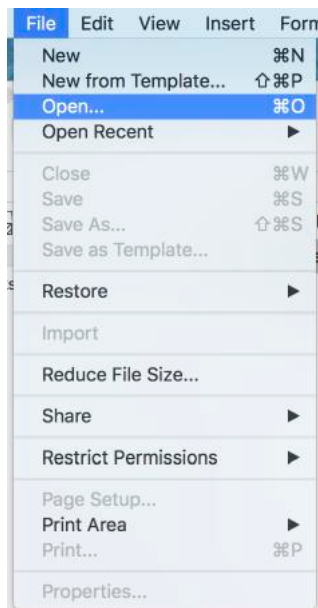


Excel for Research Workshop 7-23-20

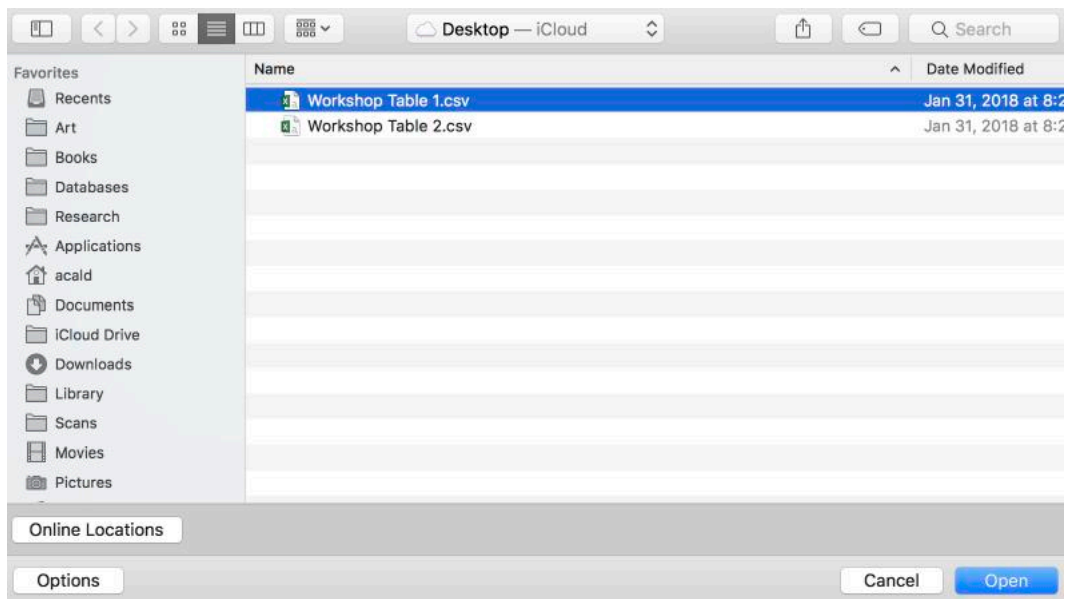
Open Workshop Files

1) Download Workshop table 1.csv & Workshop table 2.csv to a location you can find the files.

2) Open the workshop files with the **File>Open... Menu item**



3) Select the file named Workshop Table 1.csv then click the “Open” button.



4) When the Text Import Wizard Step 1 dialog box opens click the “Next” button (Make no changes).

Text Import Wizard - Step 1 of 3

The Text Wizard has determined that your data is Delimited.

If this is correct, choose Next, or choose the Data Type that best describes your data.

☒ Delimited - Characters such as commas or tabs separate each field.
☐ Fixed width - Fields are aligned in columns with spaces between each field.

Start import at row: File origin:

Preview of selected data:

Preview of file /Users/acald/Desktop/Workshop Table 1.csv.

1	State,Year	Passenger car occupants,Pickup and SUV occupants,Large truck occupants,Motorcyclists,Pedestrian
2	Alabama,2005	579,354,16,61,72
3	2006	553,401,18,103,78
4	2007	520,375,15,85,69
5	2008	438,298,25,98,66
6	2009	386,269,14,74,64
7	2010	393,281,9,86,61
8	2011	398,269,16,96,79
9	2012	386,260,13,96,77

5) When the Text Import Wizard Step 2 dialog box opens un-check the "Tab" checkbox and select the "Comma" checkbox then click on the "Next" button.

Text Import Wizard - Step 2 of 3

This screen lets you set the delimiters your data contains.

Delimiters

☐ Tab
☐ Semicolon
☒ Comma
☐ Space
☐ Other:

☐ Treat consecutive delimiters as one
 Text qualifier:

Preview of selected data:

State	Year	Passenger car occupants	Pickup and SUV occupants	Large truck occupants	Motorcyclists	Pedestrian
Alabama	2005	579	354	16	61	72
	2006	553	401	18	103	78
	2007	520	375	15	85	69
	2008	438	298	25	98	66
	2009	386	269	14	74	64
	2010	393	281	9	86	61
	2011	398	269	16	96	79
	2012	386	260	13	96	77

6) When the Text Import Wizard Step 3 dialog box opens just click on the "Finish" button.

Text Import Wizard - Step 3 of 3

This screen lets you select each column and set the Data Format.

Column data format

☒ General

☐ Text

☐ Date: MDY

☐ Do not import column (Skip)

Advanced...

Preview of selected data:

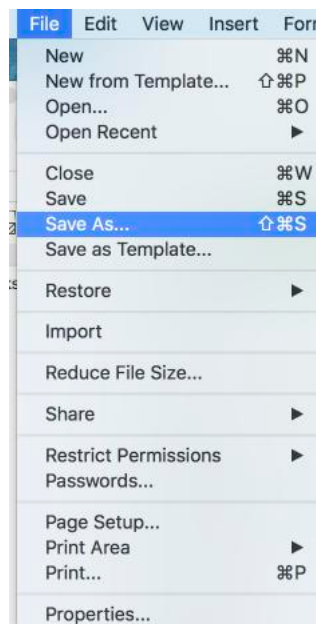
General	General	General	General	General	General
State	Year	Passenger car occupants	Pickup and SUV occupants	Large truck occupants	Motorcyclists
Alabama	2005	579	354	16	61
	2006	553	401	18	103
	2007	520	375	15	85
	2008	438	298	25	98
	2009	386	269	14	74
	2010	393	281	9	86
	2011	398	269	16	96
	2012	386	260	13	96

Cancel < Back Next > Finish

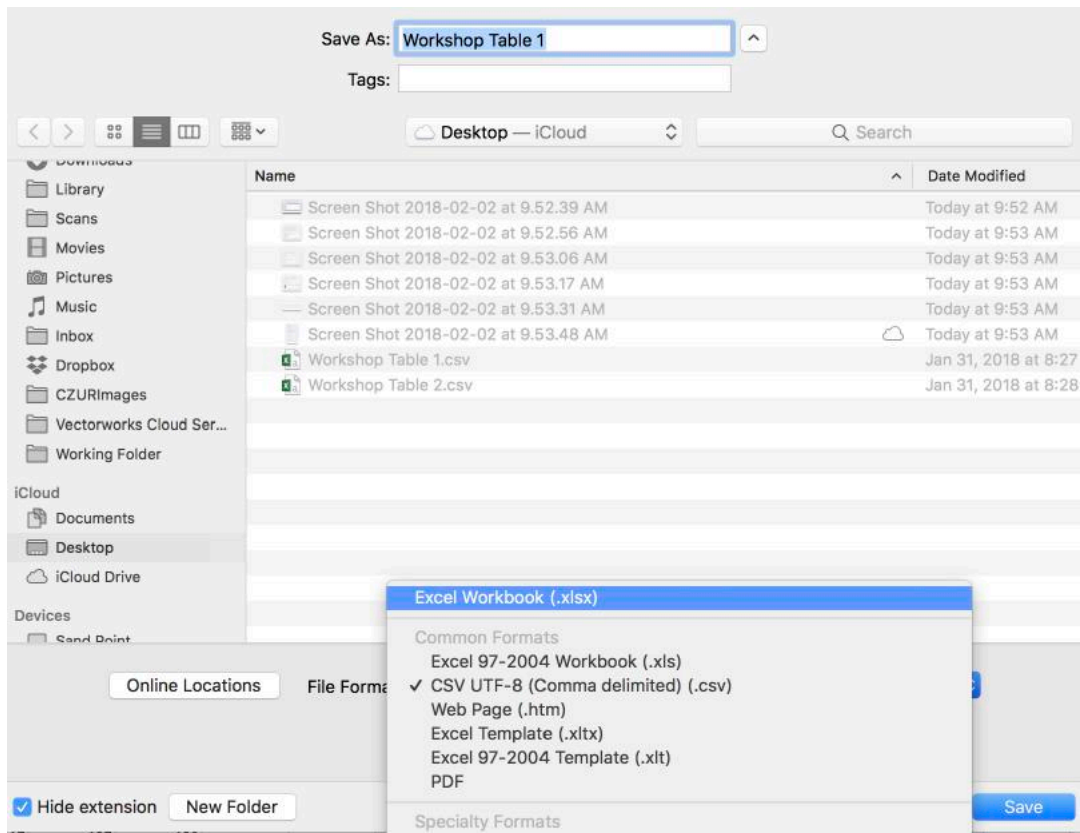
7) You should see a warning along the bottom to the tool bar indicating you should save your workbook as Excel format.



