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# Mapping Tabular Data

ArcGIS Desktop 10.1 Instructional Guide



**RICE**

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This guide was created by the staff of the GIS/Data Center at Rice University and is to be used for individual educational purposes only. The exercises outlined in this guide require access to particular software and datasets which are available at Fondren Library.

# Obtaining the Tutorial Data

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Before beginning the tutorial, you will copy all of the required tutorial data onto your Desktop. Follow the applicable set of instructions below depending on the particular computer you are using.

## Accessing tutorial data from Fondren Library using the *gistrain* profile

If you are completing this tutorial from a public computer in Fondren Library and are logged on using the *gistrain* profile, follow the instructions below:

1. On the Desktop, **double-click** the **Computer icon** → **gisdata (\\fon-gis04) (O:)** → **Short\_Courses** → **Bringing\_Data\_Into\_ArcGIS\_Series** → **Mapping\_Tabular\_Data**.
2. To create a personal copy of the tutorial data, **drag** the **TabularTutorialData** folder onto the Desktop.
3. **Close all windows**.

## Accessing tutorial data online using a personal computer

If you are completing this tutorial from a personal computer, you will need to download the tutorial data online by following the instructions below:

1. Using a web browser, go to the Introduction to Coordinate Systems and Projections short course webpage at: <http://library.rice.edu/gis-tabular>
2. At the bottom of the webpage, under the Resources section, **click** the **Mapping Tabular Data – Tutorial Data** link to download the tutorial data.
3. **Unzip** the **TabularTutorialData** folder.
4. **Copy** the unzipped **TabularTutorialData** folder to your Desktop or another location of your choice. Ensure that you note the file path of the location you have selected.

Any time throughout the tutorial that you see reference to the file path *C:\Users\gistrain\Desktop\ProjectionsTutorialData*, you will need to substitute it with the file path you have just selected.

The following step-by-step instructions and screenshots are based on the Windows 7 operating system with the Windows Classic desktop theme and ArcGIS for Desktop 10.1 software with an Advanced license. If your personal system configuration varies, you may experience minor differences from the instructions and screenshots.

# Joining Tabular Data in ArcMap

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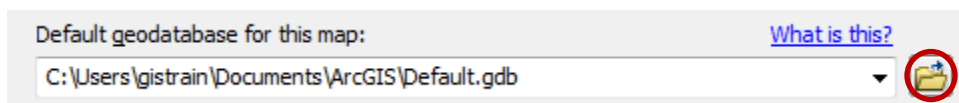
## Setting Up a Map Document

You will begin by opening ArcMap and creating a new map document.

1. On the desktop, double-click the **ArcMap 10.1** icon.
2. In the 'ArcMap – Getting Started' window, ensure that **My Templates** and the **Blank Map** template are selected.

At the bottom of the window, notice the default geodatabase for this map is currently set to C:\Users\gistrain\Documents\ArcGIS\Default.gdb. The default geodatabase should be set to the geodatabase that will contain most of the data for the particular map document you are working on. In this case, you will want to use the geodatabase in your *TabularTutorialData* folder.

3. Next to the 'Default geodatabase for this map:' box, click the **Browse** button.



4. In the 'Default Geodatabase' window, click the **Connect To Folder** button.



5. In the 'Connect To Folder' window, select the *TabularTutorialData* folder located on the Desktop.

Ensure that the *TabularTutorialData* folder is highlighted in blue and not the *TabularData.gdb* geodatabase that appears inside it. You never want to connect directly to a geodatabase, as doing so will prevent you from being able to access any of the data contained inside of it.

6. For 'Folder:', verify that either the *TabularTutorialData* folder or the **C:\Users\gistrain\Desktop\TabularTutorialData** filepath is listed and click **OK**.
7. In the 'Default Geodatabase' window, select the *TabularData.gdb* geodatabase and click **Add**.
8. Ensure the 'Default geodatabase for this map:' box says **"C:\Users\gistrain\Desktop\TabularTutorialData \TabularData.gdb"** and click **OK**.

At this point, it is a good idea to save your map document and to continue saving regularly.

