Cartography

Lab 1

Introduction to Computer Cartography

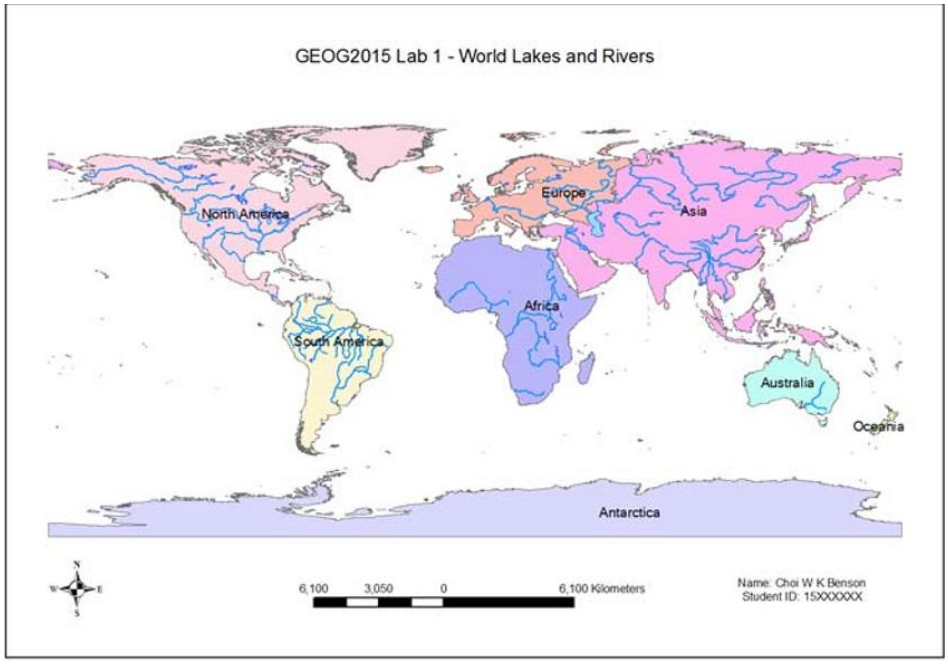
Objectives:

This lab is design to introduce students the basic concepts and operations of computer cartography software. The focus is on data organization, preparation and presentation.

After finishing the lab works, students should learn to:

- use ArcCatalog as a data management tool;
- create a map and organize layers in ArcMap;
- use various tools in tool toolbar;
- browse the information in layer's attribute table;
- create labels for features;
- make a layout of World Map and assign symbols to different features;
- insert essential map elements to map layout.

Task: You will be asked to produce a map similar to below during the exercise



Note:ArcGIS for Desktop is used to author and edit maps and geospatial content. It includes two applications: ArcMap and ArcCatalog.

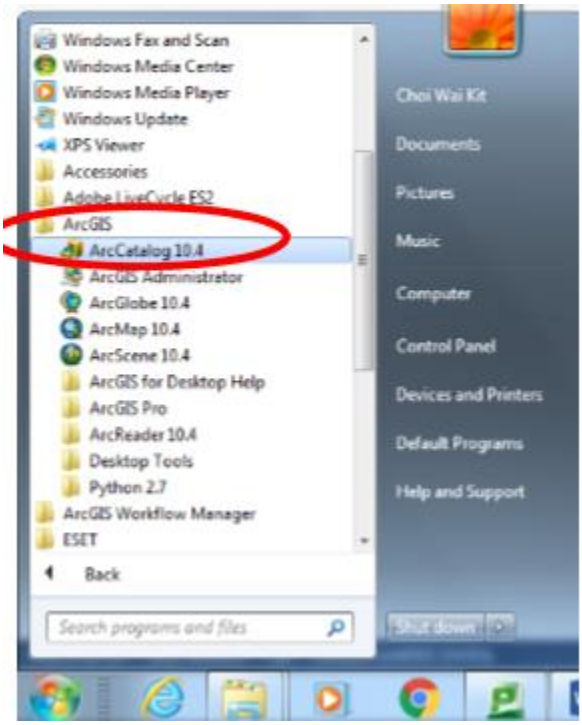
You may

- Use ArcMap for visualizing and editing geographic data, performing GIS analysis, and creating professional-quality map products;
- Use ArcCatalog for browsing, managing, and documenting geographic data;

-By : Niraj K.C.

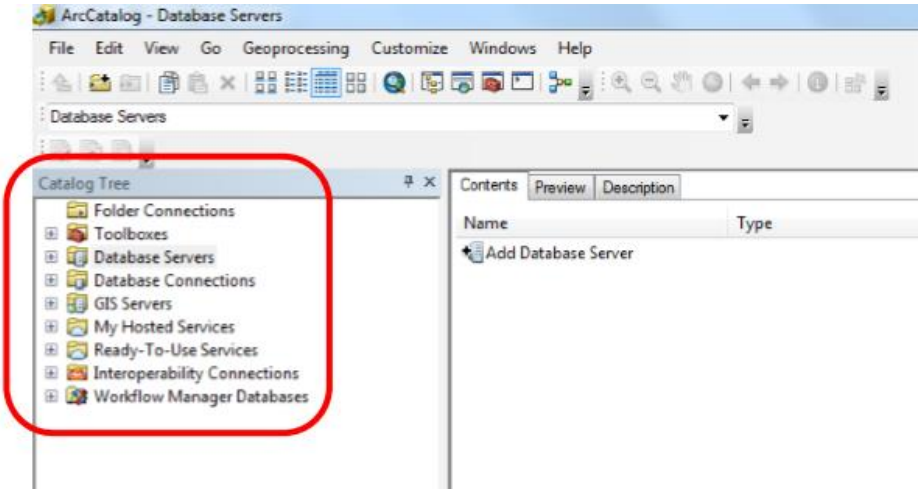
Guidelines:

1. Manage the working folder i.e. E:\important\niraj\Lab data.
2. Start ArcCatalog (press the Windows Start button > All Programs > ArcGIS > ArcCatalog 10.4.



ArcCatalog is the tool for browsing, organizing, distributing, and documenting an organization's GIS data holdings. The Catalog tree on the left side of the ArcCatalog window is for browsing and organizing your GIS data. The contents of the current branch are displayed on the right side of the Catalog window.