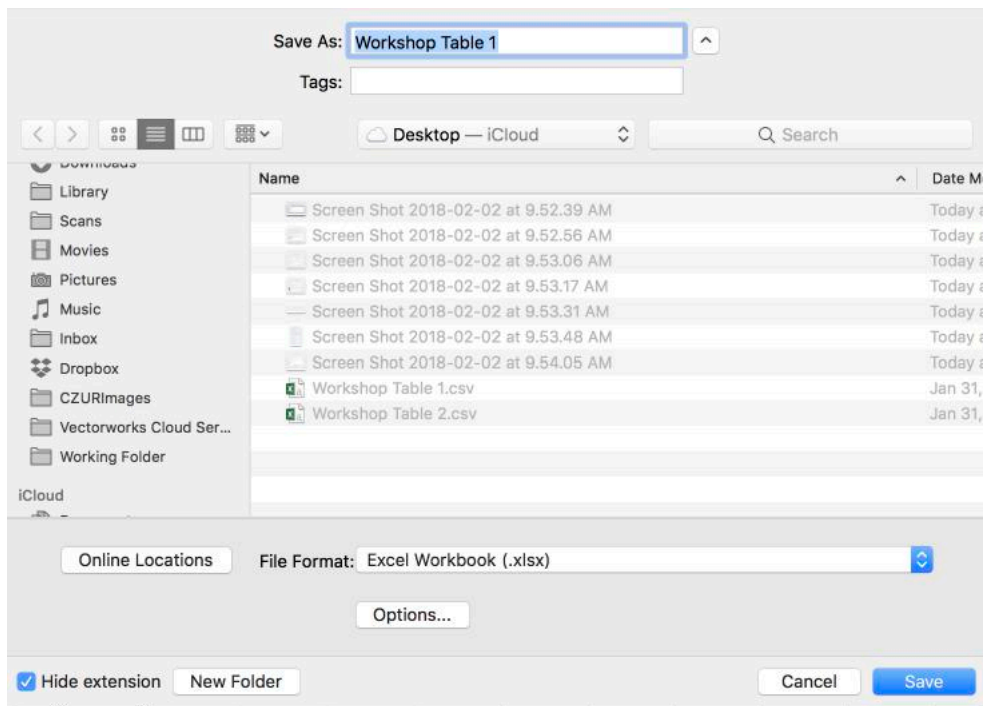
8) Either click the "Save As.." Button in the warning or goto "File>Save As.." menu item and save the file.



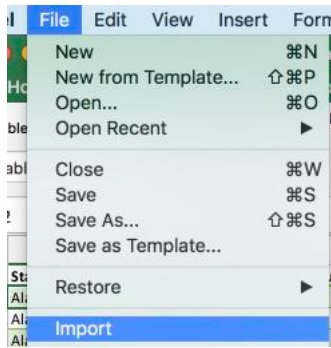
9) When the Save As dialog window opens make sure you change the format to Excel Workbook (.xlsx) format (note failure to do this will prevent several features from working as described in this tutorial).



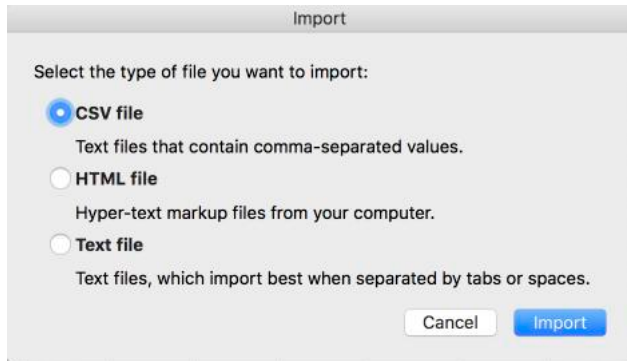
10) Select a location to save the file where you can find it again file like the desktop (the name is not important and will likely be Workshop Table 1 by default).



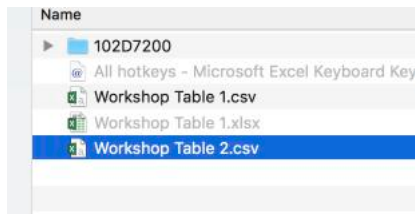
11) The next step is to import the second file onto a new sheet in the workbook. Select the "File>Import" menu item.



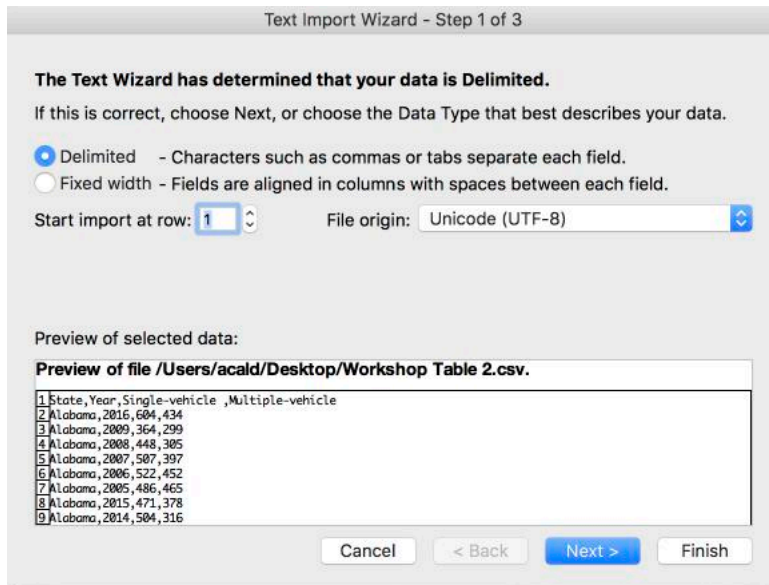
12) When the import dialog box opens select **"CSV"** file from the list.



13) Next you will be asked where is the file you want to import. Navigate to the Worksheet Table 2.csv select the file and click the **"OK"** button.



14) Next the the Text Import Wizard Step 1 dialog box will open just click on the **"Next"** button (make no changes)



15) When the Text Import Wizard Step 2 dialog box opens make sure "Comma" is the only checkbox checked then click the "Next" button.

Text Import Wizard - Step 2 of 3

This screen lets you set the delimiters your data contains.

Delimiters

☐ Tab ☐ Treat consecutive delimiters as one

☐ Semicolon Text qualifier: " ▼

☒ Comma

☐ Space

☐ Other:

Preview of selected data:

State	Year	Single-vehicle	Multiple-vehicle
Alabama	2016	504	434
Alabama	2009	564	293
Alabama	2008	448	505
Alabama	2007	507	397
Alabama	2006	522	452
Alabama	2005	486	465
Alabama	2015	471	378
Alabama	2014	504	316

Cancel < Back Next > Finish

16) The last step is to select "New Sheet" then "OK". A new worksheet will be created with the data from the Worksheet Table 2.csv file in it.

Import Data

Where do you want to put the data?

☐ Existing sheet: =\$A\$1

☒ New sheet

☐ PivotTable

Properties... Parameters... Cancel OK

Data Cleaning

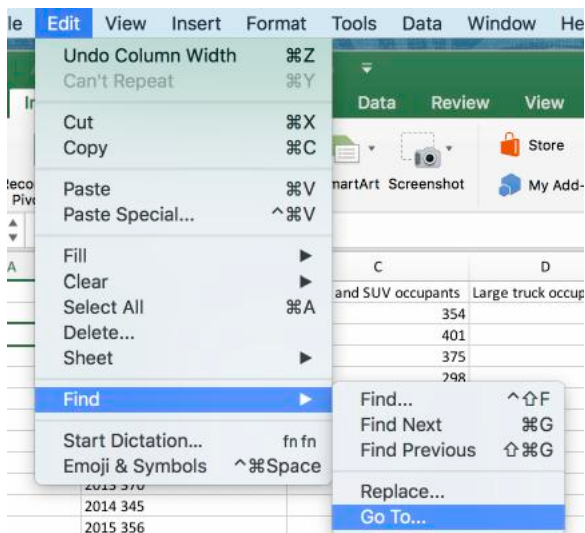
1) Switch back to the first worksheet named Workshop Table 1.