9. On the Standard toolbar, click the **Save** button.



10. In the 'Save As' window, use the 'Save in:' drop-down box to select the **TabularTutorialData** folder.

You will save the map document here, directly inside the *TabularTutorialData* folder, but NOT within the *TabularData* geodatabase.

11. For 'File name:', type "**DowntownParcels**" and click **Save**.

Remember that, in order for your GIS project to open properly on other computers, you must tell the map document to store relative pathnames to its data sources and take your **entire project folder** containing all of your data and your map document with you.

12. Click the **File** menu and select **Map Document Properties...**
13. Towards the bottom of the 'Map Document Properties' window, click the **checkbox** to 'Store relative pathnames to data sources' and click **OK**.
14. On the Standard toolbar, click the **Save** button again to store this setting in your map document.

## Adding Tabular Data

You will now add a feature class to your map document that depicts all of the land parcels in downtown Houston. This feature class was obtained from the Harris County Appraisal District (HCAD) Public Data GIS website at <http://pdata.hcad.org/GIS/index.html>. The original parcels shapefile contained all of the parcels in Harris County, but working with such a large file can be time consuming, so for the purposes of this exercise, the layer was clipped to contain only those parcels in downtown Houston.

1. On the right side of the ArcMap window, click the **Catalog** tab.
2. On the Catalog toolbar, click the **Go To Default Geodatabase** button, which will take you to the default geodatabase you specified earlier.



3. Double-click the **TabularData** geodatabase to expand its contents.
4. Drag the **DowntownParcels** feature class into the Map Display.

You will now examine the *DowntownParcels* layer's attribute table.

5. In the Table of Contents, right-click the **DowntownParcels** layer and select **Open Attribute Table**.
6. Scroll to the right and browse through all of the attributes.

Notice that in the *HCAD\_NUM* field, you are provided with the unique HCAD account number for each parcel. You are also provided with the owner name and address for each parcel, but not very much other information. Fortunately, a tremendous amount of other information about the

parcels can be obtained from HCAD in stand-alone tabular format. In this case, you would like to know the particular land use for each parcel, for example residential, commercial, or industrial. This information is contained in a separate table, which you will now explore.

7. **Close the attribute table.**
8. **On the right side of the ArcMap window, click the **Catalog** tab.**
9. **In the *TabularData* geodatabase, drag the **Land** table into the Map Display.**

Notice at the top of the Table of Contents, the highlighted icon has switched from the first 'List By Drawing Order' button to the second 'List by Source' button. That switch is because the tabular data you just added does not have a graphic component, so it cannot yet be drawn and will not appear in the drawing order view.

10. **In the Table of Contents, right-click the **Land** table and select **Open**.**
11. **Scroll to the right and browse through all of the attributes.**

Notice that you are again provided with the unique HCAD account number, but this time the field is labeled *ACCOUNT*, rather than *HCAD\_NUM*, as it was in the *DowntownParcels* feature class attribute table. You are also provided with the land use code and the land use description for each parcel. In order to symbolize the parcels by land use, you will first need to join the land use table to the parcels feature class.

You will now explore the various land use codes.

12. **Right-click the **LAND\_USE\_C** field and select **Sort Ascending**.**
13. **Scroll down and browse through all of the land use codes and descriptions.**

Notice how many different land use categories there are. For example, commercial land use is divided into very specific categories, such as Restaurant, Ice House, Bar/Lounge, Department Store, Medical Office, and Bank. While it is great to have this information available, symbolizing so many different categories on a single map can make the map difficult to understand. Instead, you would prefer to symbolize the parcels using more generalized land use categories.

Fortunately, the City of Houston has created a lookup table that assigns each appraisal district land use code to one of ten generalized land use categories. You will now explore this lookup table.

