i, ]))}), list("crs" = 4326)))

shootings_pnts_sf <- do.call("st_sfc",c(lapply(1:nrow(shootings_pnts), function(i) {st_point(as.numeric(shootings_pnts[i, ]))}), list("crs" = 4326)))
```

13. Apply transformation to the points

```
homicides_pnts_trans <- st_transform(homicides_pnts_sf, 2163)
```

```
shootings_pnts_trans <- st_transform(shootings_pnts_sf, 2163)
```

14. Left outer join at all 4 geographies to connect population with map data

```
censusBlock_sf_popln <- merge(x = censusBlock_sf, y = populationCensusBlock_df, by.x = "geoid10", by.y = "census_block_full", all.x = TRUE)

censusTract_sf_popln <- merge(x = censusTract_sf, y = populationCensusTract_df, by.x = "geoid10", by.y = "CUSTOM_tract", all.x = TRUE)

censusBlockGrp_sf_popln <- merge(x = filteredBlockGroup_sf, y = populationCensusBlockGroup_df, by.x = "GEOID10", by.y = "CUSTOM_block_grp", all.x = TRUE)

censusZip_sf_popln <- merge(x = zipCode_sf, y = chicagoPopln, by.x = "zip", by.y = "Geography", all.x = TRUE)
```

15. Rename population column

```
censusBlock_sf_popln$total_population[is.na(censusBlock_sf_popln$total_population)] <- 0

names(censusTract_sf_popln)[names(censusTract_sf_popln) == 'Freq'] <- 'total_population'

names(censusBlockGrp_sf_popln)[names(censusBlockGrp_sf_popln) == 'Freq'] <- 'total_population'

names(censusZip_sf_popln)[names(censusZip_sf_popln) == 'Population...Total'] <- 'total_population'
```

16. Voronoi conversion function

```
# Carson's Voronoi polygons function

voronoipolygons <- function(x) {

 require(deldir)

 require(sp)

 if (.hasSlot(x, 'coords')) {
```

```
  crds <- x@coords
 } else crds <- x
 z <- deldir(crds[,1], crds[,2])
 w <- tile.list(z)
 polys <- vector(mode='list', length=length(w))
 for (i in seq(along=polys)) {
  pcrds <- cbind(w[[i]]$x, w[[i]]$y)
  pcrds <- rbind(pcrds, pcrds[1,])
  polys[[i]] <- Polygons(list(Polygon(pcrds)), ID=as.character(i))
 }
 SP <- SpatialPolygons(polys)
 voronoi <- SpatialPolygonsDataFrame(SP, data=data.frame(x=crds[,1],
                                     y=crds[,2], row.names=sapply(slot(SP, 'polygons'),
                                                                  function(x) slot(x, 'ID'))))
}
```

17. Extracting voronoi grids specific to Chicago

```
highSchoolGeom_sf <- data.frame(x=as.numeric(highSchoolPoints_sf$school_longitude),
y=as.numeric(highSchoolPoints_sf$school_latitude), total_population =
as.numeric(highSchoolPoints_sf$student_count_total))

highSchoolVoronoi_grid <- voronoipolygons(highSchoolGeom_sf)

elementarySchoolGeom_sf <- data.frame(x=as.numeric(elementarySchoolPoints_sf$school_longitude),
y=as.numeric(elementarySchoolPoints_sf$school_latitude), total_population =
as.numeric(elementarySchoolPoints_sf$student_count_total))

elementarySchoolVoronoi_grid <- voronoipolygons(elementarySchoolGeom_sf)
```

```
chicagoBoundary_sf <- st_read("C:/Users/PC-P14s/Desktop/createMaps/Boundaries - City.geojson")

chicagoBoundary_spatial <- as(chicagoBoundary_sf, 'Spatial')


highSchoolChicVoronoi_grid <- intersect(highSchoolVoronoi_grid, chicagoBoundary_spatial)

highSchoolChicVoronoi_sf <- st_as_sf(highSchoolChicVoronoi_grid)

highSchoolChicVoronoiPopln_sf <- merge(x = highSchoolChicVoronoi_sf, y = highSchoolGeom_sf, by.x =
"x", by.y = "x", all.x = TRUE, all.y = TRUE)

elementarySchoolChicVoronoi_grid <- intersect(elementarySchoolVoronoi_grid,
chicagoBoundary_spatial)

elementarySchoolChicVoronoi_sf <- st_as_sf(elementarySchoolChicVoronoi_grid)

elementarySchoolChicVoronoiPopln_sf <- merge(x = elementarySchoolChicVoronoi_sf, y =
elementarySchoolGeom_sf, by.x = "x", by.y = "x", all.x = TRUE, all.y = TRUE)
```

18. Changing NA population to 0

```
censusTract_sf_popln$total_population[is.na(censusTract_sf_popln$total_population)] <- 0

censusBlockGrp_sf_popln$total_population[is.na(censusBlockGrp_sf_popln$total_population)] <- 0

censusZip_sf_popln$total_population[is.na(censusZip_sf_popln$total_population)] <- 0

highSchoolChicVoronoiPopln_sf$total_population[is.na(highSchoolChicVoronoiPopln_sf$total_populatio
n)] <- 0

elementarySchoolChicVoronoiPopln_sf$total_population[is.na(elementarySchoolChicVoronoiPopln_sf$t
otal_population)] <- 0
```

19. Tweaking population for 2 zip codes that appear twice after the merge

```
censusZip_sf_popln$total_population <- as.numeric(gsub(",","",censusZip_sf_popln$total_population))

censusZip_sf_popln$total_population[censusZip_sf_popln$zip == '60643'] <-
censusZip_sf_popln$total_population[censusZip_sf_popln$zip == '60643']/2
```

```
censusZip_sf_popln$total_population[censusZip_sf_popln$zip == '60707'] <-
censusZip_sf_popln$total_population[censusZip_sf_popln$zip == '60707']/2
```

20. Create an index column to number the geographical areas

```
censusBlock_sf_popln$index <- 1:nrow(censusBlock_sf_popln)

censusTract_sf_popln$index <- 1:nrow(censusTract_sf_popln)

censusBlockGrp_sf_popln$index <- 1:nrow(censusBlockGrp_sf_popln)

censusZip_sf_popln$index <- 1:nrow(censusZip_sf_popln)

highSchoolBoundariesMap_sf$index <- 1:nrow(highSchoolBoundariesMap_sf)

elementaryBoundariesMap_sf$index <- 1:nrow(elementaryBoundariesMap_sf)

highSchoolChicVoronoiPopln_sf$index <- 1:nrow(highSchoolChicVoronoiPopln_sf)

elementarySchoolChicVoronoiPopln_sf$index <- 1:nrow(elementarySchoolChicVoronoiPopln_sf)
```

21. Apply transformation to all maps

```
censusBlock_trans <- st_transform(censusBlock_sf_popln, 2163)

censusTract_trans <- st_transform(censusTract_sf_popln, 2163)

censusBlockGrp_trans <- st_transform(censusBlockGrp_sf_popln, 2163)

censusZip_trans <- st_transform(censusZip_sf_popln, 2163)

highSchoolBoundariesMap_trans <- st_transform(highSchoolBoundariesMap_sf, 2163)

elementaryBoundariesMap_trans <- st_transform(elementaryBoundariesMap_sf, 2163)

highSchoolChicVoronoiPopln_trans <- st_transform(highSchoolChicVoronoiPopln_sf, 2163)

elementarySchoolChicVoronoiPopln_trans <- st_transform(elementarySchoolChicVoronoiPopln_sf,
2163)
```

22. Get indices of all geographies for shootings and homicides

```
homicides_df$WhichHighVor <- apply(st_intersects(highSchoolChicVoronoiPopln_trans,
homicides_pnts_trans, sparse = FALSE), 2,

                    function(col) {

                     highSchoolChicVoronoiPopln_trans[which(col), ]$index

                    })


homicides_df$WhichElementaryVor <- apply(st_intersects(elementarySchoolChicVoronoiPopln_trans,
homicides_pnts_trans, sparse = FALSE), 2,