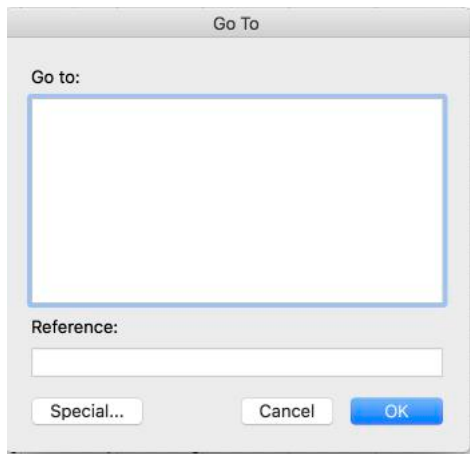
2) Select the cell directly under first state Alabama.

1	State	Year
2	Alabama	2016
3		2009
4		2008
5		2007

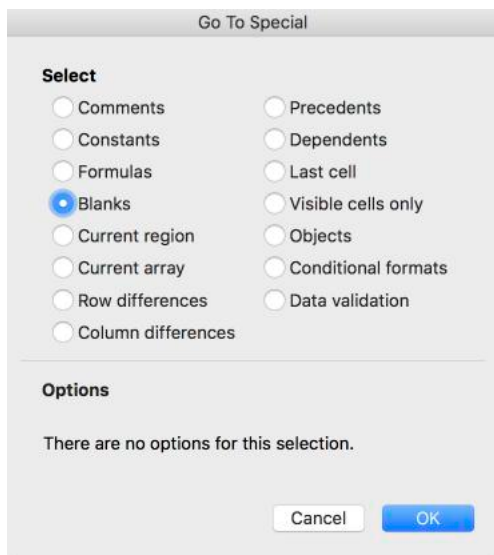
3) Select the menu item "Edit>Find>Go To..."



- 4) When the Go To dialog box opens click the **"Special..."** button.



- 5) On the Go To Special dialog box select **"Blanks"** then click **"OK"**.



- 6) With the cell still selected (don't click anything just leave the focus where it is on the cell under Alabama).

1	State	Year Paid
2	Alabama	2005 57
3		2006 55
4		2007 52
5		2008 43
6		
7		
8		
9		
10		
11		
12		
13		
14	Alaska	2005 57
15		2006 55
16		2007 52
17		2008 43
18		

- 7) Type in "=" then click on the cell that contains **"Alabama"**.

	A	
1	State	Year Paid
2	Alabama	2005 57
3	=A2	2006 55
4		2007 52
5		2008 43

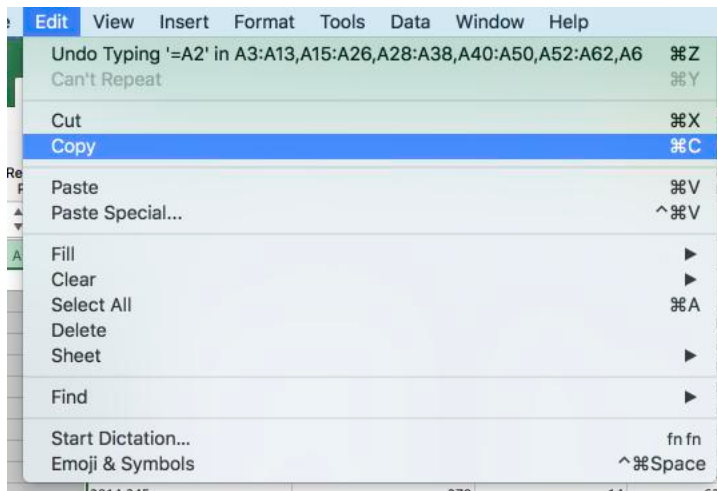
- 8) Next while holding down the **"Control"** key press **"Enter"**. All the empty cells should now have populated with state names.

	A	
1	State	Yea
2	Alabama	200
3	Alabama	200
4	Alabama	200
5	Alabama	200
6	Alabama	200
7	Alabama	201
8	Alabama	201
9	Alabama	201
10	Alabama	201
11	Alabama	201
12	Alabama	201
13	Alabama	201
14	Alaska	200
15	Alaska	200
16	Alaska	200
17	Alaska	200
18	Alaska	200
19	Alaska	200
20	Alaska	201
21	Alaska	201
22	Alaska	201
23	Alaska	201
24	Alaska	201
25	Alaska	201

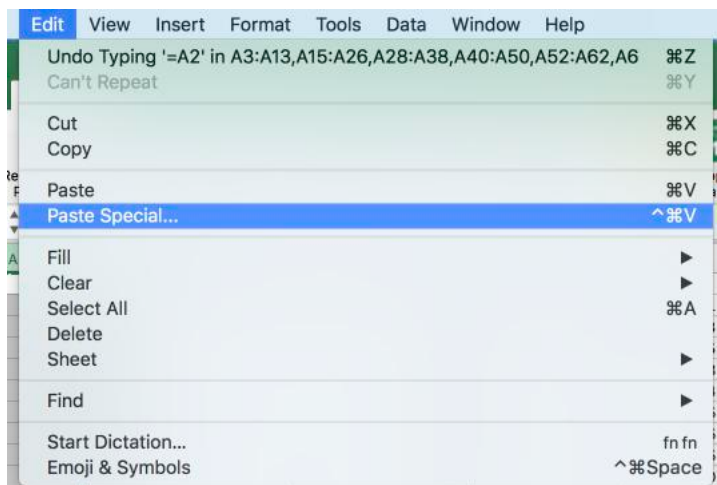
9) Next select the whole column (A) that contains the state names.

	A	
1	State	Year P
2	Alabama	2005 5
3	Alabama	2006 5
4	Alabama	2007 5
5	Alabama	2008 4
6	Alabama	2009 3
7	Alabama	2010 3
8	Alabama	2011 3
9	Alabama	2012 3
10	Alabama	2013 3
11	Alabama	2014 3
12	Alabama	2015 3
13	Alabama	2016 3
14	Alaska	2005 3
15	Alaska	2006 2
16	Alaska	2007 3
17	Alaska	2008 2
18	Alaska	2008 2
19	Alaska	2009 2
20	Alaska	2010 1
21	Alaska	2011 1
22	Alaska	2012 2
23	Alaska	2013 1
24	Alaska	2014 2
25	Alaska	2015 1
26	Alaska	2016 1
27	Arizona	2005 3
28	Arizona	2006 4
29	Arizona	2007 3
30	Arizona	2008 3
31	Arizona	2009 2
32	Arizona	2010 2
33	Arizona	2011 2
34	Arizona	2012 2
35	Arizona	2013 2

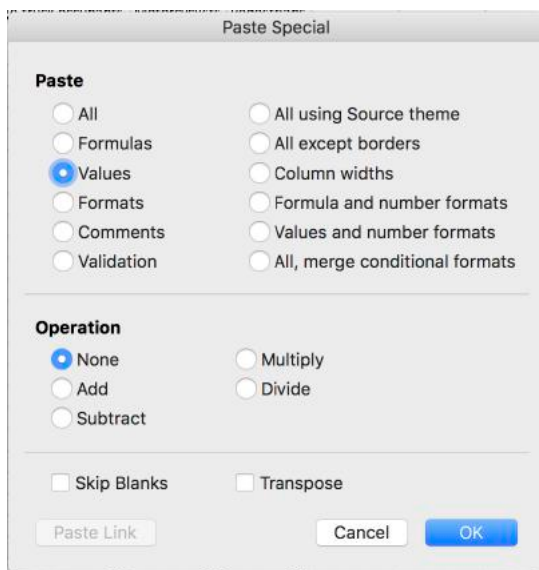
10) Copy the contents of the column by either using the “**Command**” and “**C**” keys or the copy command from the “**Edit>Copy**” menu item.



11) Select **"Paste Special..."** form the Edit menu.



12) When the Paste Special dialog box opens select **"Values"** form the Paste section and **"None"** from the Operation section then click **"OK"**



13) Press the "Esc" key to de-select the first column.

Split a field

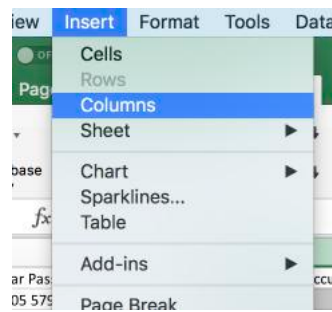
1) In the Workshop Table 1 worksheet column "B" has a problem. There should be two columns of data where there is only one. To correct this, the single column will need to be split into two.