14. **On the right side of the ArcMap window, click the **Catalog** tab.**
15. **In the *TabularData* geodatabase, drag the **LandUseCode\_LookupTable** table into the Map Display.**
16. **In the Table of Contents, right-click the **LandUseCode\_LookupTable** table and select **Open**.**

17. Scroll to the **right** and browse through all of the attributes.

Notice that the *COUNTY* field tells you which county uses the particular land use code listed. “HCAD” is for Harris County. If you scroll down, you will notice “FBCAD” and “MCAD” for Fort Bend County and Montgomery County, respectively. The *LANDUSE\_CODE* and *LANDUSE\_DESCRIPTION* fields should look familiar, since they contain the same information as the *Land* table you looked at previously. The *GROUP\_CODE* and *GROUP\_DSCR* fields store one of ten general land use categories that correspond to each specific land use code. In order to symbolize the parcels using these generalized land use categories, you will also need to join the lookup table to the land use table and the parcels feature class. You will perform the join using the land use code field that is common to both your land use table and your lookup table.

18. Close the attribute tables.

## Joining Tabular Data

Now that you have examined all of the data tables, you are ready to join them all together. It is possible to join tables together in any order, but you want to add both land use tables to the back of the attribute table for your parcels layer. To avoid confusion, it is best to perform joins from the List by Drawing Order view, so that you don’t accidentally try to join the parcels layer attribute table to the back of one of the other tables.

1. At the top of the Table of Contents, click the **List by Drawing Order** button.



You will now join the *Land* table to the *DowntownParcels* feature class using the unique HCAD account number as the common field.

2. In the Table of Contents, right-click the **DowntownParcels** layer and select **Joins and Relates > Join....**
3. For ‘What do you want to join to this layer?’, ensure that **Join attributes from a table** is selected.
4. For ‘1. Choose the field in this layer that the join will be based on:’, select the **HCAD\_NUM** field.
5. For ‘2. Choose the table to join to this layer, or load the table from disk:’, select the **Land** table.
6. For ‘3. Choose the field in the table to base the join on:’, select the **ACCOUNT** field.
7. Ensure that the ‘Join Data’ window matches that shown below and click **OK**.

1. Choose the field in this layer that the join will be based on:  
 HCAD\_NUM

2. Choose the table to join to this layer, or load the table from disk:  
 Land  Show the attribute tables of layers in this list

3. Choose the field in the table to base the join on:  
 ACCOUNT

8. If asked if you would like to create an index for the join, **click Yes**.
9. **Right-click** the *DowntownParcels* layer and **select Open Attribute Table**.
10. **Scroll** to the **right** and **browse** through all of the attributes.

Notice the four new fields added to the end of the *DowntownParcels* attribute table showing the land use for every parcel. Because you want to symbolize the parcels using the generalized land use categories, you will now also join the *LandUseCode\_LookupTable* table using the land use code as the common field.

11. **Close** the **attribute table**.
12. In the Table of Contents, **right-click** the *DowntownParcels* layer and **select Joins and Relates > Join....**
13. For 'What do you want to join to this layer?', **ensure** that **Join attributes from a table** is selected.
14. For '1. Choose the field in this layer that the join will be based on:', **select** the **LAND\_USE\_C** field.
15. For '2. Choose the table to join to this layer, or load the table from disk:', **select** the **LandUseCode\_LookupTable** table.

For '3. Choose the field in the table to base the join on:', notice that the *LANDUSE\_CODE* field that you want to base the join on cannot be selected. This is an indicator that the two join fields are probably not of the same type and cannot be joined as is.

16. **Close** the 'Join Data' window, without completing the join.

## Troubleshooting Joins

You will now examine the two tables more closely to determine why the desired join field did not show up in the 'Join Data' window.

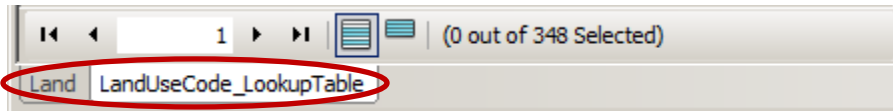
1. At the top of the Table of Contents, **click** the **List by Source** button to gain access to your tables.





2. Right-click the *Land* table and select **Open**.
3. Right-click the *LandUseCode\_LookupTable* table and select **Open**.

Notice at the bottom left of the 'Table' window, you see one tab for each of the two tables that are open, but you want to be able to examine both tables simultaneously.



4. At the top of the 'Table' window, click the **Table Options** button and select **Arrange Tables > New Horizontal Tab Group**.