                        function(col) {

                         elementarySchoolChicVoronoiPopln_trans[which(col), ]$index

                        })


homicides_df$WhichHigh <- apply(st_intersects(highSchoolBoundariesMap_trans,
homicides_pnts_trans, sparse = FALSE), 2,

                         function(col) {

                          highSchoolBoundariesMap_trans[which(col), ]$index

                         })


homicides_df$WhichElementary <- apply(st_intersects(elementaryBoundariesMap_trans,
homicides_pnts_trans, sparse = FALSE), 2,

                    function(col) {

                     elementaryBoundariesMap_trans[which(col), ]$index

                    })
```

```
homicides_df$WhichCensusBlock <- apply(st_intersects(censusBlock_trans, homicides_pnts_trans,
sparse = FALSE), 2,
                    function(col) {
                      censusBlock_trans[which(col), ]$index
                    })


homicides_df$WhichCensusTract <- apply(st_intersects(censusTract_trans, homicides_pnts_trans,
sparse = FALSE), 2,
                        function(col) {
                          censusTract_trans[which(col), ]$index
                        })


homicides_df$WhichCensusGroup <- apply(st_intersects(censusBlockGrp_trans, homicides_pnts_trans,
sparse = FALSE), 2,
                        function(col) {
                          censusBlockGrp_trans[which(col), ]$index
                        })


homicides_df$WhichCensusZip <- apply(st_intersects(censusZip_trans, homicides_pnts_trans, sparse =
FALSE), 2,
                        function(col) {
                          censusZip_trans[which(col), ]$index
                        })


shootings_df$WhichCensusBlock <- apply(st_intersects(censusBlock_trans, shootings_pnts_trans, sparse
= FALSE), 2,
                        function(col) {
```

```
  censusBlock_trans[which(col), ]$index
 })


shootings_df$WhichCensusTract <- apply(st_intersects(censusTract_trans, shootings_pnts_trans, sparse = FALSE), 2,
                 function(col) {
  censusTract_trans[which(col), ]$index
 })


shootings_df$WhichCensusGroup <- apply(st_intersects(censusBlockGrp_trans, shootings_pnts_trans, sparse = FALSE), 2,
                 function(col) {
  censusBlockGrp_trans[which(col), ]$index
 })


shootings_df$WhichCensusZip <- apply(st_intersects(censusZip_trans, shootings_pnts_trans, sparse = FALSE), 2,
                 function(col) {
  censusZip_trans[which(col), ]$index
 })


shootings_df$WhichHigh <- apply(st_intersects(highSchoolBoundariesMap_trans, shootings_pnts_trans, sparse = FALSE), 2,
                function(col) {
  highSchoolBoundariesMap_trans[which(col), ]$index
 })
```

```
shootings_df$WhichElementary <- apply(st_intersects(elementaryBoundariesMap_trans,
shootings_pnts_trans, sparse = FALSE), 2,
                                      function(col) {
                                        elementaryBoundariesMap_trans[which(col), ]$index
                                      })


shootings_df$WhichHighVor <- apply(st_intersects(highSchoolChicVoronoiPopln_trans,
shootings_pnts_trans, sparse = FALSE), 2,
                                   function(col) {
                                     highSchoolChicVoronoiPopln_trans[which(col), ]$index
                                   })


shootings_df$WhichElementaryVor <- apply(st_intersects(elementarySchoolChicVoronoiPopln_trans,
shootings_pnts_trans, sparse = FALSE), 2,
                                         function(col) {
                                           elementarySchoolChicVoronoiPopln_trans[which(col), ]$index
                                         })
```

23. Removing non-intersections [values that read ‘integer(0)’]

```
homicides homicides_onlyCensusBlock <- homicides_df$WhichCensusBlock

homicides_onlyCensusTract <- homicides_df$WhichCensusTract

homicides_onlyCensusGroup <- homicides_df$WhichCensusGroup

homicides_onlyCensusZip <- homicides_df$WhichCensusZip

homicides_onlyHigh <- homicides_df$WhichHigh

homicides_onlyElementary <- homicides_df$WhichElementary

homicides_onlyHighVor <- homicides_df$WhichHighVor

homicides_onlyElementaryVor <- homicides_df$WhichElementaryVor
```

```
shootings_onlyCensusBlock <- shootings_df$WhichCensusBlock

shootings_onlyCensusTract <- shootings_df$WhichCensusTract

shootings_onlyCensusGroup <- shootings_df$WhichCensusGroup

shootings_onlyCensusZip <- shootings_df$WhichCensusZip

shootings_onlyHigh <- shootings_df$WhichHigh

shootings_onlyElementary <- shootings_df$WhichElementary

shootings_onlyHighVor <- shootings_df$WhichHighVor

shootings_onlyElementaryVor <- shootings_df$WhichElementaryVor


homicides_onlyCensusBlock_filtered <- compact(homicides_onlyCensusBlock)

homicides_onlyCensusTract_filtered <- compact(homicides_onlyCensusTract)

homicides_onlyCensusGroup_filtered <- compact(homicides_onlyCensusGroup)

homicides_onlyCensusZip_filtered <- compact(homicides_onlyCensusZip)

homicides_onlyHigh_filtered <- compact(homicides_onlyHigh)

homicides_onlyElementary_filtered <- compact(homicides_onlyElementary)

homicides_onlyHighVor_filtered <- compact(homicides_onlyHighVor)

homicides_onlyElementaryVor_filtered <- compact(homicides_onlyElementaryVor)


shootings_onlyCensusBlock_filtered <- compact(shootings_onlyCensusBlock)

shootings_onlyCensusTract_filtered <- compact(shootings_onlyCensusTract)

shootings_onlyCensusGroup_filtered <- compact(shootings_onlyCensusGroup)

shootings_onlyCensusZip_filtered <- compact(shootings_onlyCensusZip)

shootings_onlyHigh_filtered <- compact(shootings_onlyHigh)

shootings_onlyElementary_filtered <- compact(shootings_onlyElementary)
```

```
shootings_onlyHighVor_filtered <- compact(shootings_onlyHighVor)

shootings_onlyElementaryVor_filtered <- compact(shootings_onlyElementaryVor)
```

24. Convert lists to data frame

```
homicides_onlyCensusBlock_filtered_df <- do.call(rbind.data.frame,
homicides_onlyCensusBlock_filtered)

homicides_onlyCensusTract_filtered_df <- do.call(rbind.data.frame,
homicides_onlyCensusTract_filtered)

homicides_onlyCensusGroup_filtered_df <- do.call(rbind.data.frame,
homicides_onlyCensusGroup_filtered)

homicides_onlyCensusZip_filtered_df <- do.call(rbind.data.frame, homicides_onlyCensusZip_filtered)

homicides_onlyHigh_filtered_df <- do.call(rbind.data.frame, homicides_onlyHigh_filtered)

homicides_onlyElementary_filtered_df <- do.call(rbind.data.frame, homicides_onlyElementary_filtered)

homicides_onlyHighVor_filtered_df <- do.call(rbind.data.frame, homicides_onlyHighVor_filtered)

homicides_onlyElementaryVor_filtered_df <- do.call(rbind.data.frame,
homicides_onlyElementaryVor_filtered)


shootings_onlyCensusBlock_filtered_df <- do.call(rbind.data.frame,
shootings_onlyCensusBlock_filtered)

shootings_onlyCensusTract_filtered_df <- do.call(rbind.data.frame, shootings_onlyCensusTract_filtered)

shootings_onlyCensusGroup_filtered_df <- do.call(rbind.data.frame,
shootings_onlyCensusGroup_filtered)

shootings_onlyCensusZip_filtered_df <- do.call(rbind.data.frame, shootings_onlyCensusZip_filtered)

shootings_onlyHigh_filtered_df <- do.call(rbind.data.frame, shootings_onlyHigh_filtered)

shootings_onlyElementary_filtered_df <- do.call(rbind.data.frame, shootings_onlyElementary_filtered)

shootings_onlyHighVor_filtered_df <- do.call(rbind.data.frame, shootings_onlyHighVor_filtered)
```

