Lab 4 -Vector data and Attributes Name _____

In this lab you will learn how to create your own vector data by collecting point data from GPS coordinates and by digitizing lines using an Aerial photo as a guide. In the process, you will learn how to create shapefiles in ArcCatalog, and how to import X,Y data from a spreadsheet, and convert them to a shapefile.

As always, begin by setting up your working folder:

- In ArcCatalog - Navigate to your master folder and Create a Lab 4 working folder
- In ArcCatalog, copy and paste *little_rock_nw.sid*, from your master folder into your Lab 4 working folder
- Do not forget to set relative paths

Lab due October 14, beginning of class - What to turn in:

- .jpg of map from part 1 (xxx_map4p1)
- .jpg of map from part 2 (xxx_map4p2)
- Questions from part 3

Part 1. Point data: from GPS to Spreadsheet to Shapefile

The purpose of part 1 is to demonstrate how to collect GPS coordinate information and convert it to a vector dataset. This is part of the process of collecting data and then converting it into a format usable by the ArcGIS software. This exercise will introduce you to GPS basics, and to the use of the GPS units.

Task 1: Collect Latitude/Longitude data in the field. – We will employ the low tech method of taking our GPS instruments into the field and recording the readings in a notebook.

Split into teams of 2-3 people. Each team gets a GPS unit. Make sure that everyone gets experience with using it while you are outside.

BE SURE TO SET YOU GPS UNITS TO THE GEOGRAPHIC COORDINATE SYSTEM

"Position Format" to 'hddd.ddddd°' (which is Decimal Degrees).

We will collect GPS coordinates of drainage features along Coleman Creek – natural and man-made (i.e. culverts, pipes, ditches, tributaries, manholes, etc.). We will assign group names and areas of study before we go outside.

In your notebook, set up a table with the following columns to collect notes while outside.

Table 1

Latitude	Longitude	Feature_type	Description

etc.
.
.
.

Task 2: Prepare data to be brought into ArcGIS. Type your data into an Excel spreadsheet.

Use these rules for formatting your Excel Spreadsheet columns:

- Make sure the column names are in a compatible format for bringing into ArcGIS. ArcGIS does not like any kind of punctuation, spacing, or mathematical characters within **File** names, or within **Column** names in tables. Thus, do not use any special formatting or non alphanumeric characters. Also, column names must be shorter than 13 characters.

Use these rules for formatting your data in the Excel spreadsheet.

- Format for Latitude and Longitude values
    - If your Latitude and Longitude values are in Degrees, Minutes, and Seconds (DMS), convert the values to decimal degrees (DD)

      i.e. 34°13’9.84” = 34.2194°

    - The format for distinguishing N latitude from S latitude and W longitude from E longitude is by the use of a negative symbol ("-") in other words:
      34.2194° = North latitude
      -34.2194° = South latitude
      87.36442° = East longitude
      -87.36442° = West longitude

- Share your data with other groups – and input their data to your spreadsheet.

- Save the Excel Workbook file (.xls). Save to your Lab 4 working folder – name it **gpX_pts.xls,** where X is your group number

- Then save the file as text (.txt) file (tab delimited). Save to your Lab 4 working folder name it **gpX_pts.txt,** where X is your group number

Task 3: Add the GPS data into ArcGIS.

- Launch ArcMap and open a new empty map.
- Use ArcGIS online HELP to figure out how to add and display **x,y** coordinate data to your new empty map.
- Once you have added the x,y data, then determine how to Display the x,y data

Outline your procedure below:

Task 4: Convert the x,y points to a Shapefile.

- At this point in the exercise, your points should be in the map. These points are listed as **Events** under the Table of Contents. Events are simply points posted graphically (these points are not yet a permanent GIS dataset. We need to convert the **Events** to Point Features - shapefile.
- Go back to ArcGIS HELP where you found the information about adding x,y coordinates to maps. Check out 'creating geographic data from x,y coordinates'.
- Create a Shapefile from your XY Table data. (name it **gpX_cr_pts**) with the X standing for your group number.

Outline your procedure below:

Remove the "Events" file and the ".txt" file from the Table of Contents in ArcMap to make sure that your newly exported shapefile is there.

Then close ArcMap without saving the .mxd file

Task 5: Apply a Projected Coordinate System to your **gpX_cr_pts** shapefile

Launch ArcMap and Add the Little Rock NW DOQQ (*little_rock_nw.sid*) to a new empty map.. This provides an aerial photo background. Use the "Properties", "Source" tab to determine the Projected Coordinate System of the *little_rock_nw.sid*

Project your **gpX_cr_pts** from GCS to the appropriate Projected Coordinate System. (go back to lab 3, if you've forgotten the procedure).

Add the **gpX_cr_pts** to your map with the *little_rock_nw.sid* aerial photo. The points should line up approximately with the location of the drainage features that are in the aerial photograph.

Task 6: Label your points based on the "Feature_type".

- Use ArcGIS online HELP and search on **Labels.**

Outline your procedure below:

Task 7:

Save a map document (xxx_map4p1.mxd) and Export a .jpg (xxx_map4p1.jpg).

Part 2. Create a new polyline SHAPEFILE, and give it Spatial Reference data.

Task 1 – Open ArcCatalog and determine how to create a new shapefile

Use online GIS help to determine how to create a new shapefile.

Name the file *ualr_drainage* (create this in the lab 4 folder)

Make sure you use the same PROJECTION/COORDINATE SYSTEM as the basemap (the little_rock_nw.sid DOQQ). See part 1, Task 5 above.

Task 2. Digitize polygons (search ArcGIS online HELP for "polylines, creating").

Add the *ualr_drainage* shapefile to your **xxx_map4p1** map

Uncheck the **gpX_cr_pts** so you can see what you are digitizing.

Start digitizing polylines along the drainage (Coleman Creek and its tributary – Broadmoor Creek). I will bring in a topo map that we can consult to determine where the tributaries are.

Save your edits.

Quit editing when you are done.

Task 3 Add attributes to the *ualr_drainage* shapefile.

Open the attribute table, click **Options**, and **Add Field**
Name the new field "reach_name" (is it short integer, or text? or another category? – use online help)

Start Editing (again) and Edit the attribute table by filling in the correct name for each polyline representing a creek reach/tributary.

When finished, save your edits, then Label the polylines based on the 'reach name' field.

Use the basic principles of cartography to create a map (include Title, N arrow, scale, your name, date). (does Layout View ring a bell??)

Save your work as a map document and as a .jpg
Export Map as .jpg (xxx_map4p2)

Name_____

TO TURN IN FOR LAB 4 – DUE Oct. 14 at beginning of class

MAPS :
Upload the .jpg files for xxx_map4p1 and xxx _map 4p2 to the Blackboard assignment dropbox for Lab 4.

Part 3. Questions

1. What are the three types of objects in vector GIS?

2. How is each of these objects stored/represented geometrically?

3. How many files make up a shapefile? What are the file extensions of each? What is the purpose of each?

4. What are records and fields in the context of GIS attributes tables?

5. On what conceptual model of representing geographic data is the vector data model based?

6. What are 3 advantages of the vector data model over other data models?