When looking at a table, any column that is left-aligned is treated as text and any column that is right-aligned is treated as a number. Examine the two fields that you were previously attempting to join. Notice that the *LAND\_USE\_C* field in the *Land* table is right-aligned as a number and the *LANDUSE\_CODE* field in the *LandUseCode\_LookupTable* table is left-aligned as a text. For further confirmation of this problem, you will examine the properties of each field.

5. In the *Land* table, right-click the *LAND\_USE\_C* field and select **Properties....** Notice that the field type is "Long", which stands for long integer.
6. Close the 'Field Properties' window.
7. In the *LandUseCode\_LookupTable* table, right-click the *LANDUSE\_CODE* field and select **Properties....** Notice that the field type is "String", which is another term for text.
8. Close the 'Field Properties' window.

In order to perform a join, the corresponding join fields in the respective tables must be of the same field type. Unlike in Excel, you cannot simply convert an existing field from one type to another. Instead, you must create a new field of the correct field type and copy the data over into the new field. In this case, you will convert the *LAND\_USE\_C* field in the *Land* table to a string field type to match the string field type used in the *LandUseCode\_LookupTable* table.

9. In the 'Table' window, click the *Land* table to ensure that it is selected.
10. Click the **Table Options** button and select **Add Field....**
11. For 'Name:', type "*LAND\_USE\_C\_Text*".
12. For 'Type:', select **Text** and click **OK**.

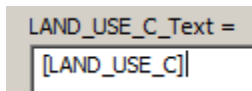
The new *LAND\_USE\_C\_Text* field has now been added to the end of the *Land* table.

13. Right-click the *LAND\_USE\_C\_Text* field and select **Field Calculator...**

14. When asked if you would like to continue editing outside of an edit session, click **Yes**.

15. In the Field Calculator window, double-click the *LAND\_USE\_C* field.

Notice that the box at the bottom of the 'Field Calculator' window now reads *LAND\_USE\_C\_Text* = [*LAND\_USE\_C*], as shown below. This statement will copy all of the content from the original *LAND\_USE\_C* integer field to the new *LAND\_USE\_C\_Text* text field.



The image shows a screenshot of the Field Calculator window. The expression field contains the text "LAND\_USE\_C\_Text = [LAND\_USE\_C]". The text is left-aligned and appears to be a copy of the field name and its value.

16. Click **OK**.

Ensure that the land use codes have indeed been copied over into the new *LAND\_USE\_C\_Text* field and that they are left-aligned as text.

17. Close the attribute tables.

18. At the top of the Table of Contents, click the **List by Drawing Order** button again.

You will now attempt to join the tables again using the edited fields, but you will also need to redo even your original join, since the *Land* table has been modified.

19. In the Table of Contents, right-click the *DowntownParcels* layer and select **Joins and Relates > Remove Join(s) > Remove All Joins**.

You will now repeat the process of joining both tables.

20. In the Table of Contents, right-click the *DowntownParcels* layer and select **Joins and Relates > Join...**

21. For 'What do you want to join to this layer?', ensure that **Join attributes from a table** is selected.

22. For '1. Choose the field in this layer that the join will be based on:', select the *HCAD\_NUM* field.

23. For '2. Choose the table to join to this layer, or load the table from disk:', select the *Land* table.

24. For '3. Choose the field in the table to base the join on:', select the *ACCOUNT* field.

25. Ensure that the 'Join Data' window matches that shown below and click **OK**.

1. Choose the field in this layer that the join will be based on:

HCAD\_NUM

2. Choose the table to join to this layer, or load the table from disk:

Land

Show the attribute tables of layers in this list

3. Choose the field in the table to base the join on:

ACCOUNT

26. Right-click the *DowntownParcels* layer and select **Open Attribute Table**.
27. Scroll to the **right** and ensure that the four land use code fields were added.
28. Close the attribute table.
29. In the Table of Contents, right-click the *DowntownParcels* layer and select **Joins and Relates > Join....**
30. For 'What do you want to join to this layer?', ensure that **Join attributes from a table** is selected.
31. For '1. Choose the field in this layer that the join will be based on:', select the new *LAND\_USE\_C\_Text* field.
32. For '2. Choose the table to join to this layer, or load the table from disk:', select the *LandUseCode\_LookupTable* table.
33. For '3. Choose the field in the table to base the join on:', select the *LANDUSE\_CODE* field.
34. Ensure that the 'Join Data' window matches that shown below and click **OK**.

