GEOG 245: Geographic Information Systems
Lab 01

Exercise 1 –ArcGIS Basics
35 Points

Introduction

The objective of this exercise is to give you the opportunity to explore basic ArcGIS operations. More specifically, we want you to become comfortable with the ArcGIS interface, the creation of new map documents, the addition and manipulation of layers, and the creation of layouts.

Part 1: Data preparation

For the first part of this exercise, you will be working with three maps: (1) a fairly old scanned and georeferenced United States Geologic Survey topographic map of the Hamilton, NY area (this is an image or raster); (2) a line shapefile (this is a vector file) showing the surficial hydrology for the Hamilton, NY region; and (3) a digital air photo of campus obtained through the NYState GIS clearinghouse (this is an image). These data are available via the geography server.

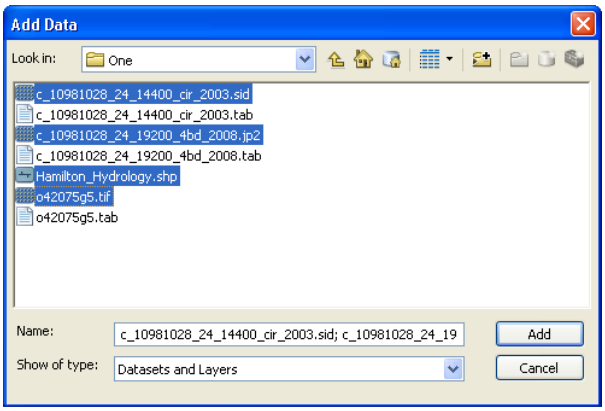
To begin this exercise, you need to:

1. **Copy** the archive file 'lab1.zip' from the labdata folder (\\geogsv01\classspace\G245F12\LabData\L01) to your workspace. You may want to map \\geogsv01\classspace\G24512\LabData as a separate network drive so that you can easily access the lab data throughout the semester. Before you copy the lab1.zip file to your server folder, you should create a LabOne folder (or something to that effect) in your workspace. This way the work you do for each lab will be saved in a separate folder. The file you are copying actually consists of multiple files, and has been packaged as single file archive using Winzip. The computers in the geography lab (as well as most across campus) have Winzip installed on them. Ask your lab instructor if you do not understand how zip files work.

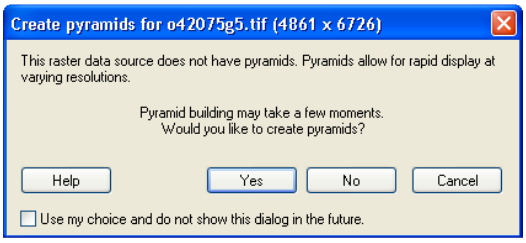
2. After the file has been copied to your server folder, right click on the filename, select Winzip, and click the "Extract to here" option. This will unpack the files and make them usable in ArcMap. Please note that several files will be unpacked during this process. If "extract to here" is not an option make sure you extract all of the files to the appropriate location while unzipping. Ask your lab instructor for help if you are unsure how to extract your data.

After you have downloaded and extracted the maps and images, launch ArcMap (or open a new map document is ArcMap is already running). Just as you did in the lab tutorial, click the "add data" button.  If all works well, your mapped network drive should appear on the directory list. If this is not the case, you will need to create a catalog link to your server folder as demonstrated in the tutorial (ask your lab instructor if you need help with this).

Open each map and image into your map document window. When the Add Data window opens, you will see a list of files with special icons that tell you what kinds of GIS data they are. The window below shows the files that need to be selected when opening the maps.



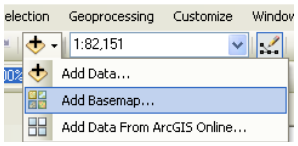
5. As the files are opening you may receive a message similar to the one below. If so, select 'yes'.



Depending on the order in which you add the maps, you may receive a Geographic Coordinate System Warning. This is because the air photo is in a different coordinate system than the other maps. In this case, select "Close" and ArcMap will reproject the maps and images to make them align. This is called "project on the fly" and is a nice feature but can cause trouble if you are not paying attention. We will address this issue more thoroughly in Exercise 2.

Once all the maps and images are in the map document, make sure the topographic map (o42075g5.tif) is the bottom layer or it will hide the other layers.

You may want to add a basemap layer. You do this by going to the "Add Data" button, clicking on the downwards pointing triangle and finding "Add Basemap."



You'll get a window of the many kinds of base layers available through ESRI. Select "Imagery."
Note: the smaller the scale of the screen, the longer it takes to bring up the basemap. Also, every time you move the screen, the base layer needs to redraw. Feel free to turn off the baselayer to increase speed of redraw until you get to a scale you like.

Explore the maps and then zoom into the downtown Hamilton area.

GEOG 245: Geographic Information Systems
Lab 01

Part 1: Questions

Answer the following questions using the tools illustrated in the tutorial part of this lab. **Make sure you include your units of measurement with your answers**.