	B
Year Passenger car occupants	Pic
2005 579	
2006 553	
2007 520	
2008 438	
2009 386	
2010 393	
2011 398	
2012 386	
2013 370	
2014 345	
2015 356	
2016 398	
2005 34	
2006 24	
2007 34	
2008 27	
2008 27	
2009 21	

2) First select the column "C".

	B	C
Year Passenger car occupants	Pickup and SUV occupants	Large truck
2005 579		354
2006 553		401
2007 520		375
2008 438		298
2009 386		269
2010 393		281
2011 398		269
2012 386		260
2013 370		296
2014 345		270
2015 356		279

3) Next from the Insert menu select "Columns" to insert a new empty column to the right of column "B"



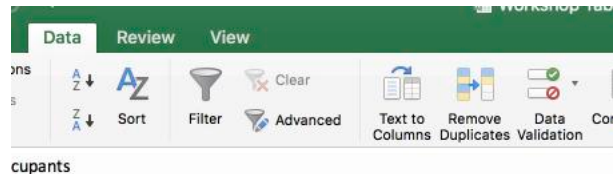
4) Column "C" should now be empty.

	B	C	
Year Passenger car occupants			Pickup an
2005 579			
2006 553			
2007 520			
2008 438			
2009 386			
2010 393			
2011 398			
2012 386			
2013 370			
2014 345			

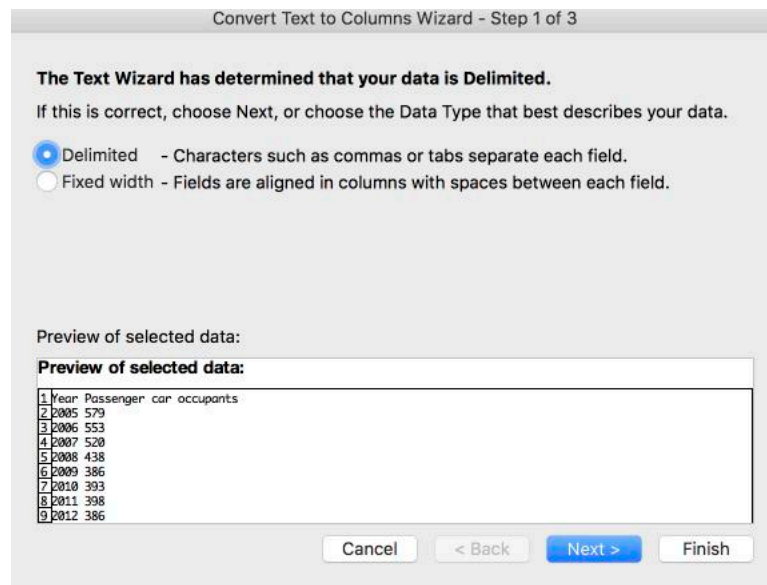
5) Select column "B"

B
Year Passenger car occupants
2005 579
2006 553
2007 520
2008 438
2009 386
2010 393
2011 398
2012 386
2013 370
2014 345
2015 356
2016 398
2005 34
2006 24
2007 34
2008 27
2008 27
2009 21
2010 19
2011 16
2012 24
2013 10
2014 20
2015 13
2016 16
2005 359

6) Click on the **"Data"** tab and then click on the **"Text to Columns"** button.



7) When the Convert Text to Columns Wizard Step 1 dialog box opens select **"Delimited"** then press the **"Next"** button.



8) When the Convert Text to Columns Wizard Step 2 dialog box opens select **"Space"**. As you can see the data is being split correctly, but the header is not because there are more than one space in the header title. Click on the **"Back"** button.

Convert Text to Columns Wizard - Step 2 of 3

This screen lets you set the delimiters your data contains.

Delimiters

☐ Tab ☒ Treat consecutive delimiters as one

☐ Semicolon Text qualifier: "

☐ Comma

☒ Space

☐ Other:

Preview of selected data:

Year	Passenger	car	occupants
2005	579		
2006	553		
2007	520		
2008	438		
2009	386		
2010	393		
2011	398		
2012	386		

Cancel < Back Next > Finish

9) When the Convert Text to Columns Wizard Step 1 dialog box opens select **"Fixed"** width this time and then press the **"Next"** button.

Convert Text to Columns Wizard - Step 1 of 3

The Text Wizard has determined that your data is Delimited.

If this is correct, choose Next, or choose the Data Type that best describes your data.

☐ Delimited - Characters such as commas or tabs separate each field.

☒ Fixed width - Fields are aligned in columns with spaces between each field.

Preview of selected data:

Preview of selected data:

1	Year	Passenger	car	occupants
2	2005	579		
3	2006	553		
4	2007	520		
5	2008	438		
6	2009	386		
7	2010	393		
8	2011	398		
9	2012	386		

Cancel < Back Next > Finish

10) Now the columns and headers look correct click the **"Next"** button.

Convert Text to Columns Wizard - Step 2 of 3

This screen lets you set field widths (column breaks).

To CREATE a break line, click at the desired position.
 To DELETE a break line, double click on the line.
 To MOVE a break line, click and drag it.

Preview of selected data:

Year	Passenger car occupants
2005	579
2006	553
2007	520
2008	438
2009	386
2010	393
2011	398
2012	386

Cancel < Back Next > Finish

11) Now there should be two columns where there was once only one.

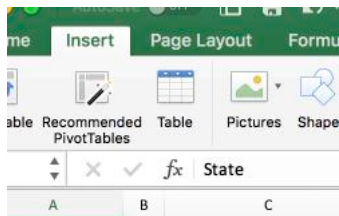
From HTML	New Database Query	Refresh All	Edit Links	Sort
A1	X ✓ fx			
B	C	D		
Year	Passenger car occupants	Pickup and		
2005	579			
2006	553			
2007	520			
2008	438			
2009	386			
2010	393			
2011	398			
2012	386			
2013	370			
2014	345			
2015	356			
2016	398			
2005	34			
2006	24			
2007	34			
2008	27			
2009	21			
2010	19			
2011	16			
2012	24			
2013	10			
2014	20			
2015	13			
2016	16			

Make Tables

1) The next step is to turn our data into tables. Goto the worksheet Workshop Table 1 and select the first cell "A1".

From HTML	From Text	New Database Query	Refresh All
A1	X ✓ fx	State	
A	B		
1	State	Year	Passenger ca
2	Alabama	2005	
3	Alabama	2006	
4	Alabama	2007	
5	Alabama	2008	
6	Alabama	2009	
7	Alabama	2010	

2) Click on the "Insert" tab then click on the "Table" button.



3) A dialog box will open and ask what range you want to be included in the table. The data should already be selected. You should see a dotted line around your data if not drag your mouse cursor over your data until it is selected. Make sure **"My table has headers"** is selected then click **"OK"**.

Where is the data for your table?

☒ My table has headers

Cancel OK

State	Year	Passenger car occupants	Pickup and SUV occupants	Large truck occupants	Motorcyclists	Pedestrians
Alabama	2005	579	354	16	61	72
Alabama	2006	553	401	18	103	78
Alabama	2007	520	375	15	85	69
Alabama	2008	438	298	25	98	66
Alabama	2009	386	269	14	74	64
Alabama	2010	393	281	9	86	61
Alabama	2011	398	269	16	96	79
Alabama	2012	386	260	13	96	77
Alabama	2013	370	296	20	80	59
Alabama	2014	345	270	14	63	96
Alabama	2015	356	279	16	64	98
Alabama	2016	398	356	32	102	111
Alaska	2005	34	19	1	4	7
Alaska	2006	24	21	1	9	9
Alaska	2007	34	18	1	6	14
Alaska	2008	27	15	1	8	3
Alaska	2008	27	15	1	8	3
Alaska	2009	21	19	0	7	9
Alaska	2010	19	18	0	9	6
Alaska	2011	16	31	0	10	9
Alaska	2012	24	14	0	7	8
Alaska	2013	10	18	1	2	6
Alaska	2014	20	21	1	8	14
Alaska	2015	13	23	0	10	12
Alaska	2016	16	35	2	5	12

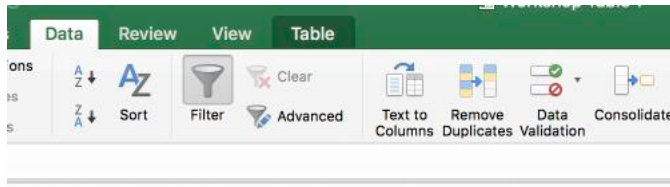
4) The data should now be converted to a table.