1. Choose the field in this layer that the join will be based on:

LAND\_USE\_C\_Text

2. Choose the table to join to this layer, or load the table from disk:

LandUseCode\_LookupTable

Show the attribute tables of layers in this list

3. Choose the field in the table to base the join on:

LANDUSE\_CODE

35. If asked if you would like to create an index for the join, click **Yes**.
36. Right-click the *DowntownParcels* layer and select **Open Attribute Table**.

37. Scroll to the **right** and browse through all of the attributes.

Notice that the generalized group code and description fields have been added to the end of the attribute table.

38. Close the attribute table.

39. On the Standard toolbar, click **Save**.

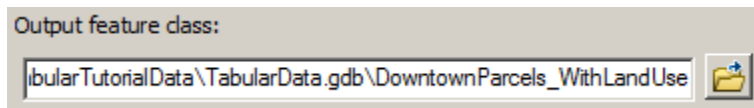
## Exporting Tabular Data

The joins that you have created are *only* stored in this particular map document. In other words, none of the original tables have been modified. If you were to add the *DowntownParcels* layer to another new map document, you would no longer see the joined tables at the back of the layer's attribute table. In addition, if your joined data tables were ever moved or deleted, the joined data would no longer be visible in this map document. For this reason, it is often a good idea to export data containing successful tabular joins, so that you do not have to worry about losing the joined data in the future.

1. Right-click the *DowntownParcels* layer and select **Data > Export Data....**

Notice that the output feature class defaults to your default geodatabase (C:\Users\gistra\ Desktop\TabularTutorialData\TabularData.gdb).

2. For 'Output feature class:', scroll to the end and rename the feature class from "Export\_Output" to "**DowntownParcels\_WithLandUse**" and click **OK**.



3. Click **Yes** to add the exported data to your map as a layer.

4. Right-click the *DowntownParcels\_WithLandUse* layer and select **Open Attribute Table**.

Notice that all of the joined attributes are now a permanent part of this new feature class attribute table. Since this permanent feature class contains everything you need in one layer, you may now remove your original parcels layer and both joined tables.

5. Close the attribute table.

6. At the top of the Table of Contents, click the **List by Source** button to gain access to your tables.

7. Right-click the *DowntownParcels* layer and select **Remove**.

8. Right-click the *Land* table and select **Remove**.

9. Right-click the *LandUseCode\_LookupTable* table and select **Remove**.

10. On the Standard toolbar, click **Save**.

You have successfully joined tabular data in ArcMap!










## Mapping Tabular Data

You will now symbolize the parcels according to their generalized land use categories.

1. Double-click the **DowntownParcels\_WithLandUse** layer to open the 'Layer Properties' window and edit the symbology.
2. Click the **Symbology** tab.
3. In the 'Show:' box on the left, click **Categories** and leave the default selection of Unique values.
4. In the 'Value Field' drop-down box, select the **GROUP\_DSCR** field.
5. In the bottom left corner, click **Add All Values**.
6. At the top of the list of values, uncheck **<all other values>**, since there are none in this case.

You will want to group "Commercial" and "Office" into one land use category.

7. Click the **Commercial** value to select it.
8. Hold down **Ctrl** and click the **Office** value to select it too.
9. Right-click the **Commercial** value and select **Group Values** to combine the two categories into one.
10. Double-click on each of the symbol patches to change the colors to those commonly used by planners to indicate the various land uses, as displayed below.

Symbol	Value	Label	Count
	<all other values>	<all other values>	0
	<b>&lt;Heading&gt;</b>	<b>GROUP_DSCR</b>	<b>1901</b>
	<Null>	<Null>	5
	Commercial; Office	Commercial; Office	581
	Industrial	Industrial	55
	Multi-Family Residential	Multi-Family Residential	673
	Public_Institutional	Public_Institutional	108
	Single-Family Residential	Single-Family Residential	11
	Transportation_Utility	Transportation_Utility	17
	Undeveloped	Undeveloped	451

11. Click **OK**.

12. On the Standard toolbar, click **Save** and minimize **ArcMap**.

# Formatting Tabular Data in Excel for Joining

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In the first exercise using HCAD data, both the layer attribute table and the join table were already formatted properly, so that you could bring them directly into ArcGIS. Unfortunately, such a situation rarely occurs and most data tables require some formatting to prepare them for import into ArcGIS.