3. In the Catalog Tree, we will not be able to find our network drives as well as our own space (i.e.E:\important\niraj\Labdata.). We need to establish connection to our workspace folder containing our dataset we wish to work with.



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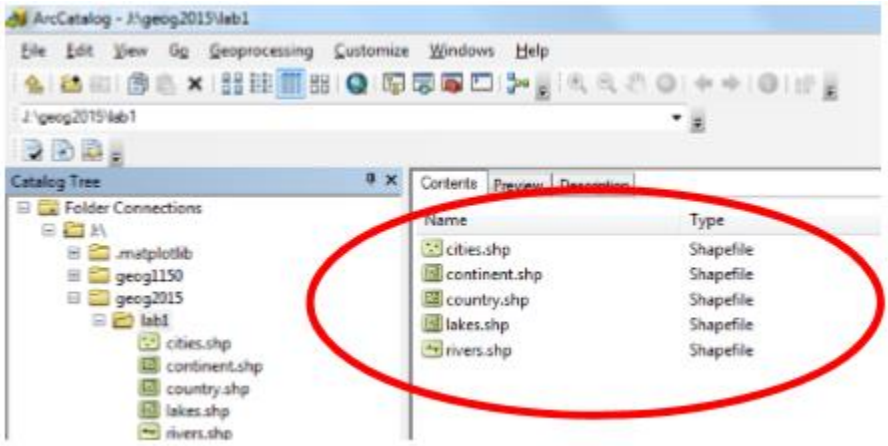
Select File > Connect Folder…

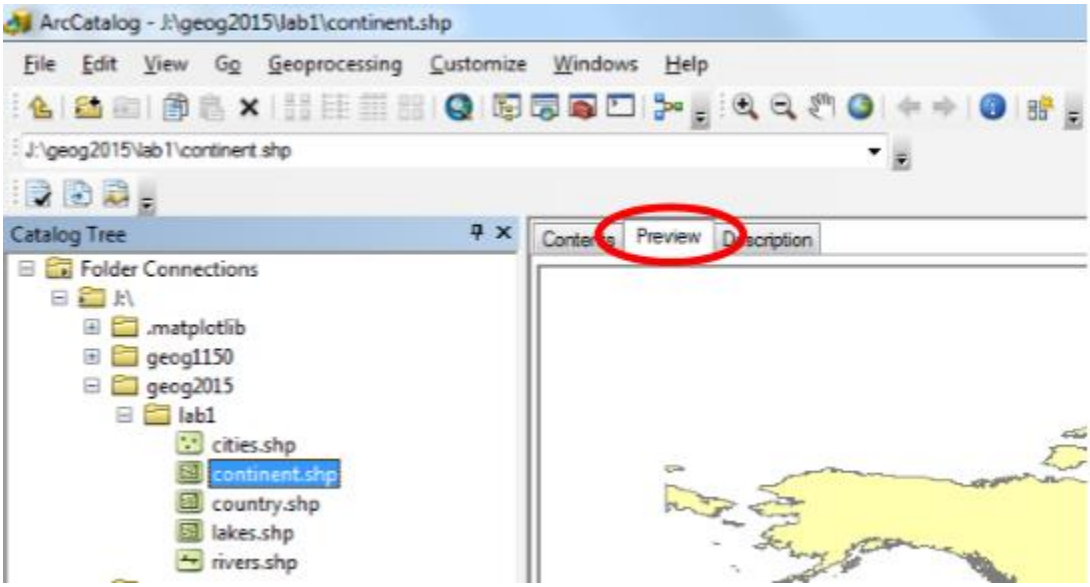
In the Connect to folder dialog box, select Computer > (your data Drive) and then click [OK].

4. In the Catalog Tree, expand the E Drive (click the + sign in front of it), then expand the Lab datafolder and select lab1 subfolder. The geographical data inside this folder should be displayed on the right side of Catalog Tree.



A shapefile is a vector data storage format for storing location, shape, and attributes of geographic features. A shapefile is stored in a set of related files and contains one feature class.

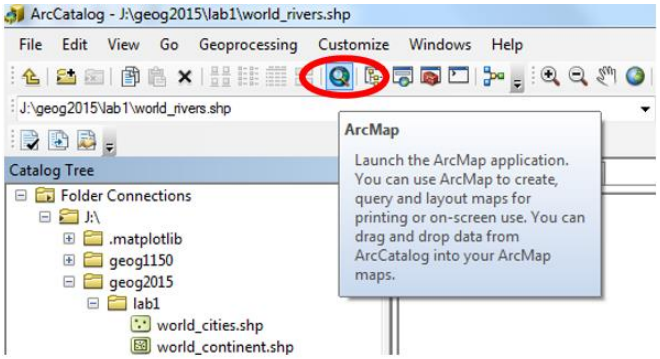
5. Change to Preview pane and check the contents of the 5 shapefiles one by one.



6. We may use ArcCatalog to manage our geographical data and documents.
We want to change the names of the shapefiles as below. Rightclick each shapefile and select Rename, then change the names according:

Old name	New name
cities.shp	world_cities.shp
continent.shp	world_continent.shp
country.shp	world_country.shp
lakes.shp	world_lakes.shp
rivers.shp	world_rivers.shp

