2nd Mid-term Exam **GEO-SCI 594A: Introduction to Geographic Information Systems**

Take-home exam; Work independently. D**ue Apr 23, 9:30am**, hand in before class. No late submission accepted.

Name SID

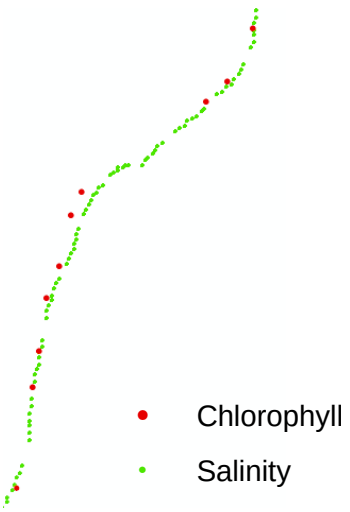
Please print the answer or write down the answer with CLEAR handwriting.

1. (10 points) Define and compare spatial join and overlay.

2. (10 points) Define and compare zonal operation and focal operation. Give an example application for each of them.

3. (15 points) Explain two terrain analyses: hillshade and viewshed. What are the results from them? How would you interpret the results?

4. (20 points) We measured Salinity and Chlorophyll with two instruments along the Hudson River during a research cruise. In the figure (right), the red dots give the locations where Chlorophyll content is measured, and the green dots give the locations where Salinity is measured. If I want to know the Salinity at the location of red dots, how can you use GIS to do an estimate as ACCURATE as possible? Write down the approach you think best and explain the operations involved.



You have two point shape files: Chlorophyll.shp and Salinity.shp. You can answer this just by imaging. However, if you want to practice, download the data here.

http://www.geo.umass.edu/courses/geo594a/midterm2data.zip

5. (25 points) With as much detail as possible, design a flowchart and describe the GIS operations needed to make a map indicating the best site for cuddybear habitat. Cuddybears require the following:

- south facing slopes (they like to sun themselves)
- the slopes must not exceed 60 degrees, but should be at least 10 degrees
- they can't be within 1 kilometer of roads (they have very short legs)
- they prefer a contiguous habitat (they need lot's of hiding places)
- because they are secretive they prefer not to be within sight of cities or towns.

The following data are given:

- cities
- elevation
- vegetation
- roads (Interstates, US Highways, Major roads, Minor roads)

Include all operations and interim data layers.

6. (20 points) Evaluate the following statement (e.g. Is the statement right or wrong?) and explain your evaluation. "A cartographic overlay operation is only as good as the poorest quality feature class." In addition, mention the factors that control the quality of overlay output.