In this exercise, you will be mapping land cover by state. The original data table was obtained from The 2011 Statistical Abstract published by the U.S. Census Bureau at <http://www.census.gov/compendia/statab/>. The particular table was accessed from the “Geography & Environment” section under the “Land, Land Use, and Earthquakes” category and was called table “265, Land Cover/Use by State: 2003”. You will now format this table for import into ArcGIS.

1. **Double-click the *TabularTutorialData* folder on the desktop.**
2. **Double-click *LandCoverByState* to open the file with Excel.**

Along the left side of the spreadsheet are the row numbers. Along the top of the spreadsheet are the column letters. When you are asked to click on a row or column, you will be clicking directly on these numbers and letters.

## Removing Extraneous Data from Excel Worksheets

Notice that the first three rows contain title information for the table, but do not contain any data, so you will delete these rows. Notice also that row 1 is barely visible, because its height has been greatly reduced.

1. **Click and hold row 3 and drag the mouse up past the top of the spreadsheet to select rows 1 through 3.**
2. **Right-click row 3 and select Delete.**

Sometimes data tables contain a lot more information than you actually need. While it is okay to import large tables into ArcMap, it can make future tasks more difficult for you. Every time you have to select a particular field for symbology, labels, or queries, you will have to scroll through a long list of fields, rather than a targeted list containing only your selected variables of interest. For this reason, it is ideal to remove all unnecessary data columns in Excel before importing into ArcGIS.

For this particular exercise, you will map the percent of all land that is developed land and the percent of all nonfederal land that is forest land. Such a task will require keeping the columns titled “State,” “Total surface area,” “Forest land,” “Developed Land,” and “Water Areas.” You will remove all of the rest of the columns.

3. **Click column C to highlight the entire column.**
4. **Hold down Ctrl and click columns D, E, F, H, I, L, M, N, O, P.**

Ensure that you are left with the five necessary columns previously mentioned.

**5. Right-click column **P** and select **Delete**.**

The selected columns should disappear and you should be left with the columns labeled “State,” “Total surface area,” “Forest land,” “Developed Land,” and “Water Areas.”

When you bring an Excel table into ArcGIS, it assumes that the first row contains the field name and then it assumes the data begins in the second row. Whatever data type it sees in that second row, it assumes is the data type for the entire column. If there is ever more than one row containing title information, ArcGIS will see that title text in the entire second row and assume that all the data contained in the entire table is text, when, in fact, the majority of the data is numerical. In short, all but one field name row must be removed, but, first, you must create an appropriate field name row.

**6. Right-click row **4** and select **Insert**.**

This newly inserted row will contain your field names. For field names, you should not use any spaces or special characters and should not start with a numeral or use more than 13 characters. You may use underscores, mixed case letters, and numerals (in the middle or end of the field name only).

**7. In row 4, type the following field names: “**State**” “**Total**” “**Forest**” “**Developed**” “**Water**”. After typing each word, press **Delete** (rather than **Enter** or the **right arrow**), so that the unwanted remainder of each phrase is not copied from the row above. Ensure that there is not an extra space after the word “**State**”.**

Since you have created a row with appropriate field names, you may now delete all rows above it.

**8. Click row **1**.**

**9. Hold down **Shift** and click row **3**.**

**10. Right-click row **3** and select **Delete**.**

Because you are mapping data for each state, you do not need the total data for the entire United States contained in row 2 or the accidental repeat of the Alabama data in row 3.

**11. Click row **2**.**

**12. Hold down **Shift** and click row **3**.**

**13. Right-click row **3** and select **Delete**.**

Scroll to the bottom of the table and notice there are extra rows that do not contain data here, as well.