State	Year	Passenger car occupants	Pickup and SUV occupants	Large truck occupants
Alabama	2005	579	354	
Alabama	2006	553	401	
Alabama	2007	520	375	
Alabama	2008	438	298	
Alabama	2009	386	269	
Alabama	2010	393	281	
Alabama	2011	398	269	
Alabama	2012	386	260	
Alabama	2013	370	296	
Alabama	2014	345	270	
Alabama	2015	356	279	
Alabama	2016	398	356	
Alaska	2005	34	19	
Alaska	2006	24	21	
Alaska	2007	34	18	
Alaska	2008	27	15	
Alaska	2008	27	15	
Alaska	2009	21	19	
Alaska	2010	19	18	
Alaska	2011	16	31	
Alaska	2012	24	14	
Alaska	2013	10	18	
Alaska	2014	20	21	
Alaska	2015	13	23	
Alaska	2016	16	35	
Arizona	2005	359	278	
Arizona	2006	452	384	
Arizona	2007	366	311	

5) Next we want to remove any duplicate records in the table. Select any cell in the table.

	A	B
1	State	Year
2	Alabama	2005
3	Alabama	2006
4	Alabama	2007
5	Alabama	2008
6	Alabama	2009

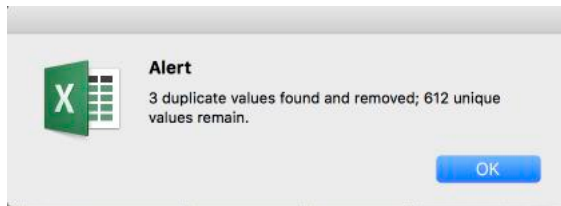
6) Select the “Data” tab then click the “Remove Duplicates” button.



7) A dialog will open asking what fields to use in the search. Leave them all selected and press the “OK” button.



8) A dialog should open displaying the results.



9) Next goto the Workshop Table 2 worksheet.



10) Select cell “A1”.

	A	B	C	D
1	State	Year	Single-vehicle	Multiple-vehicle
2	Alabama	2016	604	434
3	Alabama	2009	364	295
4	Alabama	2008	448	305
5	Alabama	2007	507	397
6	Alabama	2006	522	452
7	Alabama	2005	486	465
8	Alabama	2015	471	378
9	Alabama	2014	504	316

11) Select the “Insert” tab then press the “Table” button.

Insert Page Layout Formulas

Recommended PivotTables

fx State

A	B	C	D
State	Year	Single-vehicle	Multiple-vehicle
Alabama	2016	604	434

12) A dialog box will open asking what range you want to be included in the table. As with the previous table the data should be selected if not select the data. Make sure “My table has headers” is selected then click “OK”.

PivotTable Recommended PivotTables Table Pictures Shapes SmartArt Screenshot Store My Add-ins Bing Maps

fx State

	A	B	C	D	E	F	G	H
1	State	Year	Single-vehicle	Multiple-vehicle				
2	Alabama	2016	604	434				
3	Alabama	2009	364	299				
4	Alabama	2008	448	305				
5	Alabama	2007	507	397				
6	Alabama	2006	522	452				
7	Alabama	2005	486	465				
8	Alabama	2015	471	378				
9	Alabama	2014	504	316				
10	Alabama	2013	501	351				
11	Alabama	2012	353	300				
12	Alabama	2011	365	316				
13	Alabama	2010	387	302				
14	Alaska	2016	56	28				
15	Alaska	2009	18					
16	Alaska	2008	16					
17	Alaska	2007	25					
18	Alaska	2006	22					
19	Alaska	2005	22					
20	Alaska	2015	41					
21	Alaska	2014	41					
22	Alaska	2013	33					
23	Alaska	2012	12					

Create Table

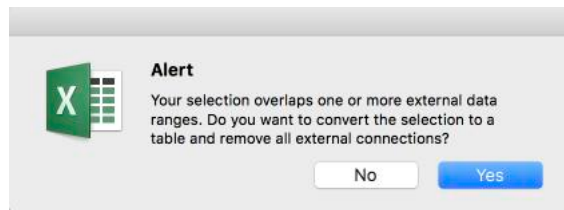
Where is the data for your table?

= \$A\$1:\$D\$613

☒ My table has headers

Cancel OK

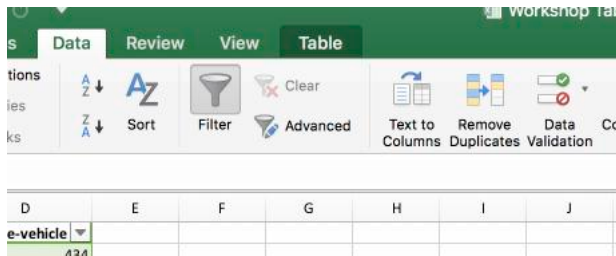
13) This time a dialog will open warning you your selection overlaps with external data ranges. Click the “Yes” button.



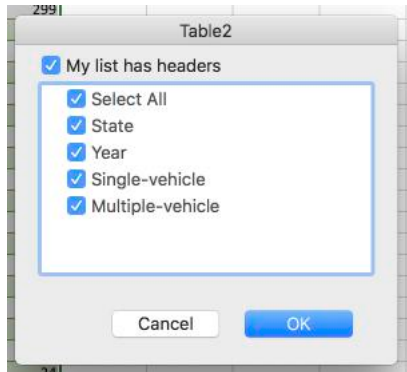
14) A new table is created from the existing data.

	A	B	C	D	E
1	State	Year	Single-vehicle	Multiple-vehicle	
2	Alabama	2016	604	434	
3	Alabama	2009	364	299	
4	Alabama	2008	448	305	
5	Alabama	2007	507	397	
6	Alabama	2006	522	452	
7	Alabama	2005	486	465	
8	Alabama	2015	471	378	
9	Alabama	2014	504	316	
10	Alabama	2013	501	351	
11	Alabama	2012	353	300	
12	Alabama	2011	365	316	
13	Alabama	2010	387	302	
14	Alaska	2016	56	28	

15) Select any cell in the table and then select the “Data” tab then click on the “Remove Duplicates” button.



16) A dialog will open asking what fields to use in the search Leave them all selected and press the “OK” button.



17) A dialog will open displaying the results.

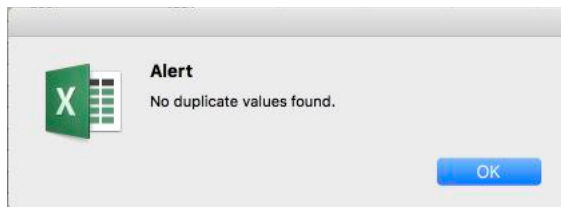


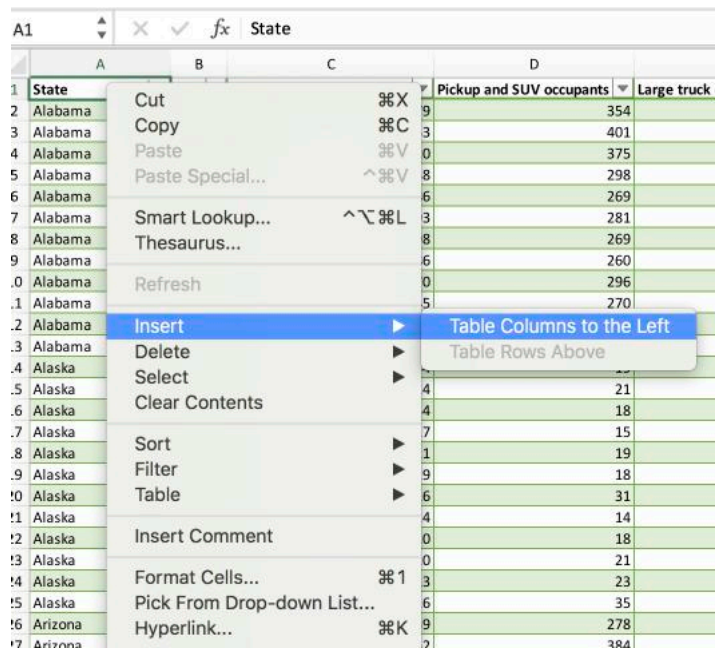
Table Join

1) In this section we will “Join” two tables using “VLOOKUP”

2) VLOOKUP relies on being able to “connect” the two tables by a related field. This field does not exist in either table so we will need to make it using other fields. Go to the Workshop Table 1 worksheet and select the first column in the table.

	A	B	C	
	State	Year	Passenger car occupants	Pickup
2	Alabama	2005	579	
3	Alabama	2006	553	
4	Alabama	2007	520	
5	Alabama	2008	438	
6	Alabama	2009	386	
7	Alabama	2010	393	
8	Alabama	2011	398	
9	Alabama	2012	386	
10	Alabama	2013	370	
11	Alabama	2014	345	

3) Next “Right click” and a menu will open. Select “Insert>Table Columns to the left”.