```
shootings_onlyElementaryVor_filtered_df <- do.call(rbind.data.frame,
shootings_onlyElementaryVor_filtered)
```

25. Rename the column in the dataframe and create a frequency distribution

```
names(homicides_onlyCensusBlock_filtered_df)[1] <- "WhichCensusBlock"

names(homicides_onlyCensusTract_filtered_df)[1] <- "WhichCensusTract"

names(homicides_onlyCensusGroup_filtered_df)[1] <- "WhichCensusGroup"

names(homicides_onlyCensusZip_filtered_df)[1] <- "WhichCensusZip"

names(homicides_onlyHigh_filtered_df)[1] <- "WhichHigh"

names(homicides_onlyElementary_filtered_df)[1] <- "WhichElementary"

names(homicides_onlyHighVor_filtered_df)[1] <- "WhichHighVor"

names(homicides_onlyElementaryVor_filtered_df)[1] <- "WhichElementaryVor"


names(shootings_onlyCensusBlock_filtered_df)[1] <- "WhichCensusBlock"

names(shootings_onlyCensusTract_filtered_df)[1] <- "WhichCensusTract"

names(shootings_onlyCensusGroup_filtered_df)[1] <- "WhichCensusGroup"

names(shootings_onlyCensusZip_filtered_df)[1] <- "WhichCensusZip"

names(shootings_onlyHigh_filtered_df)[1] <- "WhichHigh"

names(shootings_onlyElementary_filtered_df)[1] <- "WhichElementary"

names(shootings_onlyHighVor_filtered_df)[1] <- "WhichHighVor"

names(shootings_onlyElementaryVor_filtered_df)[1] <- "WhichElementaryVor"


homicides_freqDist <- data.frame(table(homicides_onlyCensusBlock_filtered_df$WhichCensusBlock))

homicides_freqDist_tract <-
data.frame(table(homicides_onlyCensusTract_filtered_df$WhichCensusTract))
```

```
homicides_freqDist_group <-
data.frame(table(homicides_onlyCensusGroup_filtered_df$WhichCensusGroup))

homicides_freqDist_zip <- data.frame(table(homicides_onlyCensusZip_filtered_df$WhichCensusZip))

homicides_freqDist_high <- data.frame(table(homicides_onlyHigh_filtered_df$WhichHigh))

homicides_freqDist_elementary <-
data.frame(table(homicides_onlyElementary_filtered_df$WhichElementary))

homicides_freqDist_highVor <- data.frame(table(homicides_onlyHighVor_filtered_df$WhichHighVor))

homicides_freqDist_elementaryVor <-
data.frame(table(homicides_onlyElementaryVor_filtered_df$WhichElementaryVor))


shootings_freqDist <- data.frame(table(shootings_onlyCensusBlock_filtered_df$WhichCensusBlock))

shootings_freqDist_tract <-
data.frame(table(shootings_onlyCensusTract_filtered_df$WhichCensusTract))

shootings_freqDist_group <-
data.frame(table(shootings_onlyCensusGroup_filtered_df$WhichCensusGroup))

shootings_freqDist_zip <- data.frame(table(shootings_onlyCensusZip_filtered_df$WhichCensusZip))

shootings_freqDist_high <- data.frame(table(shootings_onlyHigh_filtered_df$WhichHigh))

shootings_freqDist_elementary <-
data.frame(table(shootings_onlyElementary_filtered_df$WhichElementary))

shootings_freqDist_highVor <- data.frame(table(shootings_onlyHighVor_filtered_df$WhichHighVor))

shootings_freqDist_elementaryVor <-
data.frame(table(shootings_onlyElementaryVor_filtered_df$WhichElementaryVor))
```

26. Left outer join the map+population data with the frequency distribution created in previous step

```
censusBlock_sf_popln_homicides_freq <- merge(x = censusBlock_sf_popln, y = homicides_freqDist, by.x
= "index", by.y = "Var1", all.x = TRUE)

censusTract_sf_popln_homicides_freq <- merge(x = censusTract_sf_popln, y = homicides_freqDist_tract,
by.x = "index", by.y = "Var1", all.x = TRUE)
```

```
censusGroup_sf_popln_homicides_freq <- merge(x = censusBlockGrp_sf_popln, y = homicides_freqDist_group, by.x = "index", by.y = "Var1", all.x = TRUE)

censusZip_sf_popln_homicides_freq <- merge(x = censusZip_sf_popln, y = homicides_freqDist_zip, by.x = "index", by.y = "Var1", all.x = TRUE)

high_sf_popln_homicides_freq <- merge(x = highSchoolBoundariesMap_sf, y = homicides_freqDist_high, by.x = "index", by.y = "Var1", all.x = TRUE)

elementary_sf_popln_homicides_freq <- merge(x = elementaryBoundariesMap_sf, y = homicides_freqDist_elementary, by.x = "index", by.y = "Var1", all.x = TRUE)

highVor_sf_popln_homicides_freq <- merge(x = highSchoolChicVoronoiPopln_sf, y = homicides_freqDist_highVor, by.x = "index", by.y = "Var1", all.x = TRUE)

elementaryVor_sf_popln_homicides_freq <- merge(x = elementarySchoolChicVoronoiPopln_sf, y = homicides_freqDist_elementaryVor, by.x = "index", by.y = "Var1", all.x = TRUE)

censusBlock_sf_popln_shootings_freq <- merge(x = censusBlock_sf_popln, y = shootings_freqDist, by.x = "index", by.y = "Var1", all.x = TRUE)

censusTract_sf_popln_shootings_freq <- merge(x = censusTract_sf_popln, y = shootings_freqDist_tract, by.x = "index", by.y = "Var1", all.x = TRUE)

censusGroup_sf_popln_shootings_freq <- merge(x = censusBlockGrp_sf_popln, y = shootings_freqDist_group, by.x = "index", by.y = "Var1", all.x = TRUE)

censusZip_sf_popln_shootings_freq <- merge(x = censusZip_sf_popln, y = shootings_freqDist_zip, by.x = "index", by.y = "Var1", all.x = TRUE)

high_sf_popln_shootings_freq <- merge(x = highSchoolBoundariesMap_sf, y = shootings_freqDist_high, by.x = "index", by.y = "Var1", all.x = TRUE)

elementary_sf_popln_shootings_freq <- merge(x = elementaryBoundariesMap_sf, y = shootings_freqDist_elementary, by.x = "index", by.y = "Var1", all.x = TRUE)

highVor_sf_popln_shootings_freq <- merge(x = highSchoolChicVoronoiPopln_sf, y = shootings_freqDist_highVor, by.x = "index", by.y = "Var1", all.x = TRUE)

elementaryVor_sf_popln_shootings_freq <- merge(x = elementarySchoolChicVoronoiPopln_sf, y = shootings_freqDist_elementaryVor, by.x = "index", by.y = "Var1", all.x = TRUE)
```

27. Change the NA values to 0 after the join and calculating the 5-year average and per capita values

