Hands on exercises on the sp package and maps

All use the IAcountyPop.xlsx file on the class web site, data page. This file has 2019 population and 2010-2019 population growth information for a subset of IA counties.

1. Read the file into an R tibble, convert to a data frame, and create an sp object from that data frame. The locations are Latitude and Longitude using the NAD83 datum.
2. Plot the locations using the sp object with longlat coordinates. Make sure your plot includes axes.
3. Convert locations to UTM coordinates (remember, Iowa is in zone 15). Plot the locations using the sp object with UTM coordinates. Make sure your plot includes axes.
4. What is the distance between Council Bluffs (Pottawattamie County) and Dubuque (Dubuque County) using great circle distance? Using Euclidean distance on UTM coordinates?
5. Plot the locations and their population (pop2019) using color to indicate the population size. Use the cm color palette.
6. Repeat 5 except display log population size. I suggest base 10, but that’s not important.
7. Draw a bubble plot showing locations and their population (not log transformed)
8. Draw a bubble plot showing locations and their population growth
9. State Center IA is approximately the very center of Iowa. It’s at **42°** 1’N**, 93°** 9’ 50”W. Use the appropriate function(s) to convert this location to a longlat in decimal degrees.
10. Find a Google “street” map (i.e., open access map) that includes the entire state of Iowa centered on State Center. (In other words, what is the best zoom level if you want to map locations in Iowa?)
11. Draw the Iowa map showing the locations in IAcountyPop.
12. Draw the Iowa map with bubbles showing their 2019 population.

My code is in hands on sp maps.r