4) A new empty column should appear on the left.

	A	B	C	D
1	Column1	State	Year	Passenger car occu
2		Alabama	2005	
3		Alabama	2006	
4		Alabama	2007	
5		Alabama	2008	
6		Alabama	2009	
7		Alabama	2010	
8		Alabama	2011	
9		Alabama	2012	
10		Alabama	2013	
11		Alabama	2014	
12		Alabama	2015	
13		Alabama	2016	
14		Alaska	2005	

5) To create a unique value that we can use to connect the two tables we will combine the State name and Year.

	A	B	C
1	ID	State	Year
2		Alabama	
3		Alabama	
4		Alabama	
5		Alabama	
6		Alabama	
7		Alabama	
8		Alabama	

6) Select cell "A1" and type "=" then click on cell "B1". Next type "&" then click on cell "C1". Last click on the "Green Check" icon next to the formula bar.

	A	B	C
1	ID	State	Year
2	=[@State]&[@Year]		2005
3		Alabama	2006

7) The table should auto fill the new formula in column "A" and display the result.

	A	B
1	ID	State
2	Alabama2005	Alabama
3	Alabama2006	Alabama
4	Alabama2007	Alabama
5	Alabama2008	Alabama
6	Alabama2009	Alabama
7	Alabama2010	Alabama
8	Alabama2011	Alabama
9	Alabama2012	Alabama
10	Alabama2013	Alabama
11	Alabama2014	Alabama
12	Alabama2015	Alabama
13	Alabama2016	Alabama
14	Alaska2005	Alaska
15	Alaska2006	Alaska
16	Alaska2007	Alaska
17	Alaska2008	Alaska
18	Alaska2009	Alaska
19	Alaska2010	Alaska
20	Alaska2011	Alaska
21	Alaska2012	Alaska
22	Alaska2013	Alaska
23	Alaska2014	Alaska
24	Alaska2015	Alaska
25	Alaska2016	Alaska

8) Next goto the Workshop Table 2 worksheet.

207	179
255	226
Workshop Table 2	+

9) Select column "A" in the table.

	A	B	C
1	State	Year	Single-vehicle
2	Alabama	2016	604
3	Alabama	2009	364
4	Alabama	2008	448
5	Alabama	2007	507
6	Alabama	2006	522
7	Alabama	2005	486
8	Alabama	2015	471
9	Alabama	2014	504

10) Next Right click and a menu will open. Select "Insert>Table Columns to the left".

	A	B	C	D	E	F	G
1	State	Year	Single-vehicle	Multiple-vehicle			
2	Alabama	2016	604	434			
3	Alabama			299			
4	Alabama			305			
5	Alabama			397			
6	Alabama			452			
7	Alabama			465			
8	Alabama			378			
9	Alabama			316			
10	Alabama			351			
11	Alabama			300			
12	Alabama			316			
13	Alabama						
14	Alaska						
15	Alaska						
16	Alaska			27			
17	Alaska			30			
18	Alaska			24			
19	Alaska			32			
20	Alaska			24			

11) A new empty column should appear on the left.

A2

	A	B	C
1	Column1	State	Year
2		Alabama	
3		Alabama	
4		Alabama	
5		Alabama	
6		Alabama	
7		Alabama	
8		Alabama	
9		Alabama	

12) Select cell "A1" and type "=" then click on cell "B". Next type "&" then click on cell "C1". Last click on the "Green Check" icon next to the formula bar.

PivotTable Recommended Table Pictures Shapes My

FALSE

fx =[@State]&[@Year]

	A	B	C	D
1	ID	State	Year	Single-vehicle
2	=[@State]&[@Year]		2016	
3		Alabama	2009	
4		Alabama	2008	

13) The table should auto fill the new formula in column "A" and display the result.

	A	B	C
1	ID	State	Year
2	Alabama2016	Alabama	
3	Alabama2009	Alabama	
4	Alabama2008	Alabama	
5	Alabama2007	Alabama	
6	Alabama2006	Alabama	
7	Alabama2005	Alabama	
8	Alabama2015	Alabama	
9	Alabama2014	Alabama	
10	Alabama2013	Alabama	
11	Alabama2012	Alabama	
12	Alabama2011	Alabama	
13	Alabama2010	Alabama	
14	Alaska2016	Alaska	
15	Alaska2009	Alaska	
16	Alaska2008	Alaska	
17	Alaska2007	Alaska	
18	Alaska2006	Alaska	
19	Alaska2005	Alaska	
20	Alaska2015	Alaska	

14) Make a note of the "table name" and "Column Numbers" you want to display in the other table. In this case the table is "Table2" and the columns are "4" & "5".

AutoSave OFF

Workshop Table 1

Home Insert Page Layout Formulas Data Review View Table

Table Name: Table2

Summarize with PivotTable

Remove Duplicates

Convert to Range

Insert Slicer

Refresh

Header Row

Total Row

Banded Rows

First Column

Last Column

Banded Columns

B2

fx Alabama

	A	B	C	D	E	F
1	ID	State	Year	Single-vehicle	Multiple-vehicle	
2	Alabama2016	Alabama	2016	604	434	
3	Alabama2009	Alabama	2009	364	299	
4	Alabama2008	Alabama	2008	448	305	
5	Alabama2007	Alabama	2007	507	397	
6	Alabama2006	Alabama	2006	522	452	

15) Return to Workshop Table 1.

nsas	2008	Arkansas2008
Workshop Table 1		
dy		

16) At the far right column of the table type in the header cell "Single-Vehicle" then press "Return". A new column will appear.

H	I	J
trians	Single-vehicle	
72		
78		
69		
66		

17) Repeat the process again this time typing **"Multiple-Vehicle"** You should now have two new empty columns on the right side of your table.

J
Multiple-vehicle

18) Select the first empty cell under the **"Single-Vehicle"** header.

H	I	J	K
trians	Single-vehicle	Multiple-vehicle	
72			
78			
69			
66			
64			
61			
79			

19) Type the following formula **"=VLOOKUP"**. As you type a popup should appear you can either type the function or select it form the list.

I	J
Single-vehicle	Multiple-vehicle
72	=V
78	Most Recently Used
69	VLOOKUP
66	Functions
64	VALUE
61	VAR.P
79	VAR.S
77	VARA
59	VARPA
96	VDB
98	VLOOKUP
11	Compatibility Functions
7	VAR
9	
14	
3	

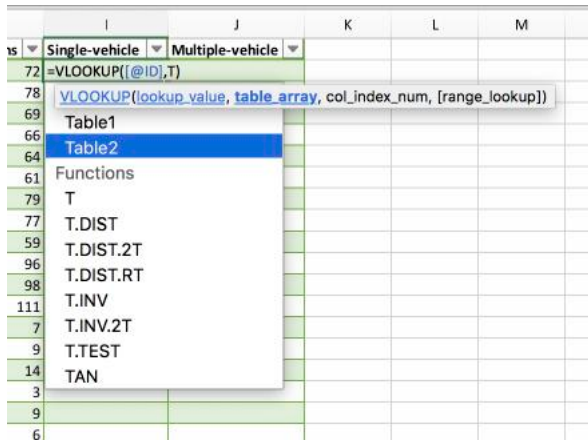
20) Another popup will appear showing you what arguments are required for the formula.

I	J	K	L	M
Single-vehicle	Multiple-vehicle			
72	=VLOOKUP()			
78	VLOOKUP(lookup_value, table_array, col_index_num, [range_lookup])			
69				

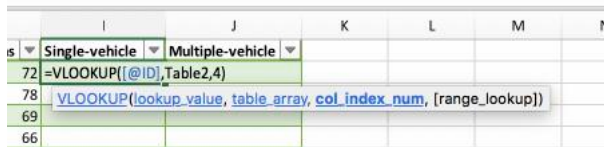
21) Next click cell **"A2"**. This is the cell with our unique lookup value.

I	J	K	L	M
ns	Single-vehicle	Multiple-vehicle		
72	=VLOOKUP([@ID])			
78	VLOOKUP(lookup_value, table_array, col_index_num, [range_lookup])			
69				

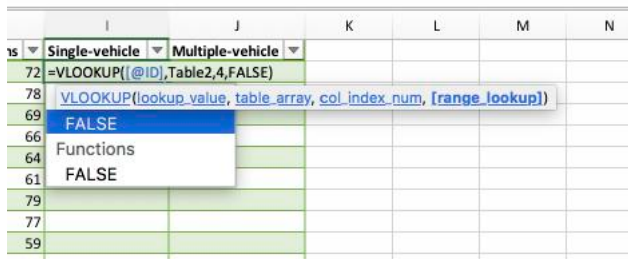
22) Next type **"**, then start typing **"Table 2"** (the name of the table in our other worksheet). A popup will appear with the tables in our worksheet you can select from the list or simply type it in.



