Biology 5000 - Final Exam

Open book – Open note – Open Google; Individual effort expected

Please type your answers in a MS Word document. Report the results of analysis as if you were presenting the information in a manuscript you are preparing for publication, including in your report an appropriate figure for each question. If you submit more than one figure for a question, I will only consider the first one.

Turn in your work using the Final Exam assignment folder in D2L. Please upload a single folder containing:

* your MS Word answer file (.docx)
* your .Rproj file (.Rproj)
* your script file (.R)
* all input files (.csv)
* all output files (.pdf, .jpg, or .png)

My folder is called Gienger\_final\_5000; yours should be *YourLastname\_final\_5000*

Yours may look something like this:

Graphical user interface, text, application, email

Description automatically generated

You will know you have been successful if you are able to open up your project and run the entire script without doing anything else (this would be good to do as a test before turning in). You will need to zip the folder to upload to D2L. Please do not use .rar compression instead of .zip and please do not nest folders within folders (there should only be one, as example above).

1. (dataset: ants) You are testing the hypothesis that the abundance of ant nests can be explained by fire history in oak-hickory forests. You have six 25 X 25 m plots setup in undisturbed forest habitats and four plots setup in previously burned forests which are now open fields. You survey the number of ant nests in each plot.

What is the effect of habitat type on ant abundance (number of nests observed)?

2. (dataset: insecticide) You are interested in whether insecticides added to gardens can reduce the number of pest insect species present. You set up an experiment with replicate plots in three different treatments that vary in their level of applied insecticide. Treatment A = 20 mL insecticide per plot, B = 10 mL insecticide per plot, and C = control plots where no insecticide was sprayed. After one week you count the number of pest species present in each of the plots.

Is there an overall effect of treatment on observed number of pest species? Are there differences between treatment types?

3. (dataset: lakes) Is there a relationship between how large a lake is (surface area) and how deep it is predicted to be (max. depth)? Rather than collecting the data yourself, you scour the internet and find published values for 27 of the world’s largest lakes.

Incorporate these elements into your answer statement for #3.

3B. Based on your analysis above, exactly how deep would you expect Lake Wobegone (a fictional lake) to be if you knew the surface area of the lake was 40,523 km2?

3C. Are there any data points that you suspect are exerting a large amount of influence on the observed relationship?

3D. How might you determine (test) for the presence of influential outliers in the dataset?

4. Using the *mtcars* dataset, create a bar chart showing mean horsepower (hp) with error bars (+/- 1 standard deviation) for each level of cylinders (cyl). Remember that *mtcars* is built into baseR, so you can call it directly without doing anything else (data=mtcars in plot and model specifications).

Add the following:

-better X axis label

-better Y axis label

-make each bar a different color (different than the default)