Problem Set 2 (CSS)

Due by 05/12/25

```
library(needs)

needs(sf,
      tidyverse,
      gganimate,
      transformr,
      gifski,
      readr
      )
```

** Download the official Leipzig shapefile (including the city districts) from the leipzig Open Data Portal.**

```
leipzig <- sf::st_read(dsn = "Data/ot.shp") # dsn = Data Set Name

head(leipzig)

ggplot(leipzig) +
  geom_sf(aes(fill = Name)) +
  #scale_fill_brewer(palette = "Set3") +  # or use another palette you like
  theme_minimal() +
  labs(fill = "Name",
       title = "Leipzig Map by Name")
```

1. Mark and plot the following three locations on the map:

- Your favorite bar
- Your favorite restaurant
- Your house

Please feel free to anonymize any of these informations if you don't feel comfortable to share or if you dont live in Leipzig ;) This is more about the exercise. (*2 Points*)

```
home <- st_sf(
  name = " ",
  geometry = st_sfc(st_point(c(12.3605, 51.3419)),
                    crs = 4326)
)


pekar <- st_sf(
  name = " ",
  geometry = st_sfc(st_point(c(12.3622,51.3365)),
                    crs = 4326)
)

skala <- st_sf(
  name = " ",
  geometry = st_sfc(st_point(c(12.3663,51.3393)),
                    crs = 4326)
)


# change to transform the points to the same as leipzig.
# Shapefile ins gleiche CRS transformieren
leipzig <- st_transform(leipzig,
                        4326)

# Combine into one sf object
locations <- rbind(skala, pekar, home)

ggplot() +
  geom_sf(data = leipzig, fill = "lavender", color = "lightgray") +
  geom_sf(data = locations, color = "purple", size = 3) +
  geom_sf_text(data = locations, aes(label = name), nudge_y = 0.0018, size = 3.5) +
  theme_minimal() +
  labs(title = "Your Leipzig POIs", subtitle = "  Home,   Pekar,   Skala")
```

2. Calculate the straight-line distance (in kilometers) between your home and your favorite bar.(*1 Point*)

3. Use R to verify whether the three points you chose are located within the same neighborhood boundaries. (*1 Point*)

4. Identify the centroid (geometric center) of your restaurants neighborhood. Is your favorite restaurant more than 800 meters away from it? (*2 Points*)
5. Download the internal migration statistics of Leipzigs neighborhoods from the Open Data Portal. Determine the ranking position of your home neighborhood in terms of *Innerstädtische Zuzüge* (i.e., people moving in from other parts of Leipzig). (*4 Points*)
6. Search the OSM-Wiki for how *Spätis* could be identified in Leipzig. Plot the identified Spätis on a map. (*5 Points*)
7. Determine which city district has the highest density of Spätis. (*2 Points*)
8. Create a 1 kilometer buffer around your home. How many Spätis are located within that buffer? (*1 Point*)
9. What are the potential limitations of the 1.5 km buffer method in measuring Späti accessibility? (*3 Points*)
10. Assume each person visits the nearest Späti to their home. Determine which Späti has the largest catchment area. (*3 Points*)