```
censusBlock_sf_popln_homicides_freq$Freq[is.na(censusBlock_sf_popln_homicides_freq$Freq)] <- 0
censusTract_sf_popln_homicides_freq$Freq[is.na(censusTract_sf_popln_homicides_freq$Freq)] <- 0
censusGroup_sf_popln_homicides_freq$Freq[is.na(censusGroup_sf_popln_homicides_freq$Freq)] <- 0
censusZip_sf_popln_homicides_freq$Freq[is.na(censusZip_sf_popln_homicides_freq$Freq)] <- 0
high_sf_popln_homicides_freq$Freq[is.na(high_sf_popln_homicides_freq$Freq)] <- 0
elementary_sf_popln_homicides_freq$Freq[is.na(elementary_sf_popln_homicides_freq$Freq)] <- 0
highVor_sf_popln_homicides_freq$Freq[is.na(highVor_sf_popln_homicides_freq$Freq)] <- 0
elementaryVor_sf_popln_homicides_freq$Freq[is.na(elementaryVor_sf_popln_homicides_freq$Freq)]
<- 0

censusBlock_sf_popln_shootings_freq$Freq[is.na(censusBlock_sf_popln_shootings_freq$Freq)] <- 0
censusTract_sf_popln_shootings_freq$Freq[is.na(censusTract_sf_popln_shootings_freq$Freq)] <- 0
censusGroup_sf_popln_shootings_freq$Freq[is.na(censusGroup_sf_popln_shootings_freq$Freq)] <- 0
censusZip_sf_popln_shootings_freq$Freq[is.na(censusZip_sf_popln_shootings_freq$Freq)] <- 0
high_sf_popln_shootings_freq$Freq[is.na(high_sf_popln_shootings_freq$Freq)] <- 0
elementary_sf_popln_shootings_freq$Freq[is.na(elementary_sf_popln_shootings_freq$Freq)] <- 0
highVor_sf_popln_shootings_freq$Freq[is.na(highVor_sf_popln_shootings_freq$Freq)] <- 0
elementaryVor_sf_popln_shootings_freq$Freq[is.na(elementaryVor_sf_popln_shootings_freq$Freq)] <-
0

censusBlock_sf_popln_homicides_freq$Freq <- censusBlock_sf_popln_homicides_freq$Freq/5
censusTract_sf_popln_homicides_freq$Freq <- censusTract_sf_popln_homicides_freq$Freq/5
censusGroup_sf_popln_homicides_freq$Freq <- censusGroup_sf_popln_homicides_freq$Freq/5
```

```
censusZip_sf_popln_homicides_freq$Freq <- censusZip_sf_popln_homicides_freq$Freq/5

high_sf_popln_homicides_freq$Freq <- high_sf_popln_homicides_freq$Freq/5

elementary_sf_popln_homicides_freq$Freq <- elementary_sf_popln_homicides_freq$Freq/5

highVor_sf_popln_homicides_freq$Freq <- highVor_sf_popln_homicides_freq$Freq/5

elementaryVor_sf_popln_homicides_freq$Freq <- elementaryVor_sf_popln_homicides_freq$Freq/5


censusBlock_sf_popln_shootings_freq$Freq <- censusBlock_sf_popln_shootings_freq$Freq/5

censusTract_sf_popln_shootings_freq$Freq <- censusTract_sf_popln_shootings_freq$Freq/5

censusGroup_sf_popln_shootings_freq$Freq <- censusGroup_sf_popln_shootings_freq$Freq/5

censusZip_sf_popln_shootings_freq$Freq <- censusZip_sf_popln_shootings_freq$Freq/5

high_sf_popln_shootings_freq$Freq <- high_sf_popln_shootings_freq$Freq/5

elementary_sf_popln_shootings_freq$Freq <- elementary_sf_popln_shootings_freq$Freq/5

highVor_sf_popln_shootings_freq$Freq <- highVor_sf_popln_shootings_freq$Freq/5

elementaryVor_sf_popln_shootings_freq$Freq <- elementaryVor_sf_popln_shootings_freq$Freq/5


censusBlock_sf_popln_homicides_freq$total_population[censusBlock_sf_popln_homicides_freq$total_
population<=30] <- 0

censusTract_sf_popln_homicides_freq$total_population[censusTract_sf_popln_homicides_freq$total_p
opulation<=30] <- 0

censusGroup_sf_popln_homicides_freq$total_population[censusGroup_sf_popln_homicides_freq$total
_population<=30] <- 0

censusZip_sf_popln_homicides_freq$total_population[censusZip_sf_popln_homicides_freq$total_popul
ation<=30] <- 0

highVor_sf_popln_homicides_freq$total_population[highVor_sf_popln_homicides_freq$total_populatio
n<=30] <- 0

elementaryVor_sf_popln_homicides_freq$total_population[elementaryVor_sf_popln_homicides_freq$t
otal_population<=30] <- 0
```

```
censusBlock_sf_popln_shootings_freq$total_population[censusBlock_sf_popln_shootings_freq$total_population<=30] <- 0

censusTract_sf_popln_shootings_freq$total_population[censusTract_sf_popln_shootings_freq$total_population<=30] <- 0

censusGroup_sf_popln_shootings_freq$total_population[censusGroup_sf_popln_shootings_freq$total_population<=30] <- 0

censusZip_sf_popln_shootings_freq$total_population[censusZip_sf_popln_shootings_freq$total_population<=30] <- 0

highVor_sf_popln_shootings_freq$total_population[highVor_sf_popln_shootings_freq$total_population<=30] <- 0

elementaryVor_sf_popln_shootings_freq$total_population[elementaryVor_sf_popln_shootings_freq$total_population<=30] <- 0



censusBlock_sf_popln_homicides_freq$FreqPerCapita <- censusBlock_sf_popln_homicides_freq$Freq / censusBlock_sf_popln_homicides_freq$total_population

censusTract_sf_popln_homicides_freq$FreqPerCapita <- censusTract_sf_popln_homicides_freq$Freq / censusTract_sf_popln_homicides_freq$total_population

censusGroup_sf_popln_homicides_freq$FreqPerCapita <- censusGroup_sf_popln_homicides_freq$Freq / censusGroup_sf_popln_homicides_freq$total_population

censusZip_sf_popln_homicides_freq$FreqPerCapita <- censusZip_sf_popln_homicides_freq$Freq / censusZip_sf_popln_homicides_freq$total_population

highVor_sf_popln_homicides_freq$FreqPerCapita <- highVor_sf_popln_homicides_freq$Freq / highVor_sf_popln_homicides_freq$total_population

elementaryVor_sf_popln_homicides_freq$FreqPerCapita <-
elementaryVor_sf_popln_homicides_freq$Freq /
elementaryVor_sf_popln_homicides_freq$total_population


censusBlock_sf_popln_shootings_freq$FreqPerCapita <- censusBlock_sf_popln_shootings_freq$Freq / censusBlock_sf_popln_shootings_freq$total_population
```

```
censusTract_sf_popln_shootings_freq$FreqPerCapita <- censusTract_sf_popln_shootings_freq$Freq / censusTract_sf_popln_shootings_freq$total_population

censusGroup_sf_popln_shootings_freq$FreqPerCapita <- censusGroup_sf_popln_shootings_freq$Freq / censusGroup_sf_popln_shootings_freq$total_population

censusZip_sf_popln_shootings_freq$FreqPerCapita <- censusZip_sf_popln_shootings_freq$Freq / censusZip_sf_popln_shootings_freq$total_population

highVor_sf_popln_shootings_freq$FreqPerCapita <- highVor_sf_popln_shootings_freq$Freq / highVor_sf_popln_shootings_freq$total_population

elementaryVor_sf_popln_shootings_freq$FreqPerCapita <- elementaryVor_sf_popln_shootings_freq$Freq / elementaryVor_sf_popln_shootings_freq$total_population
```

28. Distort into cartograms

```
library(cartogram)

censusZip_sf_popln_homicides_freq_projected <- st_transform(censusZip_sf_popln_homicides_freq, 26916)

censusZip_sf_popln_shootings_freq_projected <- st_transform(censusZip_sf_popln_shootings_freq, 26916)

highVor_sf_popln_homicides_freq_projected <- st_transform(highVor_sf_popln_homicides_freq, 26916)

highVor_sf_popln_shootings_freq_projected <- st_transform(highVor_sf_popln_shootings_freq, 26916)

elementaryVor_sf_popln_homicides_freq_projected <- st_transform(elementaryVor_sf_popln_homicides_freq, 26916)

elementaryVor_sf_popln_shootings_freq_projected <- st_transform(elementaryVor_sf_popln_shootings_freq, 26916)
```