**14. Click row **50** (FOOTNOTE:).**

15. Hold down Shift and click row 56 (Internet release date:).

16. Right-click row 56 and select Delete.

## Using Formulas in Excel

At this point, the table is mostly cleaned up, so you will add two new columns to calculate the percent of the total land area that is developed and forest.

1. In cell F1, type "Per\_Forest".
2. In cell G1, type "Per\_Developed".

Now you will calculate the formula where  $\text{Per\_Forest} = \text{Forest}/(\text{Total-Water})$ .

3. In cell F2, type "=" to indicate the start of a formula.
4. Click cell C2 (Alabama Forest).
5. Type "/" (divided by, open parenthesis).
6. Click cell B2 (Alabama Total).
7. Type "-" (minus sign).
8. Click cell E2 (Alabama Water).
9. Type "\*100" (close parenthesis, times 100).
10. Ensure your cell says "=C2/(B2-E2)\*100" and press Enter to finish the formula.
11. Click cell F2 containing the formula you just entered.

Hover your cursor over the small black box in the bottom right corner of the highlighted cell as shown below. Notice that your cursor changes from a thick white cross to a thin black cross.

12. Double-click the **black box** in the bottom right of cell F2 to copy the formula down the table.

Water	Per Forest	Per Developed
1,281.4	66.98317487	
187.1		

13. In cell G2, use the same formula building techniques to enter "=D2/(B2-E2)\*100" and copy the formula down the table.

One last problem with this worksheet, which is difficult to detect, is that there is actually a space stored after every state name. This space will prevent the table from joining properly to another table whose state names do not have a trailing space. You will now perform a series of automated operations to remove this extra space.



14. Click column B.
15. Hold down Shift and click column D.
16. Right-click column D and select Insert to add three new columns in which to work.

First, you will use the Text to Columns tool, which splits the information contained in one column into multiple columns based on a delimiter. The delimiter is the character which is used to signal when to shift the data to the next column. As a result, the delimiter itself is removed and all characters following the delimiter are shifted to the next column. In this case you will use the space as the delimiter to remove it.

17. Click column A.
18. Click the Data tab at the top of the Excel window.
19. Under the Data Tools section, click the Text to Columns button.
20. In the 'Convert Text to Columns Wizard', click Next >.
21. In the Delimiters box, uncheck Tab and check Space and click Next >.
22. Click Finish.
23. When asked if you want to replace the contents of the destination cells, click OK.

The extra spaces have been removed, but the state names with two words have been separated into two columns. You will need to concatenate them back together into a single column separated by a space, but only for those states with two words. Performing a concatenation on all the states with an added space in between the two words would end up adding the trailing space again. The formula below basically says, if column B is blank, then copy the state name from column A; otherwise, if column B contains text, then concatenate the first part of the state name in column A with the second part of the state name in column B and add a space in between them.

24. In cell C2, use your formula building techniques to enter `"=IF(B2="",A2,CONCATENATE(A2," ",B2))"`. Ensure that there is no space between the first set of quotation marks and a single space between the second set of quotation marks.

In this instance you can't double-click the black box in the bottom right of cell C2 to copy the formula down, because there is not consistent data in the column the left of it.

25. Click and hold the black box in the bottom right of cell C2 and drag down to cell C49 to copy the formula down the table.

At this point it looks good, but the values contained in column C are actually formulas, not text, and ArcGIS will not be able to interpret the formulas.

26. Right-click column C and select Copy.

27. Right-click column D and select **Paste Special....**

28. In the 'Paste Special' window, select to **Paste Values** and click **OK**.

Now the states listed in column D are stored as text, rather than as formulas, so you can now delete columns A through C.

29. Click column A.

30. Hold down **Shift** and click column C.

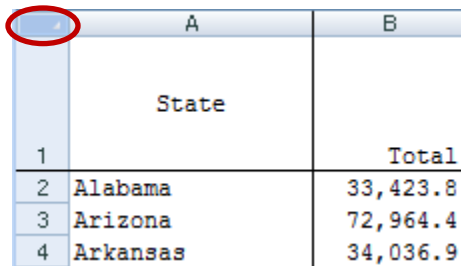
31. Right-click column C and select **Delete**.