7. Start ArcMAP in ArcCatalog by clicking the ArcMap icon on Standard toolbar.



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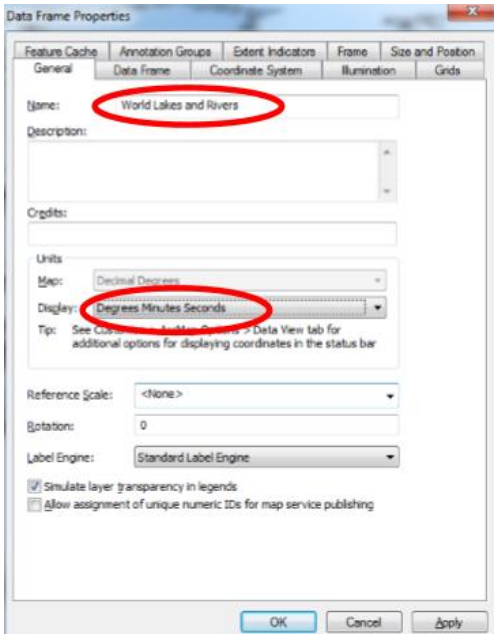
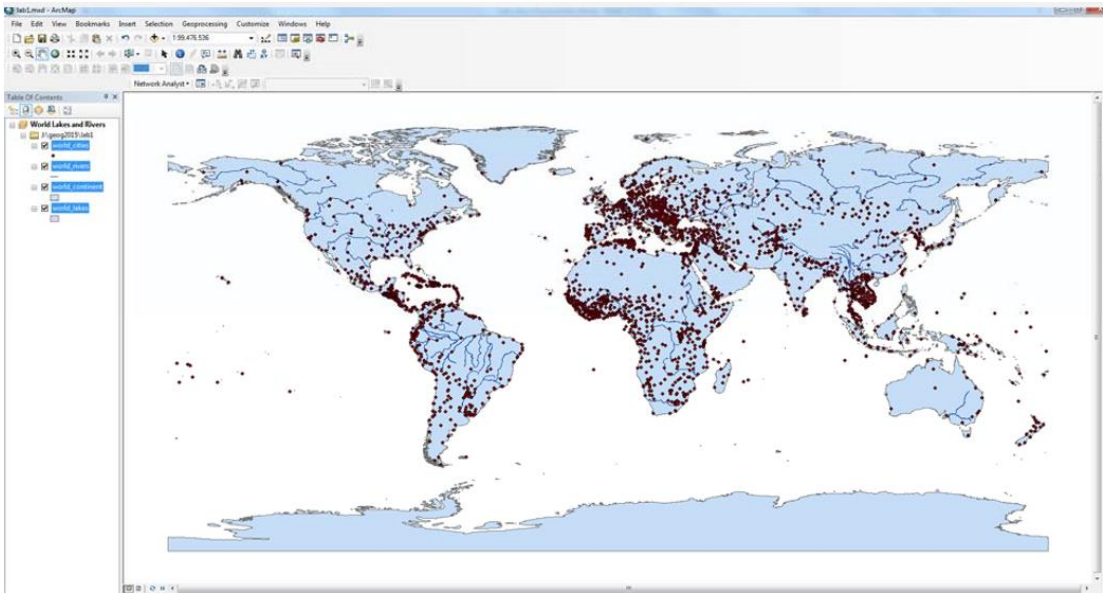
Note:ArcMap is where you display and explore the datasets for your study area, where you assig n symbols, and where you create map layouts for printing or publication. ArcMap is also the appl ication you use to create and edit datasets.

You may also start ArcMap by pressing the Windows Start button > All Programs > ArcGIS > ArcMap 10.4.

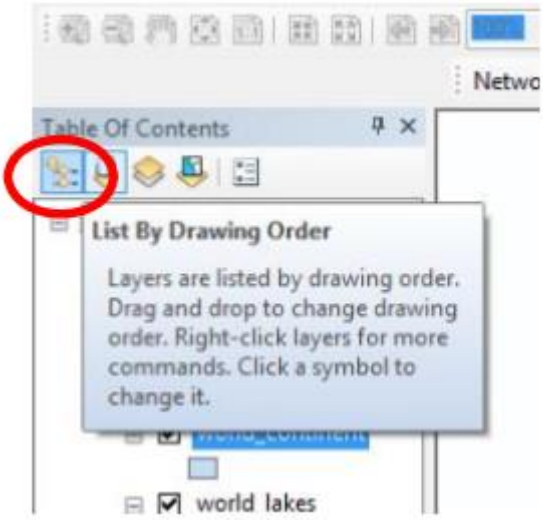
8. After ArcMap has been launched, you will be prompted to select among choices of starting ArcMap with a new map, a template or an existing map. For this exercise select New Maps > (My Templates) Blank Map and press [OK].
   Note:
   A map is the most common view for users to work with geographic information. It's the primary application in any GIS to work with geographic information. When you save a map you have created in ArcMap, it will automatically append a file extension (.mxd) to your map document name. All the maps you compose in ArcMap are saved to an ArcMap document file named with a .mxd extension. Map document files are managed in file system folders. You can work with an existing .mxd by opening it in Windows. This will start an ArcMap session for that .mxd.
9. Edit the document properties (select File > Map Document Properties…). Set the Title to be Lab 1, the Subject to be My First Assignment – World Lakes and Rivers, and the Author to be (your name). Click [OK] to confirm.
10. We will add four of our shapfiles into the Data Frame as layers. Select File > Add Data > Add Data…, navigate to FolderConnections>E:\important\niraj\Lab data, select world_cities.shp, world_continent.shp, world_lakes.shp and world_rivers.shp, and click [Add] to add them into our Data Frame.
11. Configure our Data Frame by selecting View > Data Frame Properties…. In the [General] tab, set the Name to be World Lakes and Rivers, and change the Units > Display to be Degree Minutes Seconds. Press [OK] to confirm.



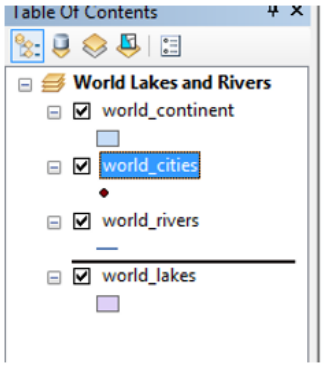
12. Save the Map Document at this stage. Save it (File > Save) as Lab1.mxd and place it in y our E:\important\niraj\Lab data subfolder.
13. Your map should be similar to this:



14. On the Table of Contents, click the List By Drawing Order icon to change the list method .



Then try to rearrange the order of layers by dragging and dropping.



