A WALK THROUGH THE WOODS:
DATA ANALYSIS OF STRUCTURAL ADAPTATION IN WOOD

THE ASSIGNMENT

Assignment Value: 15%
Assignment Due Date: 9am on Wed., Mar. 3rd

General Instructions:
In this assignment you will use a dataset to examine how structure adaptations of plant stems vary in relation to environmental factors. You are required to propose **2 question/problems** that can be studied using the dataset provided. Then you will **formulate 2 hypotheses** and select the appropriate information from the dataset to address each hypothesis. Finally, you will interpret and explain the results.

There are **two (2) parts** to the assignment (see below). **Before** you approach the assignment, you should review all the files in the Term Project folder on Brightspace.

Part I:

You are required to investigate whether there is a relationship between latitude and one (1) structural adaptation in plant stems (**Please note that latitude relates to climate)**. It is **mandatory** that you use **ALL** the data in the **latitude** column as one of the variables. However, you may choose data from any one of the other columns as the other variable to study the relationship. You will present your results in a scatterplot with a line of best fit and analyse the data with the Pearson correlation coefficient. This will show the correlation between latitude and the structural adaptation of your choice.

Part II:

You are required to investigate whether there is a relationship between any structural adaptation in 2 categories of plant stems. Your investigation will be limited to 20 plants (2 groups of 10). How you group plants is up to you, but you will have to determine which plants fit into the groups, so some background research will be required on your part. For example, you can investigate any structural adaptation in any ONE of the following category sets or come up with your own categories (which must be approved by your lab instructor):

- Tropical vs. temperate plants (If you select this topic you are not permitted to use the variable that you studied in Part I), shrubs vs. trees, desert vs. rainforest plants, plants that grow in low elevation vs. high elevation

You will have to define the specific criteria of your categories. For example, if you compare a structural feature of a stem for tall vs. short plants, you have to specifically state what qualifies as tall and what qualifies as short (as these terms are relative). This can be determined from your background research. To help with this research and sorting of data, you may want to check the following sites: Global Biodiversity Information Facility https://www.gbif.org/ OR www.canadensys.net. You will present your results with boxplots or bar graphs to compare the means between categories (ex. trees vs. shrubs) and a measure of error like standard deviation. You will determine statistical significance by performing T-test.

Specific Instructions:
The following sections should be included in your write up: (**Remember, you will need to address Part I and Part II under each heading**)

TITLE (5 points): Title should be concise yet informative. It should hint at the question or the results found in the project. This title is specific to the project and not a general write-up title.

INTRODUCTION (15 points): Present background information that is relevant to the problems you are studying. This background information or theory should help to formulate the questions and hypotheses. The introduction should include the **questions** that you are interested in studying for each part. Again, for Part I, this must be a relationship between latitude and some structural feature in plant stems and for Part II, you may use the suggestions given or group the plants your own way. The introduction should end by providing **2 hypotheses (one each for Part I and Part II)**. Each hypothesis should be an educated guess which is formulated after you have done some background reading. Use information from peer-reviewed articles within your introduction.

METHODS (10 points): For Part I, state the columns of data that you worked with and the software used. For Part II, state the variable you examined, your 2 categories, the specific criteria used to include plants into each category and the software used.

RESULTS (30 points): For Part I, present a computer-generated scatterplot. In the text, describe the relationship you see (ex. positive, negative), give the Pearson correlation coefficient value and state if there any outliers (i.e. dots that are far away from the rest?). Avoid the temptation to explain what is going on, leave that for your Discussion section. For Part II, present a boxplot or bar graph (with standard deviation bars) to compare the **means** between categories. In the text, state which group has a higher mean value and which a lower mean value, the t-test value and if the two categories compared statistically different with respect to the structural feature. Again, avoid the temptation to explain what is going on, leave that for your Discussion section.

Please Note: As part of the Results section for Part II, you are required to hand in a table including the plant species that you will be using in each category. This table should also include the appropriate data for the variable that you will be studying. Due at 9am on Fri., Feb. 5, 2021. Five (5) of the 30 marks for the results will be allocated to this.

DISCUSSION (25 points): For both Part I and Part II, you are expected to begin by stating whether your results support your hypotheses. Then, explain why you see a relationship or, if appropriate, why not. As part of your explanation, find 2 related journal articles (1 for each part) and include details of their studies and relevant findings and state if the study results are consistent with yours (don't forget to cite these articles in your discussion). Regardless of whether or not your hypotheses were supported, you should explain other factors that could affect the plants/study results such as elevation, wind, herbivory, etc. Your discussion should be well thought out and show an understanding of the topic studied and the factors that may affect tissue allocation in stems.

ACCEPTABLE SOURCES: Peer-reviewed scientific journal (original research or reviews), textbooks, government/university/research institution websites.

IN-TEXT CITATIONS (5 points): Please use APA Format. See the guide here.

REFERENCES (5 points): Please use APA Format. See the general guide here. You may also want to refer to specific guides for articles in periodicals, books, other printed sources and electronic sources (websites).

FORMAT/PRESENTATION (5 points):

- Approximately 4 pages in length (text, not including figures)
- See the template file in the folder on Brightspace

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