Geography 328 GIS
Lab Assignment 1: GIS Data Collection and Entry

Lab Due Date:
This assignment is due in one week, at the beginning of your lab time (February 1ˢᵗ, 2010).

Lab Objectives:
By the end of this lab, you will be able to:
1) Collect a simple set of spatial and attribute data from an accessible source
2) Enter these data into ArcGIS
3) Check the operability of your data by performing queries

Materials:
o ArcGIS software (available in computer lab)

Introduction
To truly understand the nature of geographic data and related data quality issues, you need to have a degree of "ownership" of the data. This exercise emphasizes the data collection and entry phase of a GIS project. Before you begin to collect data, you must have a clear understanding of the end product; in this exercise, you must design your database so that the end product provides you with the capability to query the spatial and attribute data and display spatial relationships.

Data Collection Procedure
▪ You will be assigned a section of the Parking Lot on campus. Sign out the necessary equipment, proceed to the parking lot and traverse the area enclosed by twenty parking spaces according to the verbal instructions that you are given. Take note of the dimensions of the parking spaces in metres.

▪ For each parking space, record **six** attribute data values in tabular format on a piece of paper (for example, you might record licence plate number, make and model, colour, 2-door/4-door, and so on); you will use this tabular format later when you construct a database table in ArcGIS.

Make certain you have a clear idea of the type of questions that a user of your data can answer about the parking spaces and the parked cars, as you are given only one opportunity to design your database and collect your data.

NOTE: You must record the licence plate numbers consistently — either with or without a space between the numbers and the letters. If there is <u>no</u> car in a parking space, record the letter "A" as the licence plate number for the first empty parking space, the letter "B" for the second empty parking space, the letter "C" for the third empty parking space and so.

▪ Make copies of the data that you have recorded so that each student has their own copy.

Data Entry Procedure

1. Create a **lab1** sub-folder in your **U:\geog_328** folder. *** Note — You may have named your GIS work folder something other than "geog_328" (i.e. you may have simply called the folder "GIS"). If you did, then use that folder and in your mind translate "U:\geog_328\" to "U:\GIS" (or whatever you named your course folder).*

2. Copy the **Parking_Lot_Image.mxd** map document from the **G:\geog_328\lab1** folder to the **lab1** sub-folder on your **U:** drive.

3. Start ArcMap and open the existing map document **U:\geog_328\lab1\Parking_Lot_Image**.

4. Save and name the map document. Select *File | Save As* and navigate to your student drive: **U:\geog_328\lab1** and name the file ***My_Parking_Lot***.

    You copied a map document (Parking_Lot_Image.mxd) from the G: drive to your U: drive BUT you did not copy any data layers. So how is it that you can see a photo of the parking lot? Check out the source of the TIF image. Note it is rather large—hence its location.

    What is the "coordinate system" (datum and projection) of the data frame?
   *Datum _____*
    Projection _____

    You will be creating a data layer and it is best if you create it with the same coordinate system as your data frame.

5. Rename the Data Frame. Highlight "Layers" in the table of contents and right click it. Select *Properties*, and set the *Name* and *Description* for your data frame. The *Display Units* should already be set to meters.
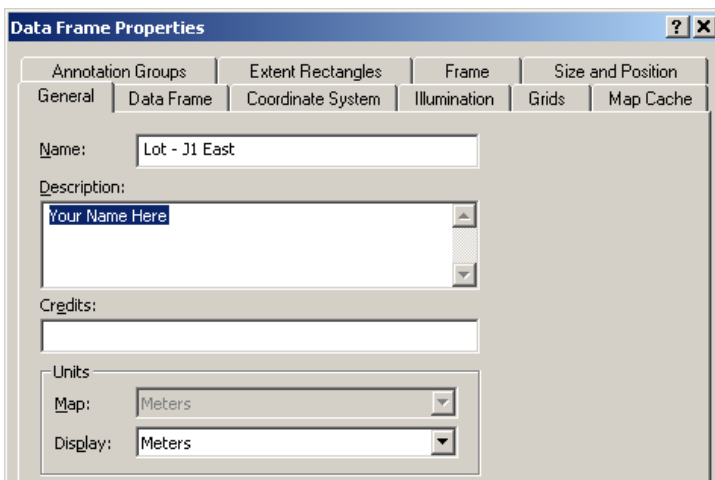
6. Start ArcCatalog and navigate to your working directory (U:\geog_328\lab1). Create a new shapefile. Select *File | New | Shapefile…* and enter the *Name* and *Feature Type* of your new shapefile, as shown below:
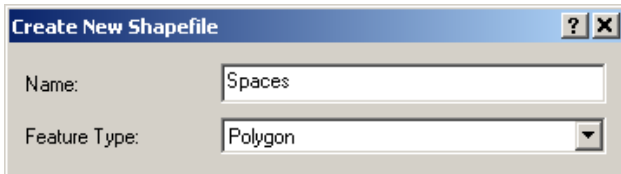
Next, you will want to set the coordinate system of this new layer to be the same as your existing data frame.