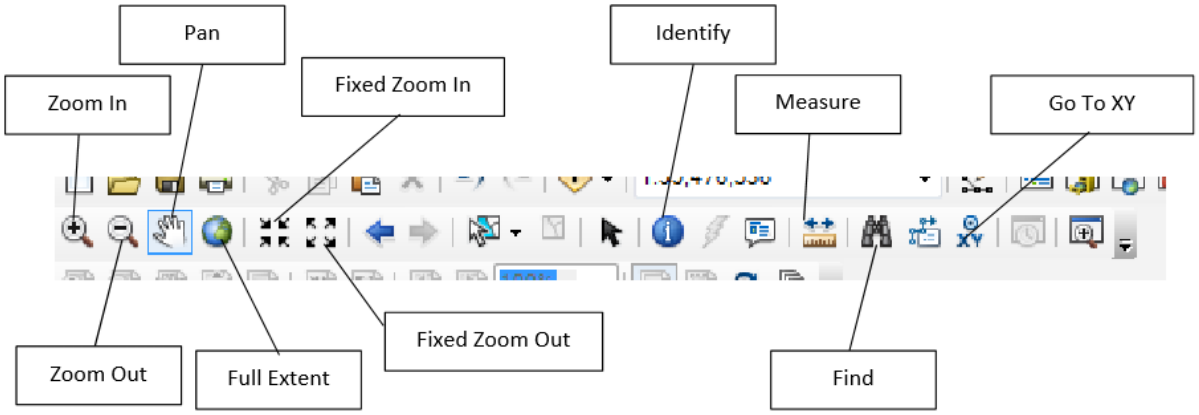
Questions:

1. What will happen if we place the world_continent layer as the topmost layer?

2. What is the best order to arrange the four layers in the view (1 – topmost, 4 – bottommost).
   world_cities_____ world_continent_____ world_lakes_____ world_rivers _____.

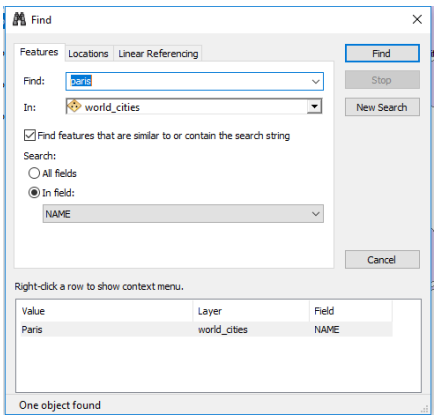
Note:In case the Table of Contents is hidden, you may select Window > Table of Contents to show it again.

15. Practice on using Zoom In, Zoom Out, Fixed Zoom In, Fixed Zoom Out tools (on Tools toolbar) for zoom control. Also try to use Pan Tool to move around. When you finish, click the Full Extent tool to restore the map's original size.

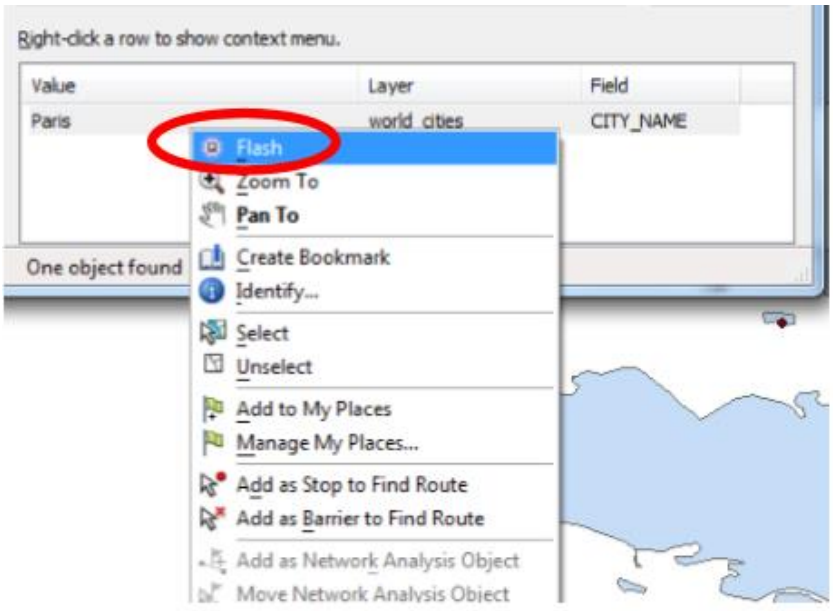


If you cannot find the Tools toolbar, select Customize > Toolbars, and check if the Tools toolbar is ticked.

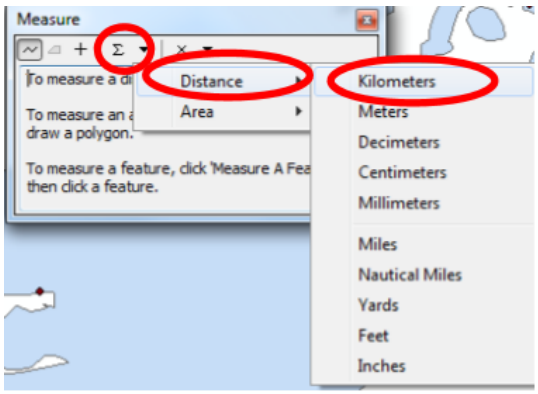
16. Select the Find tool (on Tools toolbar) to launch the Find dialog box. In the [Features] tab, type Paris in Find field, and set world_cities in In field. In the Search option, select In Field: CITY_Name. Leave other fields as defaults. Then click [Find] button.The found record (Paris) will be listed at the bottom of the dialog box.



Right-click the record, select Flash to find out where it is on the map.



17. We want to measure the distance between Paris and Lille on the map.
    Select the Measure tool (on Tools toolbar) to launch the Measure dialog box.
    Set Distace > Kilometers (click the arrow next to ∑) as unit before you do the measurement.



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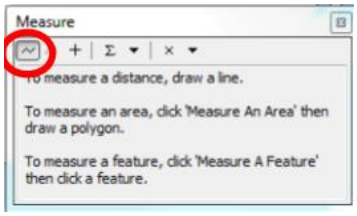
Click the Measure Line icon on Measure dialog box, then draw to line between Paris and Lille, and record the length that list in the Measure dialog box.