32. In cell A1, type "State".

## Removing all formatting in Excel

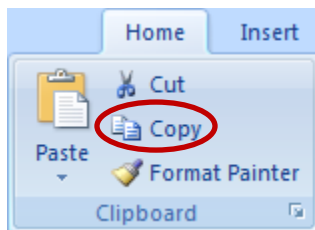
At this point your table has everything you need and nothing extra, but it is always recommended to clear all formatting and programming, including special fonts, background colors, borders, formulas, etc., before bringing the Excel file into ArcGIS. To get rid of all formatting and programming, you will copy all of the data into a new blank worksheet.

1. Click the **Select All** button in the top left corner of the spreadsheet.



	A	B
1	State	
2	Alabama	33,423.8
3	Arizona	72,964.4
4	Arkansas	34,036.9

2. In the Home tab, click **Copy**.



3. Click the **File** tab and select **New**.

4. Ensure that **Blank Workbook** is selected and click **Create**.

5. In the new workbook, right-click cell A1 and select **Paste Special....**

6. Select to paste **Values** and click **OK**.

You should now have a clean version of your data with no special formatting. The last step is to expand the cells to ensure that all of their content is displayed.

7. **Click column A.**
8. **Hold down Shift and click column G.**

Hover your cursor over one of the lines between any two of the column letters. Notice that your cursor changes from a single arrow pointing down to a double arrow pointing left and right.

9. **Double-click the **dividing line** between column A and B.**

The width of all your columns should now be expanded to show all of the cells' content. You are finished formatting your table.

10. **Click the **File** tab and select **Save As**.**
11. **Navigate to the *TabularTutorialData* folder on the desktop.**
12. For 'File name:', type "**US\_LandCover**".
13. For 'Save as type:', use the drop-down box to select **Excel 97-2003 Workbook**.
14. **Click **Save**.**
15. **Close **Excel**.**

## Setting Up a Map Document from an Existing Map Document

Now you will return to ArcMap to map the land cover data by state.

1. **Maximize **ArcMap**.**

Because you already have the map document from the prior exercise set up with the correct default database and it has been set to save relative path, you will use this map document as a template, rather than starting a new one.

2. **Click the **Insert** menu and select **Data Frame**.**

This creates a new data frame in which you will map your state land cover data, so you no longer need your old data frame containing the downtown Houston parcels.

3. **In the **Table of Contents**, right-click the top **Layers** data frame and select **Remove**.**

You will now save this map document under a different name so as not to overwrite your map document from the first exercise.

4. **Click the **File** menu and select **Save As....****
5. **In the 'Save As' window, change the File name to "**USLandCover**" and click **Save**.**

You will now explore the state data.

6. On the right side of the ArcMap window, click the **Catalog** tab.
7. In the *TabularData* geodatabase, drag the **US\_States** feature class into the Map Display.
8. In the Table of Contents, right-click the **US\_States** layer and select **Open Attribute Table**.

Examine the attribute table for the *US\_States* layer and notice that the field containing the state names is “*NAME10*”.

9. Close the attribute table.
10. On the right side of the ArcMap window, click the **Catalog** tab.

It is likely that your newly saved *US\_LandCover* Excel file will not be visible in ArcCatalog yet. You will need to refresh the Data folder for it to appear.

11. Right-click the *TabularTutorialData* folder and select **Refresh**.
12. Double-click the *USLandCover* Excel file to expand it and see the individual worksheets.

Because a single Excel file can have multiple worksheets and each worksheet is treated in ArcGIS as a separate table, you must always specify which specific worksheet you want to use. You cannot add in an entire Excel file directly into ArcMap.

13. In the *USLandCover* Excel file, drag the **Sheet1\$** worksheet into the Map Display.
14. In the Table of Contents, right-click the **Sheet1\$** worksheet and select **Open**.

Examine the *Sheet1\$* table and notice that the field containing the state names is “*State*”.

Using your knowledge from the first exercise, try to join the *Sheet1\$* worksheet to the *US\_States* feature class and symbolize the states by both the percent developed land and the percent forest land. If you get stuck, ask for help.

Last updated September 17, 2012.