Click on the *Edit* button and then click on the *Select…* button from Spatial Reference Properties dialog box.
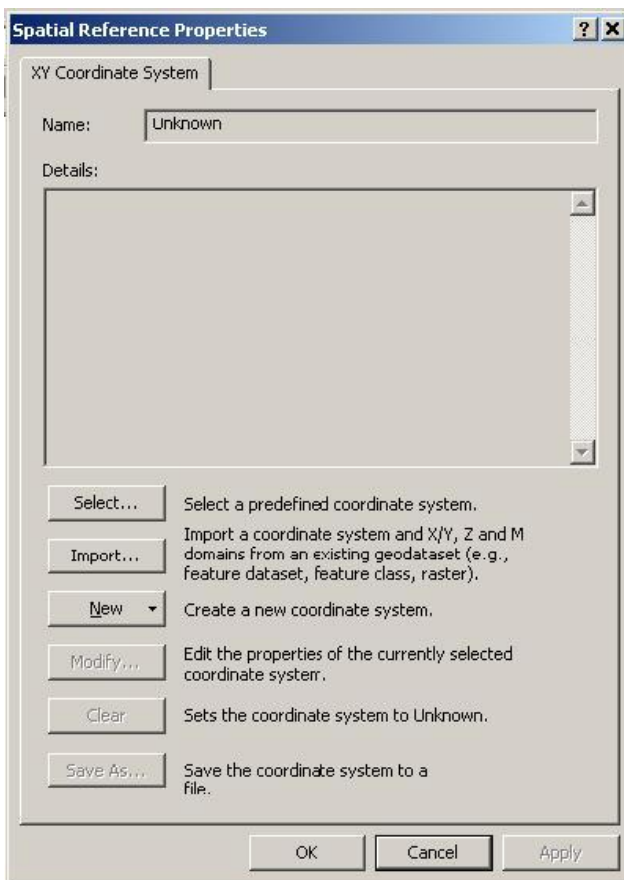
On the next set of windows, double click to select the *Projected Coordinate Systems*, then continue until you find the same coordinate system as the data frame.

When the projection details are displayed on the Spatial Reference Properties dialog box, click *OK* and then click *OK* again on the Create New Shapefile dialog box.

7. Drag the **Spaces** layer from ArcCatalog to your Data View in ArcMap. Make sure that the Spaces layer appears above the image layer in the Table of Contents.

8. Drag a zoom-in box around your twenty parking spaces.

9. Digitize your polygons (parking stalls). Begin by selecting *Editor | Start Editing*, on your *Editor* toolbar. If you can't see the Editor toolbar, select *View | Toolbars* and enable the *Editor* toolbar.
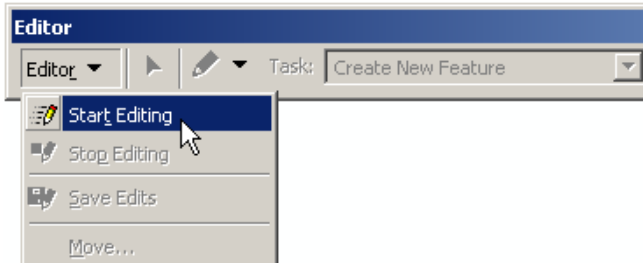

Note that the current settings are *Task: Create New Feature* and *Target: Spaces*. Since this is the task that we intend to perform, there is no need to alter the Editor selection.

a. Click on the *Sketch* tool in the *Editor* toolbar and trace a rectangle to represent the first parking space. You will define the rectangle with 4 corners. Single click the first 3 corners but double-click the last corner to end the rectangle. You should see a blue outline around the rectangle.

b. On the *Editor* toolbar, select *Editor | Save Edits* to save your edits.