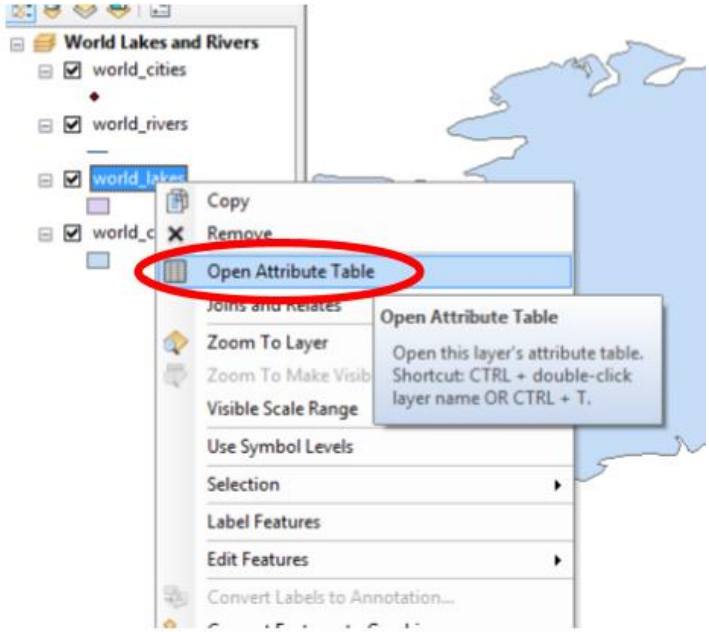


Question

- What is the distance between Paris and Lille on map in kilometers? _____(km)

Once you finishing measuring, close the Measure dialog box. Chang to use **Select Elements** tool (on Tools toolbar).

18. In the Table of Contents, rightclick the world_lakes layer and select Open Attribute Table to open the attribute table of this layer.



In world_lakes' attribute table, you may find the information of all lakes on the map.

world_lakes

FID	Shape	featurecla	scalerank	name	name_abb	name_alt	dam_name	min_label
0	Polygon	Lake	9	Egridir	Egridir			8
1	Polygon	Lake	7	Beysehir	Beysehir			6.7
2	Polygon	Lake	5	Engozero	Engozero			6
3	Polygon	Lake	4	Pjrvi	Pjrvi	Lake Pya, Ozero Pjaozero		5
4	Polygon	Lake	9	Ozero Pitlyarskiy Sor	O. Pitlyarskiy Sor	Lake Pitlyarskiy Sor		8
5	Polygon	Lake	0	Great Bear Lake	Great Bear L.			3
6	Polygon	Lake	0	Great Slave Lake	Great Slave L.			3
7	Polygon	Lake	0	McLeod Bay	McLeod Bay			3
8	Polygon	Lake	0	Lake Winnipeg	L. Winnipeg			3
9	Polygon	Lake	0	Lake Erie	L. Erie	Great Lakes		3
10	Polygon	Lake	0	Lake Ontario	L. Ontario	Great Lakes		3
11	Polygon	Lake	0	Lake St. Clair	L. St. Clair	Great Lakes		3
12	Polygon	Lake	1	Lake Okeechobee	L. Okeechobee			3.6
13	Polygon	Lake	1	Lago de Nicaragua	L. de Nicaragua			3.6
14	Polygon	Lake	4					5
15	Polygon	Lake	2	Wollaston Lake	Wollaston L.			3.7
16	Polygon	Lake	2	Reindeer Lake	Reindeer L.			3.7
17	Polygon	Lake	2	Lake of the Woods	L. of the Woods			5
18	Polygon	Lake	2	Lake Nipigon	L. Nipigon			3.7
19	Polygon	Lake	2	Lake Manitoba	L. Manitoba			3.7
20	Polygon	Lake	2	Lake Winnipegosis	L. Winnipegosis			5
21	Polygon	Lake	2	Lake Athabasca	L. Athabasca			3.7
22	Polygon	Lake	2	Lake Mistassini	L. Mistassini			3.7
23	Polygon	Lake	3	Oneida Lake	Oneida L.			4
24	Polygon	Lake	3	Iliamna Lake	Iliamna L.			4
25	Polygon	Lake	3					4
26	Polygon	Lake	3	Lake Tahoe	L. Tahoe			4
27	Polygon	Lake	3	Lake Winnebago	L. Winnebago			6
28	Polygon	Lake	3	Nettilling Lake	Nettilling L.			4

1 (0 out of 1354 Selected)

world_lakes

Questions:

- How many lakes are there on the map? _____

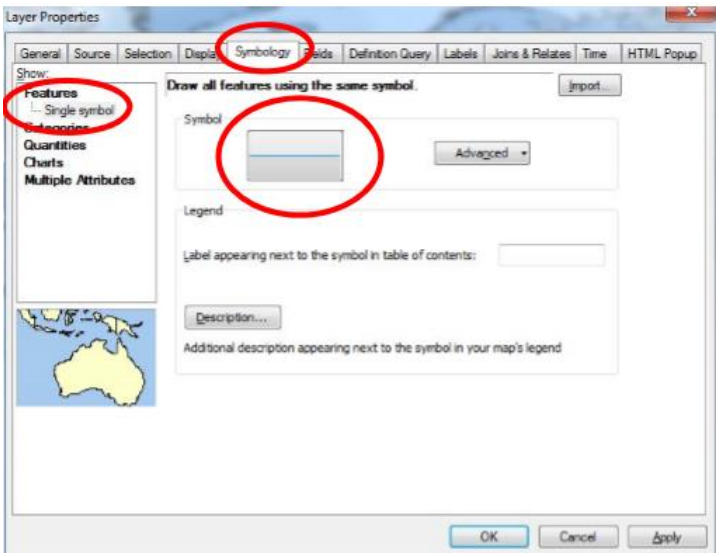
19. Close all unnecessary dialog boxes and attribute tables on the Data Frame. Zoom the map into its full extent.
    In the Table of Contents, rightclick the world_cities layer and select Properties… to open the Layer Properties dialog box. In the [General] tab, untick the box next to visible, then click [OK] to close it. You will find the world_cities layer is hidden from your Data Frame.