```
censusZip_sf_popln_homicides_freq_projected_rmna <-
subset(censusZip_sf_popln_homicides_freq_projected,
(!is.na(censusZip_sf_popln_homicides_freq_projected$FreqPerCapita)) &
(!is.infinite(censusZip_sf_popln_homicides_freq_projected$FreqPerCapita)))

censusZip_sf_popln_shootings_freq_projected_rmna <-
subset(censusZip_sf_popln_shootings_freq_projected,
(!is.na(censusZip_sf_popln_shootings_freq_projected$FreqPerCapita)) &
(!is.infinite(censusZip_sf_popln_shootings_freq_projected$FreqPerCapita)))

highVor_sf_popln_homicides_freq_projected_rmna <-
subset(highVor_sf_popln_homicides_freq_projected,
(!is.na(highVor_sf_popln_homicides_freq_projected$FreqPerCapita)) &
(!is.infinite(highVor_sf_popln_homicides_freq_projected$FreqPerCapita)))

highVor_sf_popln_shootings_freq_projected_rmna <-
subset(highVor_sf_popln_shootings_freq_projected,
(!is.na(highVor_sf_popln_shootings_freq_projected$FreqPerCapita)) &
(!is.infinite(highVor_sf_popln_shootings_freq_projected$FreqPerCapita)))

elementaryVor_sf_popln_homicides_freq_projected_rmna <-
subset(elementaryVor_sf_popln_homicides_freq_projected,
(!is.na(elementaryVor_sf_popln_homicides_freq_projected$FreqPerCapita)) &
(!is.infinite(elementaryVor_sf_popln_homicides_freq_projected$FreqPerCapita)))

elementaryVor_sf_popln_shootings_freq_projected_rmna <-
subset(elementaryVor_sf_popln_shootings_freq_projected,
(!is.na(elementaryVor_sf_popln_shootings_freq_projected$FreqPerCapita)) &
(!is.infinite(elementaryVor_sf_popln_shootings_freq_projected$FreqPerCapita)))
```

```
censusZip_sf_popln_homicides_freq_projected_cart <-
cartogram_cont(censusZip_sf_popln_homicides_freq_projected_rmna, "total_population", itermax=15,
maxSizeError = 1.0001, prepare="adjust", threshold = 0.05)

censusZip_sf_popln_shootings_freq_projected_cart <-
cartogram_cont(censusZip_sf_popln_shootings_freq_projected_rmna, "total_population", itermax=15,
maxSizeError = 1.0001, prepare="adjust", threshold = 0.05)

highVor_sf_popln_homicides_freq_projected_cart <-
cartogram_cont(highVor_sf_popln_homicides_freq_projected_rmna, "total_population", itermax=15,
maxSizeError = 1.0001, prepare="adjust", threshold = 0.05)
```

```
highVor_sf_popln_shootings_freq_projected_cart <-
cartogram_cont(highVor_sf_popln_shootings_freq_projected_rmna, "total_population", itermax=15,
maxSizeError = 1.0001, prepare="adjust", threshold = 0.05)

elementaryVor_sf_popln_homicides_freq_projected_cart <-
cartogram_cont(elementaryVor_sf_popln_homicides_freq_projected_rmna, "total_population",
itermax=15, maxSizeError = 1.0001, prepare="adjust", threshold = 0.05)

elementaryVor_sf_popln_shootings_freq_projected_cart <-
cartogram_cont(elementaryVor_sf_popln_shootings_freq_projected_rmna, "total_population",
itermax=15, maxSizeError = 1.0001, prepare="adjust", threshold = 0.05)
```

29. Label the centroids of cartograms – NOT BEING USED

```
censusZip_sf_popln_homicides_freq_projected_cart$zipCode <-
censusZip_sf_popln_homicides_freq_projected_cart$zip

censusZip_sf_popln_shootings_freq_projected_cart$zipCode <-
censusZip_sf_popln_shootings_freq_projected_cart$zip


library(ggh4x)

censusZip_homicides_centroids <-

 gCentroid(

  spgeom = methods::as( object = censusZip_sf_popln_homicides_freq_projected_cart, Class = "Spatial"
)

  , byid = TRUE

 )


censusZip_shootings_centroids <-

 gCentroid(

  spgeom = methods::as( object = censusZip_sf_popln_shootings_freq_projected_cart, Class = "Spatial"
)
```

```
  , byid = TRUE
)

censusZip_sf_popln_homicides_freq_projected_cart$x <- censusZip_homicides_centroids$x
censusZip_sf_popln_homicides_freq_projected_cart$y <- censusZip_homicides_centroids$y
censusZip_sf_popln_shootings_freq_projected_cart$x <- censusZip_shootings_centroids$x
censusZip_sf_popln_shootings_freq_projected_cart$y <- censusZip_shootings_centroids$y
```

30. Plot and save all maps

```
ggplot() + geom_sf(data = censusBlock_sf_popln_homicides_freq, mapping = aes(fill = log10(Freq), colour = log10(Freq)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(option = "mako", direction = -1, na.value = "white") + scale_fill_viridis(option="mako", direction = -1, name = "Homicides \nper Year", na.value = "white", breaks = c(0, 1, 2, 3), labels = c(1, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.2, 0.2), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Homicides \nin Chicago by Census Block", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nHomicides are victims in that database classified as non-shooting homicide or fatal shooting.\nData from August 1, 2016 -  July 31, 2021.") + geom_sf(data = overlayStreets, fill = NA, size = 0.0, color = "grey")

ggsave("Yearly Homicides in Chicago by Census Block.png", width = 8.5, height = 11, units = "in")

ggplot() + geom_sf(data = censusTract_sf_popln_homicides_freq, mapping = aes(fill = log10(Freq), colour = log10(Freq)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(option = "mako", direction = -1, na.value = "white") + scale_fill_viridis(option="mako", direction = -1, name = "Homicides \nper Year", na.value = "white", breaks = c(0, 0.778, 1, 2, 3), labels = c(1, 6, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.2, 0.2), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Homicides \nin Chicago by Census Tract", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nHomicides are victims in that database classified as non-shooting homicide or fatal
```

```
shooting.\nData from August 1, 2016 -  July 31, 2021.") + geom_sf(data = overlayStreets, fill = NA, size = 0.0, color = "grey")

ggsave("Yearly Homicides in Chicago by Census Tract.png", width = 8.5, height = 11, units = "in")

ggplot() + geom_sf(data = censusGroup_sf_popln_homicides_freq, mapping = aes(fill = log10(Freq), colour = log10(Freq)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(option = "mako", direction = -1, na.value = "white") + scale_fill_viridis(option="mako", direction = -1, name = "Homicides \nper Year", na.value = "white", breaks = c(0, 0.477, 1, 2, 3), labels = c(1, 3, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.2, 0.2), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Homicides \nin Chicago by Block Group", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nHomicides are victims in that database classified as non-shooting homicide or fatal shooting.\nData from August 1, 2016 -  July 31, 2021.") + geom_sf(data = overlayStreets, fill = NA, size = 0.0, color = "grey")

ggsave("Yearly Homicides in Chicago by Block Group.png", width = 8.5, height = 11, units = "in")

ggplot() + geom_sf(data = censusZip_sf_popln_homicides_freq, mapping = aes(fill = log10(Freq), colour = log10(Freq)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(option = "mako", direction = -1, na.value = "white") + scale_fill_viridis(option="mako", direction = -1, name = "Homicides \nper Year", na.value = "white", breaks = c(0, 1, 2, 3), labels = c(1, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.2, 0.2), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Homicides \nin Chicago by Zip Code", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nHomicides are victims in that database classified as non-shooting homicide or fatal shooting.\nData from August 1, 2016 -  July 31, 2021.") + geom_sf(data = overlayStreets, fill = NA, size = 0.0, color = "grey")

ggsave("Yearly Homicides in Chicago by Zip Code.png", width = 8.5, height = 11, units = "in")