The remaining parking spaces need to be digitized as being "exactly adjacent" to each other. In order to do this, you will turn on a drafting assist called *snapping*.

c. On the *Editor* toolbar, select *Editor | Snapping* and select Vertex for the Spaces layer. Close the Snapping dialog box.

d. On the *Editor* toolbar, select *Editor | Options* and set the snapping tolerance to **1** map unit (since the map units are set to metres, this will equate to 1 metre – thus, if your cursor is within 1 metre of an existing vertex (corner) it will allow you to snap exactly to this point).
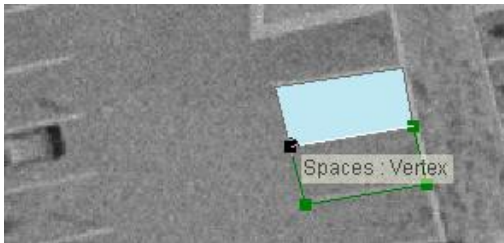
Using the Sketch tool , digitize the second parking space by first clicking on one of the adjacent vertices of the first parking space:
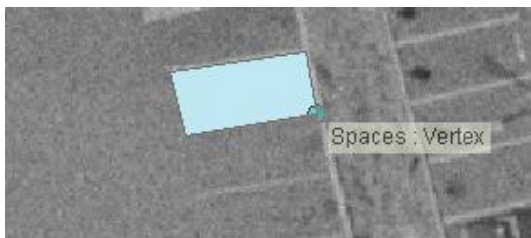
Then click the next two vertices for the opposite edge of the second parking space:
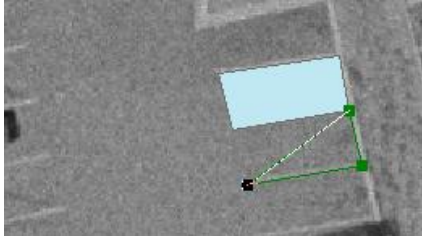
Finally, double click the last vertex of the second parking space using the adjacent vertex on the first parking space:

Repeat this step for the remaining 18 parking spaces.

NOTE—It is alright if the polygons representing the parking spaces are not "perfect". It is, however, very important that each polygon is correctly snapped to the adjacent polygon.

e. On the *Editor* toolbar, select *Editor | Stop Editing*, and save your edits.

f. Click on the floppy disk icon 💾 (or click *File | Save*) to save your map document (MXD file).

10. Open the attribute table for your **Spaces** layer:

Note the default table name supplied by ArcGIS: ***Attributes of Spaces***
Also, note that all entries in the Shape* field are "Polygon".

11. Create new fields to correspond to the data categories you collected in the field.

a. Using the *Options* menu (at the bottom-right of the attribute table), select *Add Field…*

b. Select a field Name and an appropriate data Type for your field. The data type will be different depending upon what sort of information will be stored in that column of your attribute table. We'll discuss all of the possible data types in a forthcoming lecture, but you will likely choose from:

Text   Letters or mixed letters and numbers. This data type would be used for license plate numbers, vehicle model, etc., where the information is words or mixed text.

Short Integer   Numbers with no decimal component, like -1, 0, 1 … 100, etc. This might be useful for the number of doors for each vehicle, or the model year.

Float	Numbers with a decimal component, like -100.23, 1.2235, etc. This might be useful for the length of the vehicle, in metres.
Date	Dates, which may or may not include components for month, day, year, and time of day. This might be useful for an attribute such as the expiry date of the license plate.
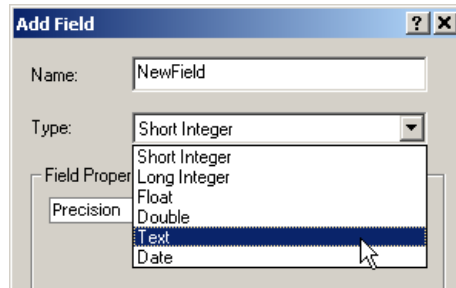
Set the length for any Text fields that you create to 20 (instead of the default 50). You may accept the default values for any other parameters, such as Precision, in the lower part of the *Add Field* dialog as you create each field.