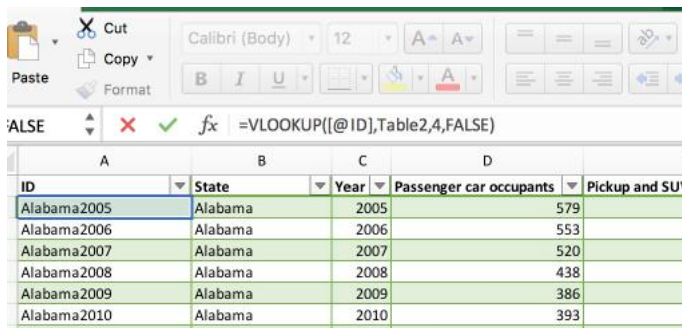
23) Next type “,” then “4” (this is the column we want to return form the other worksheet).



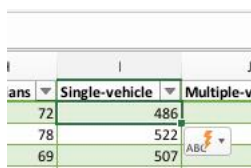
24) Finally type another “,” and the word “FALSE” (do not pick FALSE from the pop up list). Click the “Green Check” to accept the formula.



25) Column “D” should now be filled with related values form Workshop Table 2.



26) Next we want to repeat the process for column “J” but instead of re-typing the whole formula we can simply copy paste the formula in to the cell and change the column to return value. Select cell “I2”



27) Select the formula in the formula bar.

	State	Year	Passenger car occupants	Pickup and SUV occupants
05	Alabama	2005	579	
06	Alabama	2006	553	
07	Alabama	2007	520	

28) Copy the formula to the clipboard.



29) Press the "Esc" key to de-select the formula. Select cell "J2".

Single-vehicle	Multiple-vehicle
486	
522	
507	
448	
364	
387	

30) Paste the formula into the cell.



31) Next edit the formula and change the "4" to a "5". Press the "Green Check" box. The last column should now auto fill out with the values form Table2.

	State	Year	Passenger car occupants	Pickup and SUV occupants	Large truck and trailer occupants
	Alabama	2005	579		
	Alabama	2006	553		
	Alabama	2007	520		
	Alabama	2008	500		
	Alabama	2009	480		
	Alabama	2010	460		

PivotTable

A pivot table is a table that summarizes data in another table, and is made by applying an operation such as sorting, averaging, or summing to data in the first table, typically including grouping of the data. - Wikipedia

1) In Workshop Table 1 select cell "A2".

ID	State	Year
Alabama2005	Alabama	2005
Alabama2006	Alabama	2006
Alabama2007	Alabama	2007
Alabama2008	Alabama	2008
Alabama2009	Alabama	2009
Alabama2010	Alabama	2010

2) Select the "Insert" tab in the toolbar then click the "PivotTable" button.

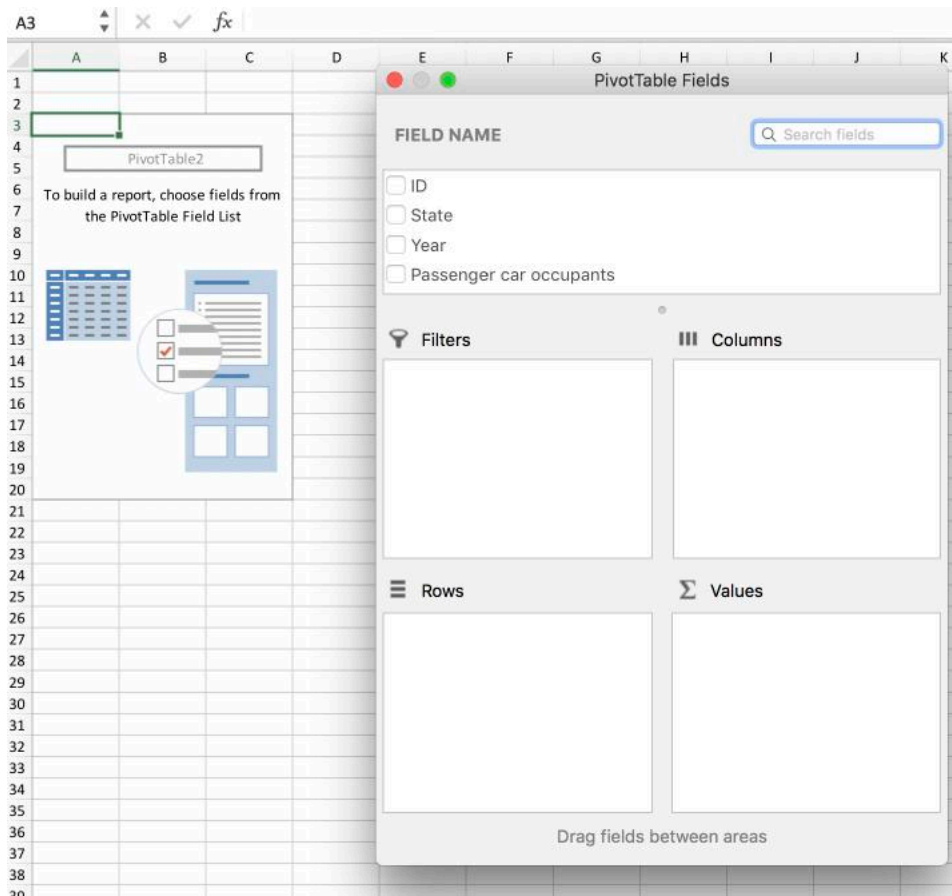
The screenshot shows the Microsoft Excel interface. The 'Insert' tab is active, and the 'PivotTable' button is highlighted. Below the ribbon, the formula bar shows the formula `=[@State]&[@Year]`. The worksheet contains a table with the following data:

	A	B	C
1	ID	State	Year
2	Alabama2005	Alabama	2005
3	Alabama2006	Alabama	2006
4	Alabama2007	Alabama	2007
5	Alabama2008	Alabama	2008
6	Alabama2009	Alabama	2009
7	Alabama2010	Alabama	2010
8	Alabama2011	Alabama	2011

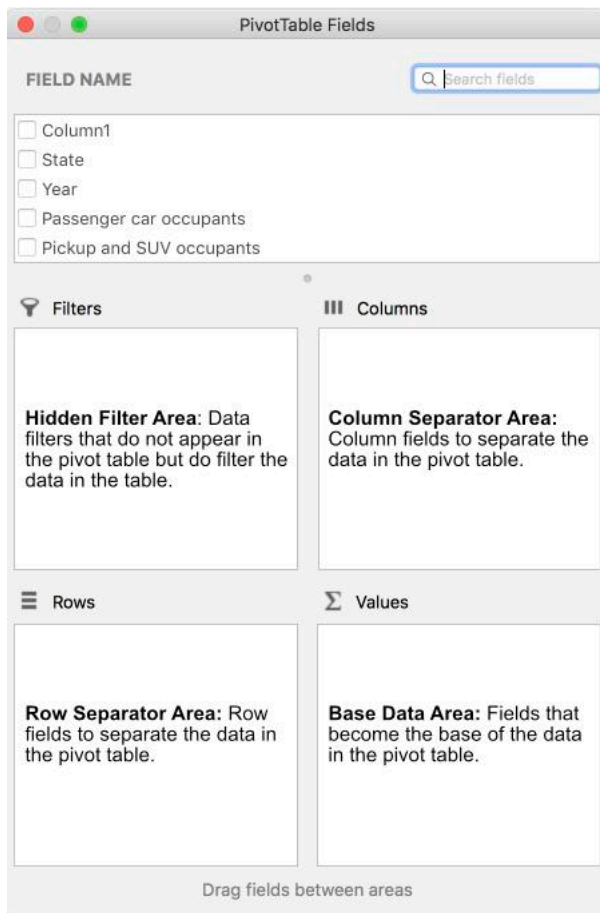
3) When the Create PivotTable dialog box opens make sure “**Select a table or range**” is selected and “**Table1**” is being displayed. In addition make sure the “**Choose where to place the PivotTable**” is set to “**New worksheet**”. Next click the “**OK**” button.

The screenshot shows the 'Create PivotTable' dialog box. The 'Choose the data that you want to analyze.' section has the 'Select a table or range' radio button selected, and the 'Table/Range' field contains 'Table1'. The 'Choose where to place the PivotTable.' section has the 'New worksheet' radio button selected. The 'Table/Range' field in this section is empty. The 'OK' button is highlighted in blue.

4) A new sheet will be created and the PivotTable Fields dialog will be displayed.



5) Below is a brief description of what the different parts of the PivotTable Fields dialog represent.