ggplot() + geom_sf(data = high_sf_popln_homicides_freq, mapping = aes(fill = log10(Freq), colour = log10(Freq)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(option = "mako", direction = -1, na.value = "white") + scale_fill_viridis(option="mako", direction = -1, name = "Homicides \nper Year", na.value = "white", breaks = c(0, 1, 2, 3), labels = c(1, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.2, 0.2), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Homicides \nin Chicago by High School Boundaries", caption = "Data provided by the Chicago Police Department and accessed from the Chicago
```

Data Portal.\nHomicides are victims in that database classified as non-shooting homicide or fatal shooting.\nData from August 1, 2016 - July 31, 2021.") + geom_sf(data = overlayStreets, fill = NA, size = 0.0, color = "grey")

ggsave("Yearly Homicides in Chicago by High School Boundaries.png", width = 8.5, height = 11, units = "in")

ggplot() + geom_sf(data = elementary_sf_popln_homicides_freq, mapping = aes(fill = log10(Freq), colour = log10(Freq)), size = 0.0) + guides(colour = "none") + scale_color_viridis(option = "mako", direction = -1, na.value = "white") + scale_fill_viridis(option="mako", direction = -1, name = "Homicides \nper Year", na.value = "white", breaks = c(0, 1, 2, 3), labels = c(1, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.2, 0.2), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Homicides \nin Chicago by Elementary School Boundaries", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nHomicides are victims in that database classified as non-shooting homicide or fatal shooting.\nData from August 1, 2016 - July 31, 2021.") + geom_sf(data = overlayStreets, fill = NA, size = 0.0, color = "grey")

ggsave("Yearly Homicides in Chicago by Elementary School Boundaries.png", width = 8.5, height = 11, units = "in")

ggplot() + geom_sf(data = highVor_sf_popln_homicides_freq, mapping = aes(fill = log10(Freq), colour = log10(Freq)), size = 0.0) + guides(colour = "none") + scale_color_viridis(option = "mako", direction = -1, na.value = "white") + scale_fill_viridis(option="mako", direction = -1, name = "Homicides \nper Year", na.value = "white", breaks = c(0, 1, 2, 3), labels = c(1, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.2, 0.2), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Homicides \nin Chicago by Closest High School", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nHomicides are victims in that database classified as non-shooting homicide or fatal shooting.\nData from August 1, 2016 - July 31, 2021.") + geom_sf(data = overlayStreets, fill = NA, size = 0.0, color = "grey")

ggsave("Yearly Homicides in Chicago by Closest High School.png", width = 8.5, height = 11, units = "in")

ggplot() + geom_sf(data = elementaryVor_sf_popln_homicides_freq, mapping = aes(fill = log10(Freq), colour = log10(Freq)), size = 0.0) + guides(colour = "none") + scale_color_viridis(option = "mako", direction = -1, na.value = "white") + scale_fill_viridis(option="mako", direction = -1, name = "Homicides \nper Year", na.value = "white", breaks = c(0, 1, 2, 3), labels = c(1, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.2, 0.2), legend.key.size = unit(1, "cm"),

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legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Homicides \nin Chicago by Closest Elementary School", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nHomicides are victims in that database classified as non-shooting homicide or fatal shooting.\nData from August 1, 2016 -  July 31, 2021.") + geom_sf(data = overlayStreets, fill = NA, size = 0.0, color = "grey")

ggsave("Yearly Homicides in Chicago by Closest Elementary School.png", width = 8.5, height = 11, units = "in")



ggplot() + geom_sf(data = censusBlock_sf_popln_shootings_freq, mapping = aes(fill = log10(Freq), colour = log10(Freq)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(option = "mako", direction = -1, na.value = "white") + scale_fill_viridis(option="mako", direction = -1, name = "Shootings \nper Year", na.value = "white", breaks = c(0, 0.477, 1, 2, 3), labels = c(1, 3, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.2, 0.2), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Shootings \nin Chicago by Census Block", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nShootings are victims in that database classified as non-fatal shooting or fatal shooting.\nData from August 1, 2016 -  July 31, 2021.") + geom_sf(data = overlayStreets, fill = NA, size = 0.0, color = "grey")

ggsave("Yearly Shootings in Chicago by Census Block.png", width = 8.5, height = 11, units = "in")

ggplot() + geom_sf(data = censusTract_sf_popln_shootings_freq, mapping = aes(fill = log10(Freq), colour = log10(Freq)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(option = "mako", direction = -1, na.value = "white") + scale_fill_viridis(option="mako", direction = -1, name = "Shootings \nper Year", na.value = "white", breaks = c(0, 1, 2, 3), labels = c(1, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.2, 0.2), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Shootings \nin Chicago by Census Tract", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nShootings are victims in that database classified as non-fatal shooting or fatal shooting.\nData from August 1, 2016 -  July 31, 2021.") + geom_sf(data = overlayStreets, fill = NA, size = 0.0, color = "grey")

ggsave("Yearly Shootings in Chicago by Census Tract.png", width = 8.5, height = 11, units = "in")

ggplot() + geom_sf(data = censusGroup_sf_popln_shootings_freq, mapping = aes(fill = log10(Freq), colour = log10(Freq)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(option = "mako",
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direction = -1, na.value = "white") + scale_fill_viridis(option="mako", direction = -1, name = "Shootings \nper Year", na.value = "white", breaks = c(0, 1, 2, 3), labels = c(1, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.2, 0.2), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Shootings \nin Chicago by Block Group", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nShootings are victims in that database classified as non-fatal shooting or fatal shooting.\nData from August 1, 2016 -  July 31, 2021.") + geom_sf(data = overlayStreets, fill = NA, size = 0.0, color = "grey")

ggsave("Yearly Shootings in Chicago by Block Group.png", width = 8.5, height = 11, units = "in")

ggplot() + geom_sf(data = censusZip_sf_popln_shootings_freq, mapping = aes(fill = log10(Freq), colour = log10(Freq)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(option = "mako", direction = -1, na.value = "white") + scale_fill_viridis(option="mako", direction = -1, name = "Shootings \nper Year", na.value = "white", breaks = c(0, 1, 2, 3), labels = c(1, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.2, 0.2), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Shootings \nin Chicago by Zip Code", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nShootings are victims in that database classified as non-fatal shooting or fatal shooting.\nData from August 1, 2016 -  July 31, 2021.") + geom_sf(data = overlayStreets, fill = NA, size = 0.0, color = "grey")

ggsave("Yearly Shootings in Chicago by Zip Code.png", width = 8.5, height = 11, units = "in")

ggplot() + geom_sf(data = high_sf_popln_shootings_freq, mapping = aes(fill = log10(Freq), colour = log10(Freq)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(option = "mako", direction = -1, na.value = "white") + scale_fill_viridis(option="mako", direction = -1, name = "Shootings \nper Year", na.value = "white", breaks = c(0, 1, 2, 3), labels = c(1, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.2, 0.2), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Shootings \nin Chicago by High School Boundaries", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nShootings are victims in that database classified as non-fatal shooting or fatal shooting.\nData from August 1, 2016 -  July 31, 2021.") + geom_sf(data = overlayStreets, fill = NA, size = 0.0, color = "grey")

ggsave("Yearly Shootings in Chicago by High School Boundaries.png", width = 8.5, height = 11, units = "in")
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ggplot() + geom_sf(data = elementary_sf_popln_shootings_freq, mapping = aes(fill = log10(Freq), colour = log10(Freq)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(option = "mako", direction = -1, na.value = "white") + scale_fill_viridis(option="mako", direction = -1, name = "Shootings \nper Year", na.value = "white", breaks = c(0, 1, 2, 3), labels = c(1, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.2, 0.2), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Shootings \nin Chicago by Elementary School Boundaries", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nShootings are victims in that database classified as non-fatal shooting or fatal shooting.\nData from August 1, 2016 -  July 31, 2021.") + geom_sf(data = overlayStreets, fill = NA, size = 0.0, color = "grey")

ggsave("Yearly Shootings in Chicago by Elementary School Boundaries.png", width = 8.5, height = 11, units = "in")

