PCB 6466: Homework 3 DUE Sept 19

Instructions: You may consult with others but develop your own code and answers. Use packages and commands we used in lab for graphing here – artistic license is encouraged but optional. Use this week's data at https://sciences.ucf.edu/biology/d4lab/methods-1. Your answer to each question should include (a) a graph or statistical result and (b) a sentence or two that clearly answers the question, based on the graph. 2 pts. each question. Also provide your code, and submit your answers as a pdf.

Questions 1-5 (2 pts each): England is pretty far north, but its weather is buffered by the Gulf Stream. Thus, future climate change is uncertain there. The SilwoodWeather data set shows historical (daily, 1987-2005) upper and lower temperatures (^{o}C), and rainfall (mm) at the Imperial College's Silwood campus, west of London.

1. Make boxplots, where you obtain one box & whiskers *per month* (i.e., each box represents monthly data in all years, with 12 boxes in your graph). Describe the typical annual pattern in rainfall at Silwood.

2. Rainfall is famously variable day to day – a better approach may be to calculate a monthly total rainfall [dplyr is your friend], and then repeat #1.

3. Calculate the average daily *upper* temperature for each month of each year, and then graph those values as a scatterplot. Based on your graph, what month(s) are warmest at Silwood?

4. Using the same data as in #3 above (but now using lattice to make 1 graph per month): Have high temperatures increased through the years, consistent with global warming projections? Explain what you see in the graphs.

5. Calculate the daily temperature range (i.e., upper – lower), and then the monthly average of those daily ranges; to yield an average daily range for every month of every year. Now graph those monthly average ranges through time. Have temperatures become more variable through time, consistent with global warming?