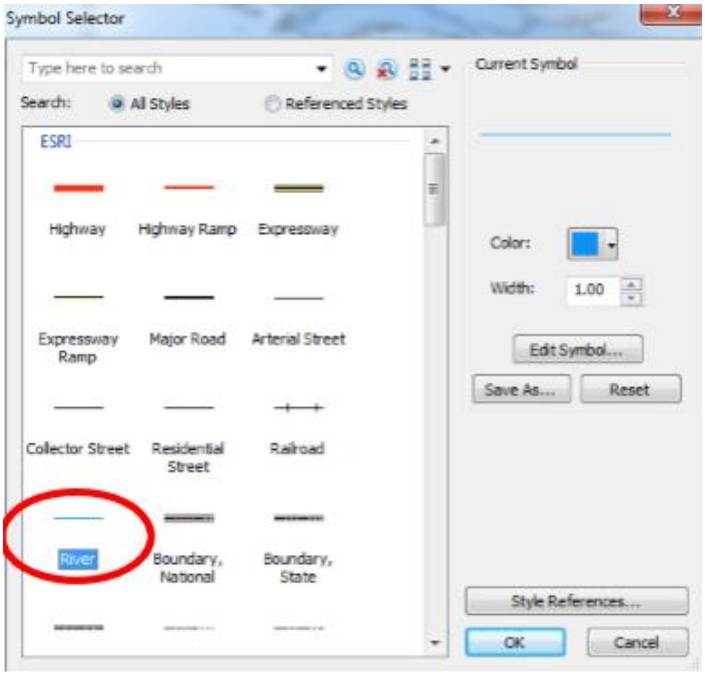
Question:

- Can you suggest another way to hide the world_cities layer (apart from removing it from theData Frame)? _____

20. Rightclick the world_rivers layer and select Properties…. In the Layer Properties dialog box, select [Symbology] tab.

In the Layer Properties dialog box, ensure that Feature > Single symbol is selected in Show box. Click the symbol in Symbol box. In Symbol Selector, select the River symbol, accept all default settings for this symbol, then click [OK] to close the symbol selector, and click [OK] again to close the Layer Properties dialog box.





21. Use the same method as in step 21, set the symbol of world_lakes layer as Lake (ESRI style).

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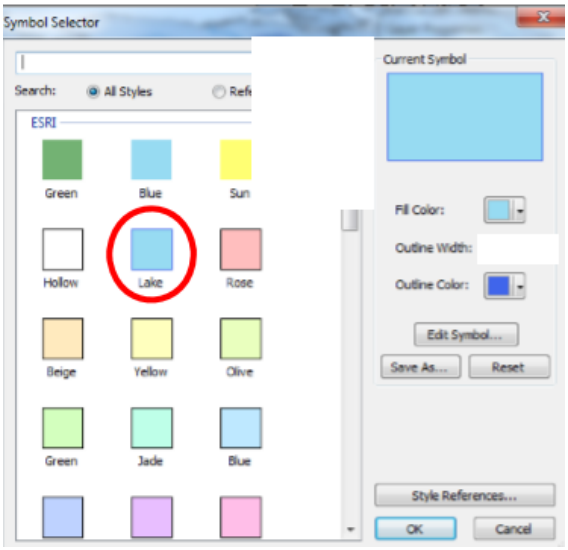
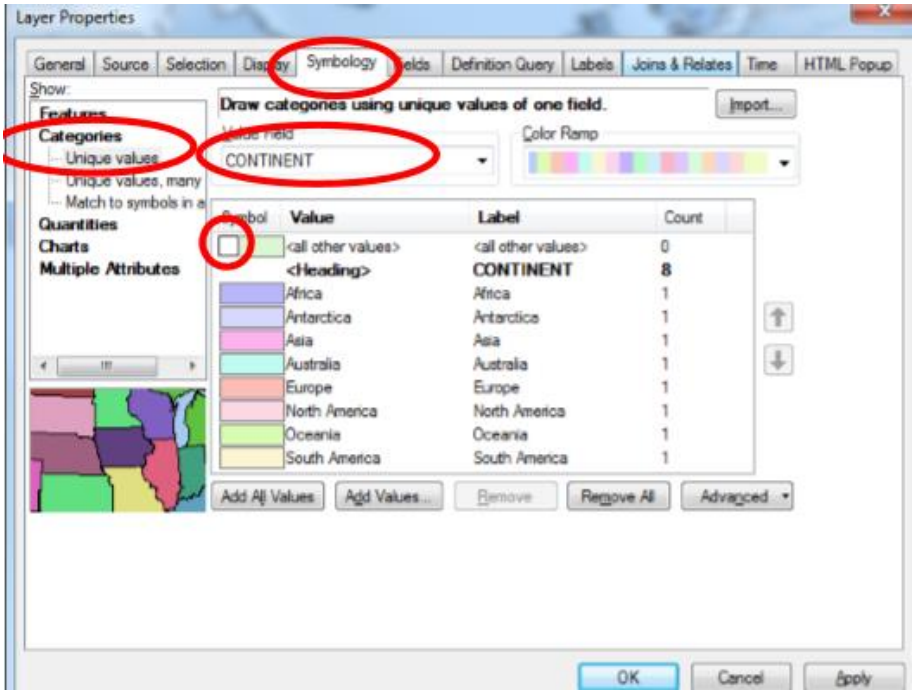


Question:

- What is the default outline width of Lake Symbol (in points)? _____

22. Set the symbol of world_continent layer by rightclicking this layer and select Properties. In the Layer Properties dialog box, select [Symbology] tab.
    In the Layer Properties dialog box, this time selects Categories > Unique values in Show box. Set CONTINENT as Value Field. Click the [Add All Values] button to assign Symbols to all continents. Untick the box next to <all other values> as our list of continents is exclusive. Click [Apply] to see the effect. Keep the Layer Properties dialog box opens.



