R for Natural Resources final assignment. Due at 11:59pm on Sunday May 15

The goal of this assignment is to use functional programming to complete an analysis of the iNaturalist Wisconsin bird observation data. The analysis will use simulation-based hypothesis testing to determine whether observations of a given bird species have increased or decreased from 2012-2021.

Raw data URL: https://raw.githubusercontent.com/jaredhomola/RforNatRes/gh-pages/iNaturalistWiscBirds.csv

Target bird species URL: https://raw.githubusercontent.com/jaredhomola/RforNatRes/gh-pages/targetBirds.csv

As usual, your final knitted file should be publication quality in all ways we've previously discussed. Here's the approach you'll need for full credit:

1. **Find a target bird.** After reading in the target bird data linked above, use a pipeline of two functions to randomly subset the tibble into a single observation. Assign it to a new variable.

2. **Write a custom data wrangling function.** The function should require two inputs: 1) the raw dataset and 2) the variable name assigned above for the target bird. It should return a tibble of the yearly count of observations for a given bird species from 2012-2021 with the number of observations scaled by the total number of Wisconsin bird observations submitted to iNaturalist that year. For instance, if a bird was observed 100 times in 2013 and there were 1000 bird observations submitted to iNaturalist that year, your scaled value would be 100/1000 or 0.1. Ensure that the year variable is stored as data type "double" and that you drop NAs at the appropriate place in your algorithm so you don't unnecessarily remove data. The tibble created by the function should contain variables for the species' common name, year, and scaled number of observations. It should have 1 row for each year from 2012-2021.

3. **Create a polished table.** Using kableExtra to make a publication-quality table in include in your final R markdown generated html file.

4. **Simulate distributions.** Use a permutation test to create a null distribution of 1000 replicates that you can use to evaluate the hypothesis that the number of observations for a given bird species has changed between 2012-2021. Also, use bootstrapping to generate a 1000-replicate distribution for determining confidence in the slope parameter for your model. Your data wrangling function should provide your input data. Assign each distribution to a new variable.

5. **Fit the model and assign the resulting tibble to a new variable.**

6. **Write a custom analysis function.** Your function should evaluate the hypothesis that the number of observations for a given bird species has changed between 2012-2021. It should use the null distribution generated via permutation, the bootstrap distribution, and the model results as input and output a tibble containing one row with variables for the model term, the slope estimate, a p-value, a lower confidence interval, and an upper confidence interval.

7. **Write a custom plotting function.** Finally, write one more function to generate a two-panel plot that shows 1) the permutated null distribution with an indicator of the slope point estimate and 2) the bootstrapped distribution with indicators for the lower and upper confidence intervals. Generate that two-panel plot using grid.arrange from the package gridExtra.