ggplot() + geom_sf(data = highVor_sf_popln_shootings_freq, mapping = aes(fill = log10(Freq), colour = log10(Freq)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(option = "mako", direction = -1, na.value = "white") + scale_fill_viridis(option="mako", direction = -1, name = "Shootings \nper Year", na.value = "white", breaks = c(0, 1, 2, 3), labels = c(1, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.2, 0.2), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Shootings \nin Chicago by Closest High School", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nShootings are victims in that database classified as non-fatal shooting or fatal shooting.\nData from August 1, 2016 -  July 31, 2021.") + geom_sf(data = overlayStreets, fill = NA, size = 0.0, color = "grey")

ggsave("Yearly Shootings in Chicago by Closest High School.png", width = 8.5, height = 11, units = "in")

ggplot() + geom_sf(data = elementaryVor_sf_popln_shootings_freq, mapping = aes(fill = log10(Freq), colour = log10(Freq)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(option = "mako", direction = -1, na.value = "white") + scale_fill_viridis(option="mako", direction = -1, name = "Shootings \nper Year", na.value = "white", breaks = c(0, 1, 2, 3), labels = c(1, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.2, 0.2), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Shootings \nin Chicago by Closest Elementary School", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nShootings are victims in that database classified as non-fatal shooting or fatal shooting.\nData from August 1, 2016 -  July 31, 2021.") + geom_sf(data = overlayStreets, fill = NA, size = 0.0, color = "grey")
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ggsave("Yearly Shootings in Chicago by Closest Elementary School.png", width = 8.5, height = 11, units = "in")
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ggplot() + geom_sf(data = censusBlock_sf_popln_homicides_freq, mapping = aes(fill = log10(FreqPerCapita), colour = log10(FreqPerCapita)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(na.value="white", option = "mako", direction = -1) + scale_fill_viridis(na.value="white", option="mako", direction = -1, name = "Homicides \nper Year \nper 10,000 People", breaks = c(-4, -3, -2, -1), labels = c(1, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.2, 0.2), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Homicides per 10,000 people \nin Chicago by Census Block", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nHomicides are victims in that database classified as non-shooting homicide or fatal shooting.\nData from August 1, 2016 -  July 31, 2021.") + geom_sf(data = overlayStreets, fill = NA, size = 0.0, color = "grey")

ggsave("Yearly Per Capita Homicides in Chicago by Census Block.png", width = 8.5, height = 11, units = "in")

ggplot() + geom_sf(data = censusTract_sf_popln_homicides_freq, mapping = aes(fill = log10(FreqPerCapita), colour = log10(FreqPerCapita)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(na.value="white", option = "mako", direction = -1) + scale_fill_viridis(na.value="white", option="mako", direction = -1, name = "Homicides \nper Year \nper 10,000 People", breaks = c(-4, -3, -2, -1), labels = c(1, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.2, 0.2), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Homicides per 10,000 people \nin Chicago by Census Tract", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nHomicides are victims in that database classified as non-shooting homicide or fatal shooting.\nData from August 1, 2016 -  July 31, 2021.") + geom_sf(data = overlayStreets, fill = NA, size = 0.0, color = "grey")

ggsave("Yearly Per Capita Homicides in Chicago by Census Tract.png", width = 8.5, height = 11, units = "in")

ggplot() + geom_sf(data = censusGroup_sf_popln_homicides_freq, mapping = aes(fill = log10(FreqPerCapita), colour = log10(FreqPerCapita)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(na.value="white", option = "mako", direction = -1) +
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scale_fill_viridis(na.value="white", option="mako", direction = -1, name = "Homicides \nper Year \nper 10,000 People", breaks = c(-4, -3, -2, -1), labels = c(1, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.2, 0.2), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Homicides per 10,000 people \nin Chicago by Block Group", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nHomicides are victims in that database classified as non-shooting homicide or fatal shooting.\nData from August 1, 2016 -  July 31, 2021.") + geom_sf(data = overlayStreets, fill = NA, size = 0.0, color = "grey")

ggsave("Yearly Per Capita Homicides in Chicago by Block Group.png", width = 8.5, height = 11, units = "in")

ggplot() + geom_sf(data = censusZip_sf_popln_homicides_freq, mapping = aes(fill = log10(FreqPerCapita), colour = log10(FreqPerCapita)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(na.value="white", option = "mako", direction = -1) + scale_fill_viridis(na.value="white", option="mako", direction = -1, name = "Homicides \nper Year \nper 10,000 People", breaks = c(-4, -3, -2, -1), labels = c(1, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.2, 0.2), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Homicides per 10,000 people \nin Chicago by Zip Code", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nHomicides are victims in that database classified as non-shooting homicide or fatal shooting.\nData from August 1, 2016 -  July 31, 2021.") + geom_sf(data = overlayStreets, fill = NA, size = 0.0, color = "grey")

ggsave("Yearly Per Capita Homicides in Chicago by Zip Code.png", width = 8.5, height = 11, units = "in")

ggplot() + geom_sf(data = highVor_sf_popln_homicides_freq, mapping = aes(fill = log10(FreqPerCapita), colour = log10(FreqPerCapita)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(na.value="white", option = "mako", direction = -1) + scale_fill_viridis(na.value="white", option="mako", direction = -1, name = "Homicides \nper Year \nper 10,000 People", breaks = c(-4, -3, -2, -1), labels = c(1, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.2, 0.2), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Homicides per 10,000 people \nin Chicago by Closest High School", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nHomicides are victims in that database classified as non-shooting homicide or fatal shooting.\nData from August 1, 2016 -  July 31, 2021.") + geom_sf(data = overlayStreets, fill = NA, size = 0.0, color = "grey")
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ggsave("Yearly Per Capita Homicides in Chicago by Closest High School.png", width = 8.5, height = 11, units = "in")

ggplot() + geom_sf(data = elementaryVor_sf_popln_homicides_freq, mapping = aes(fill = log10(FreqPerCapita), colour = log10(FreqPerCapita)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(na.value="white", option = "mako", direction = -1) + scale_fill_viridis(na.value="white", option="mako", direction = -1, name = "Homicides \nper Year \nper 10,000 People", breaks = c(-4, -3, -2, -1), labels = c(1, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.2, 0.2), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Homicides per 10,000 people \nin Chicago by Closest Elementary School", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nHomicides are victims in that database classified as non-shooting homicide or fatal shooting.\nData from August 1, 2016 -  July 31, 2021.") + geom_sf(data = overlayStreets, fill = NA, size = 0.0, color = "grey")

ggsave("Yearly Per Capita Homicides in Chicago by Closest Elementary School.png", width = 8.5, height = 11, units = "in")


ggplot() + geom_sf(data = censusBlock_sf_popln_shootings_freq, mapping = aes(fill = log10(FreqPerCapita), colour = log10(FreqPerCapita)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(na.value="white", option = "mako", direction = -1) + scale_fill_viridis(na.value="white", option="mako", direction = -1, name = "Shootings \nper Year \nper 10,000 People", breaks = c(-4, -3, -2, -1), labels = c(1, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.2, 0.2), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Shootings per 10,000 people \nin Chicago by Census Block", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nShootings are victims in that database classified as non-fatal shooting or fatal shooting.\nData from August 1, 2016 -  July 31, 2021.") + geom_sf(data = overlayStreets, fill = NA, size = 0.0, color = "grey")

ggsave("Yearly Per Capita Shootings in Chicago by Census Block.png", width = 8.5, height = 11, units = "in")

ggplot() + geom_sf(data = censusTract_sf_popln_shootings_freq, mapping = aes(fill = log10(FreqPerCapita), colour = log10(FreqPerCapita)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(na.value="white", option = "mako", direction = -1) + scale_fill_viridis(na.value="white", option="mako", direction = -1, name = "Shootings \nper Year \nper 10,000 People", breaks = c(-4, -3, -2, -1), labels = c(1, 10, 100, 1000)) + theme(axis.text =
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element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.2, 0.2), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Shootings per 10,000 people \nin Chicago by Census Tract", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nShootings are victims in that database classified as non-fatal shooting or fatal shooting.\nData from August 1, 2016 -  July 31, 2021.") + geom_sf(data = overlayStreets, fill = NA, size = 0.0, color = "grey")

ggsave("Yearly Per Capita Shootings in Chicago by Census Tract.png", width = 8.5, height = 11, units = "in")