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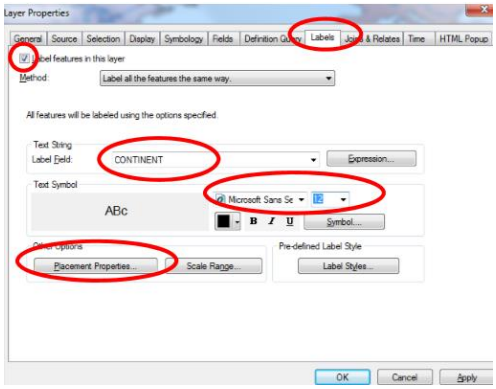
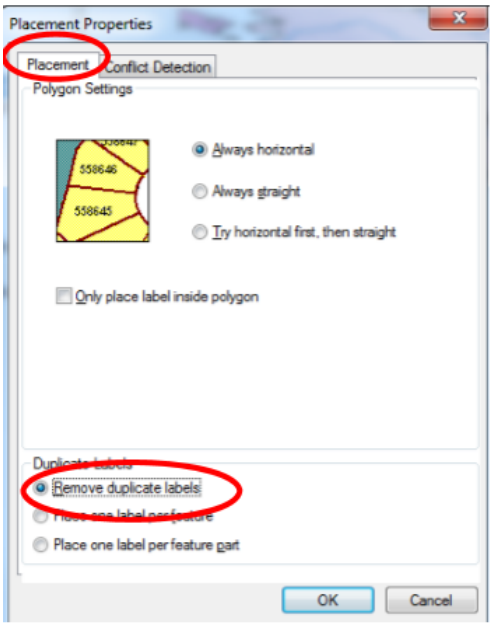
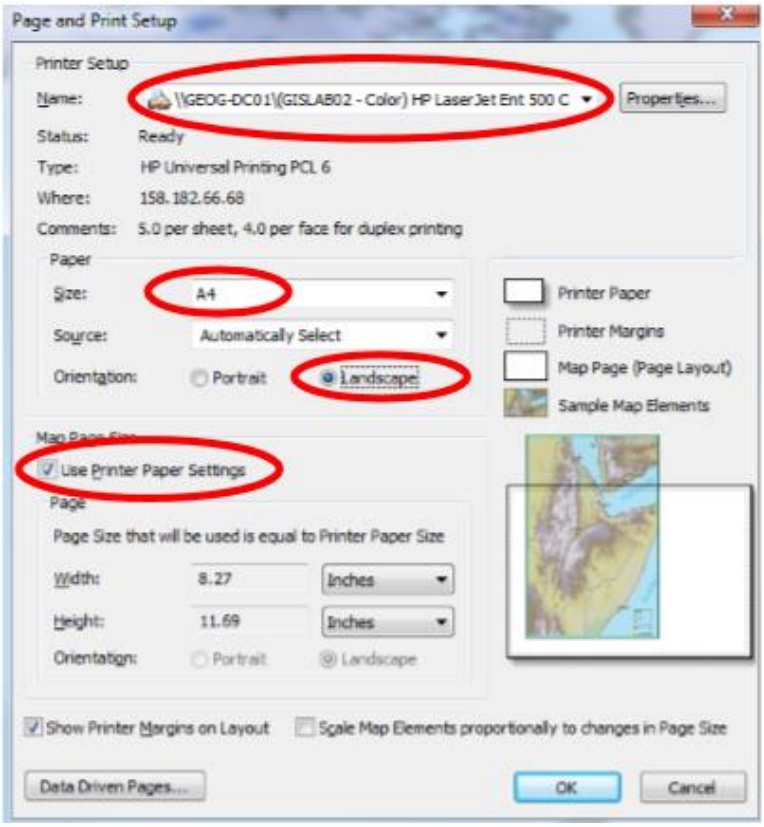
Note: You may choose different Color Ramp if you want to assign a different color scheme to Continents.

23. Select [Labels] tab in Layer Properties dialog box. Tick the box next to Label features in this layer.
    Select CONTINENT as Label Field. Set the Text Symbol as Microsoft Sans Serif and size 12. Then click the [Placement Properties…] button. In the [Placement] tab of Placement Properties dialog box, click Remove duplicate labels in Duplicate Labels Option. Click [OK] to close the Placement Properties dialog box. Click [OK] again to Close the Layer Properties dialog box and see the effect.