Create a field for each category of data you collected. ALSO, be sure to add a field for the value (nearest dollar amount). At time of data entry you can just estimate a value for each vehicle.

12. Record the field definitions on your answer sheet (attached).

13. Keep the attribute table for **Spaces** open. From the *Editor* toolbar, select *Editor | Start Editing*.

14. Populate the **id** field with the numbers 1, 2, 3, …. ,20

15. Save your map document again.

16. Add text labels to the parking spaces using the **id** field. Right-click on the Spaces layer in your table of contents and select Properties. In the Labels tab, set the Label Field to be **id**, and check the Label Features check box at the top. Click *OK*.
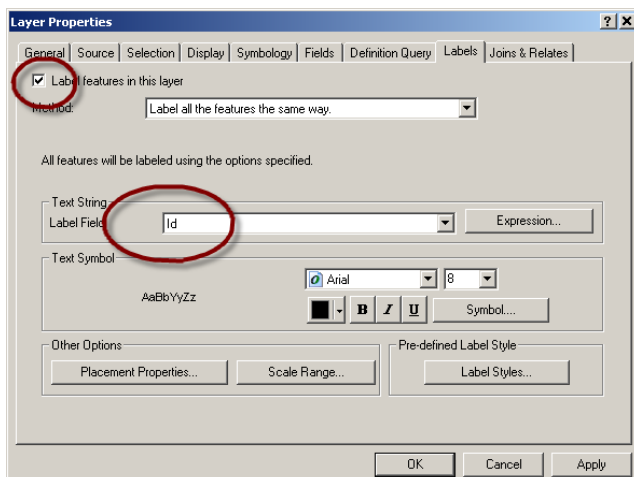
17. Populate the remaining fields of the attribute table with the data that you collected.

18. On the *Editor* toolbar, select *Editor | Stop Editing*, and save your edits.

19. Click on the floppy disk icon 💾 (or click *File | Save*) to save your map document (MXD file).

Check the Operability of Your Data

1. Interrogate the spatial data to retrieve the associated attribute data.
   a. Use the *Identify* tool to click on the different parking spaces.
   b. Scrutinize the data values. Do they match the values you entered?

2. Query the attribute data and display the associated spatial data:
   a. Use the *Select by Attributes* function to find those parking spaces with **id** numbers greater than 8.
   b. Double click on field **id**
   c. Click on "greater than" symbol **>**
   d. Enter the number **8**
   e. Click on **Apply**
      Note the screen display.

3. Record the query expression on your answer sheet – use the right column of the *Four Queries Table*.

4. Convert the query results (selection) to a separate shapefile layer:
   a. Right-click on the **Spaces** layer and select *Selection*.
   b. Select the option to **create a layer from selected features**.
   c. The new layer will be automatically added to your map document and will be assigned the name "Spaces Selection".
   d. Rename the layer "Parking Spaces gt 8 "
   e. Record its name next to previously entered expression on the answer sheet (*Four Queries Table*).

5. Perform two other queries of your choosing; save and name them in sequence. The last query should be for value > $7,000. Be sure to enter this data in the table as well.

6. Create a JPEG file of you last query.
   o Ensure that Image layer is on the very bottom, the Spaces layer is above the Image layer and that your last query layer is displayed above the Spaces layer.
   o Follow the instructions on the Lab Resources web page to create a JPEG file. Name the file as *Name_Lab1*.jpg (e.g. Corrin_Lab1.jpg).

7. Save your map document again.

8. Check that all the shapefiles are in the "lab1" sub-folder on your **U** drive.

9. Hand in the following page, with your attributes, field definitions and query expressions.

10. Email your JPEG to doug.corrin@viu.ca

GIS Lab1 Submission: **Name:** _____

Attribute Data Table (Write the name of each field and enter the data in the table below.)

Stall No.	Field 1: License_Pl	Field 2:	Field 3:	Field 4:	Field 5:	Field 6:	Field 7: Value*
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

* Note—If you collected vehicle values as one of the six attributes then you won't need to add this field to your table. If you did NOT collect vehicle values, then simply enter estimated values.

Field Definitions Table

Name	Type	Precision / Length
id	long integer	6

Four Queries Table

Layer Name	Expression