GLY 6932/6862 – Quantitative Methods in Earth Sciences

Assignment 2:
Using Univariate Statistics to Understand Regional Drainage Patterns

Part A Description: You have been given some lake sediments collected from the Eastern and Western parts of a lake that has multiple fluvial sources. You are interested in the source of these sediments to understand local drainage patterns because you have reason to suspect that tectonic activity has rearranged regional stream flow pathways in the area. Your goal is to determine if each of the two pairs of lake sediment samples come from the same source. After determining the organic matter content in these sediments, you have distilled the data into two .mat files: (organic_matter_east.mat and organic_matter_west.mat). Each .mat file has two samples of 60 observations each. In other words, you will be comparing two samples from a delta on the eastern margin of the lake to one another, then you will be comparing two samples from a delta on the western margin of the lake to one another. You will not be comparing samples from the eastern and western lake margin deltas to one another.

Part A Deliverables:

1) For each of the .mat files, load and plot the organic matter content data, as two, different colored histograms on one figure.

2) Fit normal (Gaussian) distributions to each of these samples and plot the resulting smooth pdfs (2 of them) on the same figure with the two histograms. Do this for the observations from the 'east' portion of the lake as well as the 'west' portion. To do this, you will need to determine the means and standard deviations of each of the samples, and utilize the 'normpdf' function.

3) Perform a t-test to compare the means of the distributions. Once you have clearly defined your null hypothesis, and performed your t-tests, you are able to address the question: "Are the sediments in the eastern and western portions of the lake derived from unique sources?" Please answer the question and explain why you came to the conclusion that you did.

4) As before, use MATLAB's publishing capabilities to generate a well-documented html file to present your deliverables and send me the link to that url.

Part B Description: I am interested in other examples from Earth Sciences where a t-test is helpful in addressing a data set. In the second part of this assignment (Part B), I would like you to find univariate data upon which a t-test can be applied and do so.

Part B Deliverables:

1) Same as above, largely, including a description of the data set and how you came to a conclusion through a t-test.