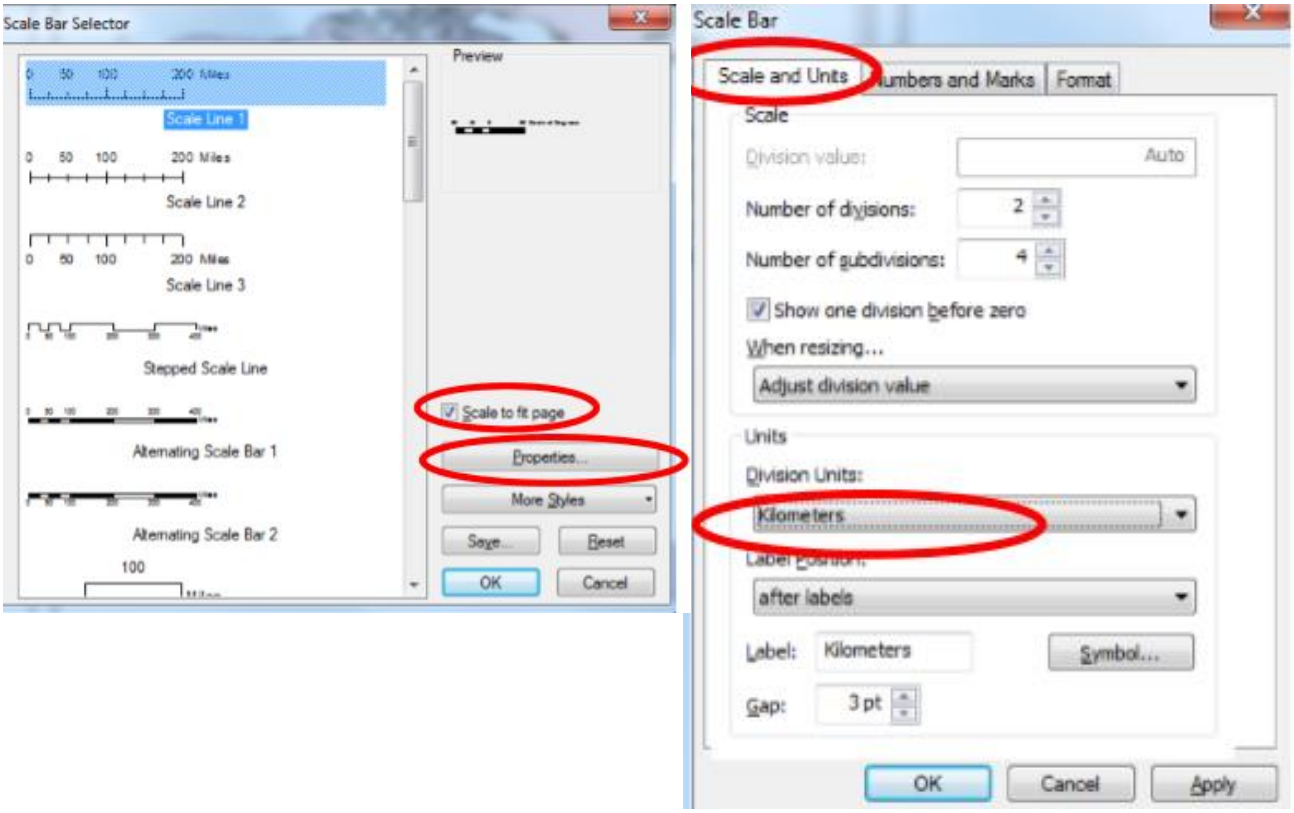


24. Setup your layout by selecting File > Page and Print Setup… Select the color printer and make sure that you have selected A4 size paper.
    We want to produce the map in landscape (i.e. greater width than height), so select Lands cape in Orientation option. Also tick the Use Printer Paper Settings in Map Page Size Section to make sure that settings for paper and printers are matched (i.e. the map size will fit the paper size). Press [OK] to accept.



25. Switch to Layout View by selecting View > Layout View. The size of paper and map may not be matched. You may need to adjust the map frame to make it fit to the paper orientation.
    - Layout view is where you add map surrounds, frames, graticules, and other finishing touches to a map. What you see on the layout is what you get if you print or export the map to the same page size.
    - If you find only partial map is shown in layout, or the map is too small, switch back to Data View and adjust the zoom level to Full Extent.
26. Insert necessary map elements include north arrow, scale bar and title.
    Select Insert > North Arrow... In the North Arrow Selector, select an appropriate north arrow (chosen by yourself) and click [OK]. Move it to your desired location and resize it if necessary.
    Select Insert > Scale Bar…. In the Scale Bar Selector, select an appropriate scale bar (Chosen by yourself). Click [Properties…] button to edit is properties. In [Scale and Unit s] tab, change the Division Units to be Kilometers then click [OK]. In the Scale Bar

Selector, ensure that Scale to fit page is tick, then click [OK] to close Scale Bar Selector. Move it to your desired location and resize it if necessary.



Question:

- What happen if you adjust the length of the scale bar in layout? _____.

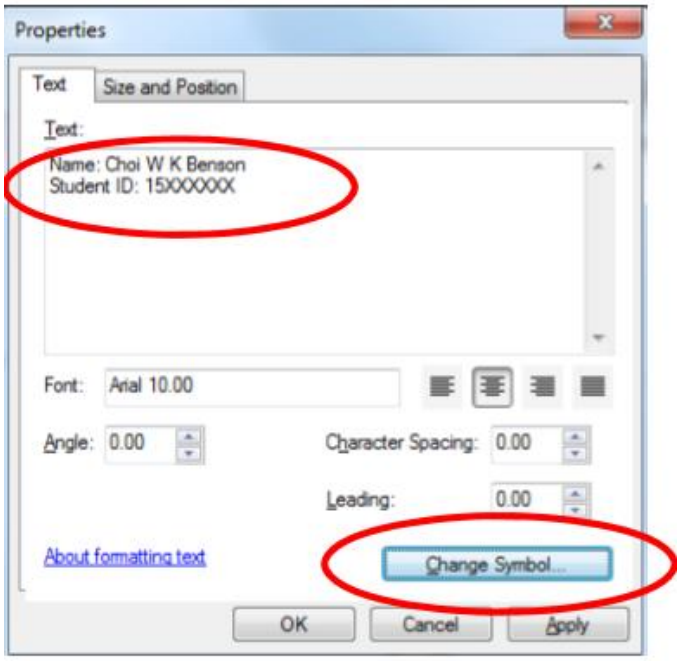
Select Insert > Title. Move title to your desired location.

Question:

What is the title of the map now? How can you change the title if you think it is not appro priate (suggest one method)? _____

Use the method you suggested, change the title to Lab 1 – World Lakes and Rivers

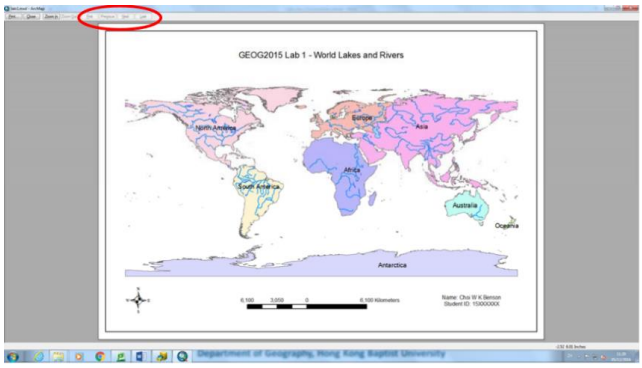
27. Also insert you name and student ID no. by selecting Insert > Text (Type your name and student ID by yourself). Move the texts to your desired location. Double-click the text to change its contents and font face. (Click [Change Symbol…] button to Change the appearance of the texts).



Note:

Most items in Insert menu will not be available if you are in Data View.

28. Preview the layout (File > Print Preview...) to see if it is okay. Print it out (File > Print…) when you have finalized it.
    (Check that the [First] [Previous] [Next] [Last] buttons should be grey out. Otherwise your printout will consist of more than one page.)



Question:

- Print the layout out in a A4 size paper using color printer.

29. Save the Map Document (File > Save) again. Quit ArcMap (File > Exit). Moreover, switch to ArcCatalog and quit (File > Exit). Turn off your workstation before you leave.
    Note:
    ArcGIS Desktop Help can be reached by selecting Help > ArcGIS Desktop Help (or Arc GIS Desktop Web Help) in most of the ArcGIS applications.