1. What is the latitude and longitude of the bridge (in DMS) along Willow Walk that crosses the stream entering Taylor Lake? (2 points) *Note: if you find that the coordinates are being listed as "unknown" or in some strange system other than latitude and longitude, right-click in the map window and select Data Frame properties. Select the General tab and make sure the display units are set appropriately*.

   Note: always pay attention to significant figures and units of measurement. What is reasonable to report? What are you actually measuring and how are you doing it? (2 points)

2. View the attribute table in the 'Hamilton_Hydro' layer. What is the total number of records present? How many hydrologic lines have the 'minor1' value of 200? What do these lines correspond to (what kind of hydrology)? (6 Points)

3. Using the identify tool  determine the length of Taylor Lake's shoreline. You will have to add together the length of both lines that define the shore. Lengths are in meters. (2 Points)

4. Using the measuring tool  determine the "straight line" distance in **kilometers** between the Andy Kerr Football Stadium and the Colgate Inn. (2 Points)

5. Determine the approximate **driving** distance in **kilometers** from the stoplight in the center of the village to the eastern "peninsula" of Lake Moraine (near the "M" of "Lake Moraine"). (2 Points)

Part 2

For the second part, we would like you create a new blank map document by selecting "new" under the file menu. When your new map document is ready, click the ADD DATA button, navigate to the C:\ESRI\ESRIDATA folder, and open the World folder. Open the file entitled "Country". You will be presented with a map of the world showing each country as an individual polygon. I would also like you to add the cities and rivers layers.

1. Open the attribute file for the country layer and look at the various attributes. One of the attributes will be the population for each country (POP_CNTRY). Also included in the attribute table is the area of the country (SQKM_CNTRY). Close the attribute window and return to the map document. Let's imagine someone asks you to provide information on the population density (persons/area) for Australia, the United States, India, and Norway. Use the identify tool to gather the necessary information and then make the calculation. Show your work. (8 Points)

2. Another attribute in the table is 'landlocked'. How many landlocked countries are there in the world today? (2 Points)

3. How many countries (or territories) both use the French Franc as a form of currency (curr_code, FRF) and are smaller than 100,000 square kilometers? (2 points) (Note: these data are old)

4. What are the latitude and longitude coordinates of Sao Paulo, Brazil (please answer in decimal degrees; 2 points)?

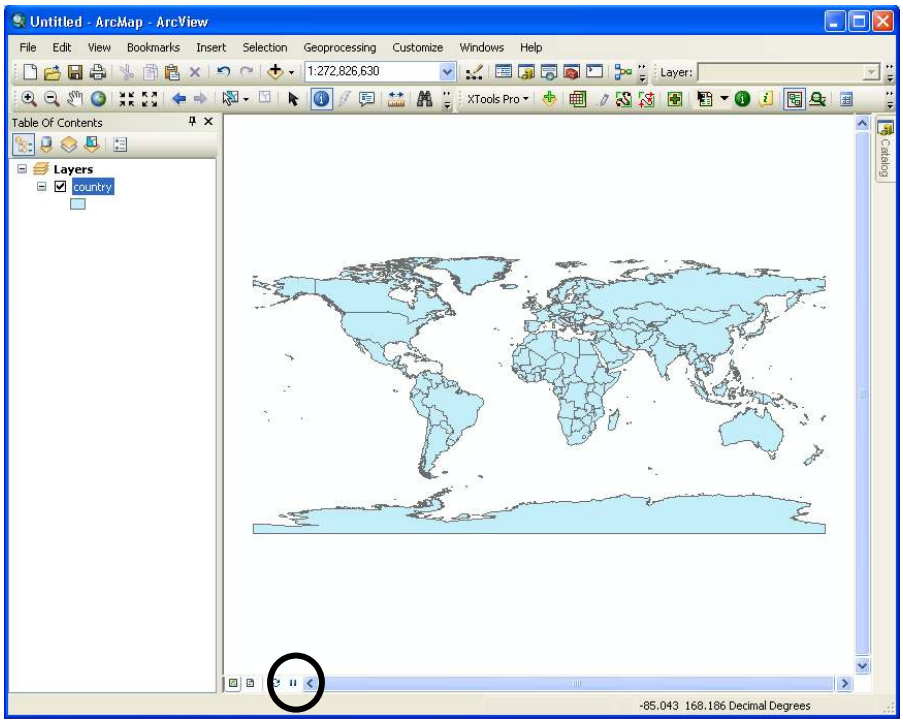
5. What is the name of the closest city to Hobart, Tasmania (Australia)? How far away is it in kilometers? (2 Points)

Using the help menu answer the following three questions.

1. What is the meaning of 'greyed out' selection boxes in the table of contents with red exclamation marks situated immediately to their right (shown below)? When this happens you cannot see a layer. Note: the answer is unrelated to visible scale range. (1 point)

2. What is the keyboard shortcut to exit ArcMap? (1 point)

3. What is the purpose of the button circled below (it looks like a quotation mark)? When would you use it? (1 point)


Untitled - ArcMap - ArcView
File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help
1:272,826,630
Layer:
XTools Pro
Table Of Contents
Layers
country
Catalog
-85.043 168.186 Decimal Degrees