ggplot() + geom_sf(data = censusGroup_sf_popln_shootings_freq, mapping = aes(fill = log10(FreqPerCapita), colour = log10(FreqPerCapita)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(na.value="white", option = "mako", direction = -1) + scale_fill_viridis(na.value="white", option="mako", direction = -1, name = "Shootings \nper Year \nper 10,000 People", breaks = c(-4, -3, -2, -1), labels = c(1, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.2, 0.2), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Shootings per 10,000 people \nin Chicago by Block Group", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nShootings are victims in that database classified as non-fatal shooting or fatal shooting.\nData from August 1, 2016 -  July 31, 2021.") + geom_sf(data = overlayStreets, fill = NA, size = 0.0, color = "grey")

ggsave("Yearly Per Capita Shootings in Chicago by Block Group.png", width = 8.5, height = 11, units = "in")

ggplot() + geom_sf(data = censusZip_sf_popln_shootings_freq, mapping = aes(fill = log10(FreqPerCapita), colour = log10(FreqPerCapita)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(na.value="white", option = "mako", direction = -1) + scale_fill_viridis(na.value="white", option="mako", direction = -1, name = "Shootings \nper Year \nper 10,000 People", breaks = c(-4, -3, -2, -1), labels = c(1, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.2, 0.2), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Shootings per 10,000 people \nin Chicago by Zip Code", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nShootings are victims in that database classified as non-fatal shooting or fatal shooting.\nData from August 1, 2016 -  July 31, 2021.") + geom_sf(data = overlayStreets, fill = NA, size = 0.0, color = "grey")
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ggsave("Yearly Per Capita Shootings in Chicago by Zip Code.png", width = 8.5, height = 11, units = "in")

ggplot() + geom_sf(data = highVor_sf_popln_shootings_freq, mapping = aes(fill = log10(FreqPerCapita), colour = log10(FreqPerCapita)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(na.value="white", option = "mako", direction = -1) + scale_fill_viridis(na.value="white", option="mako", direction = -1, name = "Shootings \nper Year \nper 10,000 People", breaks = c(-4, -3, -2, -1), labels = c(1, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.2, 0.2), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Shootings per 10,000 people \nin Chicago by Closest High School", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nShootings are victims in that database classified as non-fatal shooting or fatal shooting.\nData from August 1, 2016 -  July 31, 2021.") + geom_sf(data = overlayStreets, fill = NA, size = 0.0, color = "grey")

ggsave("Yearly Per Capita Shootings in Chicago by Closest High School.png", width = 8.5, height = 11, units = "in")

ggplot() + geom_sf(data = elementaryVor_sf_popln_shootings_freq, mapping = aes(fill = log10(FreqPerCapita), colour = log10(FreqPerCapita)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(na.value="white", option = "mako", direction = -1) + scale_fill_viridis(na.value="white", option="mako", direction = -1, name = "Shootings \nper Year \nper 10,000 People", breaks = c(-4, -3, -2, -1), labels = c(1, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.2, 0.2), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Shootings per 10,000 people \nin Chicago by Closest Elementary School", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nShootings are victims in that database classified as non-fatal shooting or fatal shooting.\nData from August 1, 2016 -  July 31, 2021.") + geom_sf(data = overlayStreets, fill = NA, size = 0.0, color = "grey")

ggsave("Yearly Per Capita Shootings in Chicago by Closest Elementary School.png", width = 8.5, height = 11, units = "in")


ggplot() + geom_sf(data = censusZip_sf_popln_homicides_freq_projected_cart, mapping = aes(fill = log10(FreqPerCapita), colour = log10(FreqPerCapita)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(na.value="white", option = "mako", direction = -1) + scale_fill_viridis(na.value="white", option="mako", direction = -1, name = "Homicides \nper Year \nper 10,000 People", breaks = c(-4, -3, -2, -1), labels = c(1, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title =
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element_text(size = 20, hjust = 0.5), legend.position = c(0.15, 0.15), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Homicides per 10,000 people \nin Chicago by Zip Code", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nHomicides are victims in that database classified as non-shooting homicide or fatal shooting.\nData from August 1, 2016 -  July 31, 2021.")

ggsave("Homicides Cartogram by Zip Code.png", width = 8.5, height = 11, units = "in")

ggplot() + geom_sf(data = censusZip_sf_popln_shootings_freq_projected_cart, mapping = aes(fill = log10(FreqPerCapita), colour = log10(FreqPerCapita)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(na.value="white", option = "mako", direction = -1) + scale_fill_viridis(na.value="white", option="mako", direction = -1, name = "Shootings \nper Year \nper 10,000 People", breaks = c(-4, -3, -2, -1), labels = c(1, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.15, 0.15), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Shootings per 10,000 people \nin Chicago by Zip Code", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nShootings are victims in that database classified as non-fatal shooting or fatal shooting.\nData from August 1, 2016 -  July 31, 2021.")

ggsave("Shootings Cartogram by Zip Code.png", width = 8.5, height = 11, units = "in")

ggplot() + geom_sf(data = highVor_sf_popln_homicides_freq_projected_cart, mapping = aes(fill = log10(FreqPerCapita), colour = log10(FreqPerCapita)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(na.value="white", option = "mako", direction = -1) + scale_fill_viridis(na.value="white", option="mako", direction = -1, name = "Homicides \nper Year \nper 10,000 People", breaks = c(-4, -3, -2, -1), labels = c(1, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.15, 0.15), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Homicides per 10,000 people \nin Chicago by Closest High School", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nHomicides are victims in that database classified as non-shooting homicide or fatal shooting.\nData from August 1, 2016 -  July 31, 2021.")

ggsave("Homicides Cartogram by Closest High School.png", width = 8.5, height = 11, units = "in")

ggplot() + geom_sf(data = highVor_sf_popln_shootings_freq_projected_cart, mapping = aes(fill = log10(FreqPerCapita), colour = log10(FreqPerCapita)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(na.value="white", option = "mako", direction = -1) + scale_fill_viridis(na.value="white", option="mako", direction = -1, name = "Shootings \nper Year \nper 10,000 People", breaks = c(-4, -3, -2, -1), labels = c(1, 10, 100, 1000)) + theme(axis.text =
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element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.15, 0.15), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Shootings per 10,000 people \nin Chicago by Closest High School", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nShootings are victims in that database classified as non-fatal shooting or fatal shooting.\nData from August 1, 2016 -  July 31, 2021.")

ggsave("Shootings Cartogram by Closest High School.png", width = 8.5, height = 11, units = "in")

ggplot() + geom_sf(data = elementaryVor_sf_popln_homicides_freq_projected_cart, mapping = aes(fill = log10(FreqPerCapita), colour = log10(FreqPerCapita)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(na.value="white", option = "mako", direction = -1) + scale_fill_viridis(na.value="white", option="mako", direction = -1, name = "Homicides \nper Year \nper 10,000 People", breaks = c(-4, -3, -2, -1), labels = c(1, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.15, 0.15), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Homicides per 10,000 people \nin Chicago by Closest Elementary School", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nHomicides are victims in that database classified as non-shooting homicide or fatal shooting.\nData from August 1, 2016 -  July 31, 2021.")

ggsave("Homicides Cartogram by Closest Elementary School.png", width = 8.5, height = 11, units = "in")

ggplot() + geom_sf(data = elementaryVor_sf_popln_shootings_freq_projected_cart, mapping = aes(fill = log10(FreqPerCapita), colour = log10(FreqPerCapita)), size = 0.0 ) + guides(colour = "none") + scale_color_viridis(na.value="white", option = "mako", direction = -1) + scale_fill_viridis(na.value="white", option="mako", direction = -1, name = "Shootings \nper Year \nper 10,000 People", breaks = c(-4, -3, -2, -1), labels = c(1, 10, 100, 1000)) + theme(axis.text = element_blank(), axis.ticks = element_blank(), panel.grid  = element_blank(), plot.title = element_text(size = 20, hjust = 0.5), legend.position = c(0.15, 0.15), legend.key.size = unit(1, "cm"), legend.title = element_text(size = 12), legend.text = element_text(size = 12), legend.background = element_rect(fill = "transparent")) + labs(title = "Yearly Shootings per 10,000 people \nin Chicago by Closest Elementary School", caption = "Data provided by the Chicago Police Department and accessed from the Chicago Data Portal.\nShootings are victims in that database classified as non-fatal shooting or fatal shooting.\nData from August 1, 2016 -  July 31, 2021.")

ggsave("Shootings Cartogram by Closest Elementary School.png", width = 8.5, height = 11, units = "in")
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