6) The easiest way to understand PivotTables is to play with the interface. Let's start by dragging the **"State"** field from the **"Field Name"** section to the **"Rows"** section. As you can see the state names fill out in the first column. You might also notice in worksheet table 1 the state names repeated one per year to create 613 rows. The PivotTable has summarized this into 51 rows.

The screenshot shows an Excel spreadsheet with a PivotTable. The PivotTable is located in the range A3:I51. The first column (A) contains the names of 51 US states, listed from Alabama at the top to Washington at the bottom. The other columns (B through I) are currently empty. A 'PivotTable Fields' task pane is open over the PivotTable. In the 'FIELD NAME' section, the 'State' field is checked and has been moved to the 'Rows' section. The 'Filters' and 'Columns' sections are empty. The 'Values' section is also empty. At the bottom of the task pane, it says 'Drag fields between areas'.

7) Next drag the "Year" field from the "Field Name" section to the "Columns" section. Now, we have years across the top of our table.

PivotTable Fields

FIELD NAME

- ☒ State
- ☒ Year
- ☒ Passenger car occupants
- ☐ Pickup and SUV occupants

Filters

Columns

- Year

Rows

- State

Values

- Sum of Passenger...

Drag fields between areas

9) Let's add more data. In the "Field Name" section check the **"Pickup and SUV occupants"** field. The data now displays along side the Passenger car occupants data. We can see although all of our data is being displayed it's hard to read in this form.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1																
2																
3																
4	Row Labels	Column Labels	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Grand Total	
5	Alabama															
6	Sum of Passenger car occupants		579	553	520	438	386	393	398	386	370	345	356	398	5122	
7	Sum of Pickup and SUV occupants		354	401	375	298	269	281	269	260	296	270	279	356	3708	
8	Alaska															
9	Sum of Passenger car occupants		34	24	34	27	21	19	16	24	10	20	13	16	258	
10	Sum of Pickup and SUV occupants		19	21	18	15	19	18	31	14	18	21	23	35	252	
11	Arizona															
12	Sum of Passenger car occupants		359	452	366	300	235	200	211	240	224	231	260	271	3349	
13	Sum of Pickup and SUV occupants		278	384	311	260	210	210	216	228	221	160	217	218	2913	
14	Arkansas															
15	Sum of Passenger car occupants		273	267	261	234	226	221	189	211	166	167	191	191	2597	
16	Sum of Pickup and SUV occupants		220	236	216	205	210	183	206	185	173	175	181	192	2382	
17	California															
18	Sum of Passenger car occupants		1954	1838	1717	1366	1275	994	1001	1061	1112	1118	1161	1330	15927	
19	Sum of Pickup and SUV occupants		855	870	827	629	622	579	535	506	485	486	581	586	7561	
20	Colorado															
21	Sum of Passenger car occupants		262	199	202	203	151	162	155	150	150	175	175	199	2183	
22	Sum of Pickup and SUV occupants		175	163	155	169	145	141	133	137	165	132	165	159	1839	
23	Connecticut															
24	Sum of Passenger car occupants		138	163	146	124	107	155	105	110	127	109	108	120	1512	
25	Sum of Pickup and SUV occupants		41	37	45	37	40	46	34	40	54	27	46	48	495	
26	Delaware															
27	Sum of Passenger car occupants		76	70	59	47	48	44	44	44	34	46	49	45	606	
28	Sum of Pickup and SUV occupants		19	31	24	28	28	23	14	17	16	24	15	27	266	
29	District of Columbia															
30	Sum of Passenger car occupants		17	17	15	14	9	8	11	3	5	6	6	8	119	
31	Sum of Pickup and SUV occupants		4	0	6	0	1	0	2	1	1	4	0	4	23	
32	Florida															
33	Sum of Passenger car occupants		1416	1293	1196	1047	931	890	746	793	768	791	924	1077	11872	
34	Sum of Pickup and SUV occupants		760	710	660	659	565	500	474	444	427	399	511	597	6706	
35	Georgia															
36	Sum of Passenger car occupants		765	762	732	638	491	495	481	477	476	458	577	587	6939	
37	Sum of Pickup and SUV occupants		554	503	496	437	411	379	390	347	327	325	413	445	5027	
38	Hawaii															
39	Sum of Passenger car occupants		47	59	42	37	34	33	19	26	21	16	19	42	395	
40	Sum of Pickup and SUV occupants		22	31	31	20	18	22	21	27	21	22	17	20	272	
41	Idaho															
42	Sum of Passenger car occupants		117	106	100	86	81	84	76	62	79	61	76	78	1006	
43	Sum of Pickup and SUV occupants		105	102	89	83	81	69	48	71	81	69	86	109	993	
44	Illinois															
45	Sum of Passenger car occupants		695	635	602	472	442	419	397	410	426	386	405	436	5725	
46	Sum of Pickup and SUV occupants		255	258	238	233	177	196	173	196	214	225	231	260	2656	
47	Indiana															
48	Sum of Passenger car occupants		441	412	396	399	324	361	352	345	344	291	351	344	4360	

PivotTable Fields

FIELD NAME

☒ Passenger car occupants
☒ Pickup and SUV occupants
☐ Large truck occupants
☐ Motorcyclists

Filters

Columns

: Year

Rows

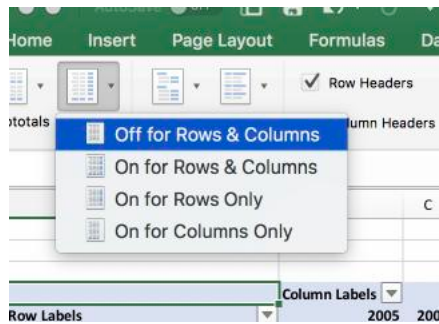
: State
: Values

Values

: Sum of Passenger...
: Sum of Pickup an...

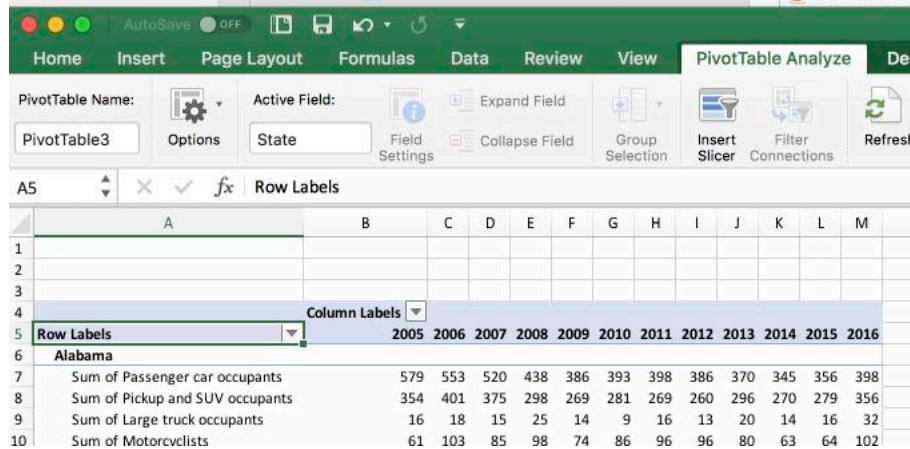
Drag fields between areas

11) Select the remaining fields in the "Field Names" section to see the rest of the data displayed. By playing with the order and position of the various fields, you will be able to visualize your data in different ways.



14) Using Slicers - Filter buttons.

15) Select the column you want to filter on then click the “PivotTable Analyze” tab. Next click the “Insert Slicer” button.



16) The Insert Slicers dialog box will open allowing you to select additional fields to filter on. For now just leave “State” selected and click the “OK” button.



17) A floating window will now appear allowing you to filter on various states by clicking the state name in the Slicer window.

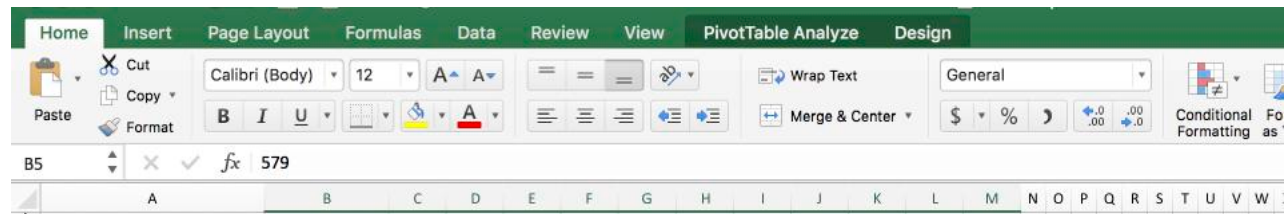
G17

<

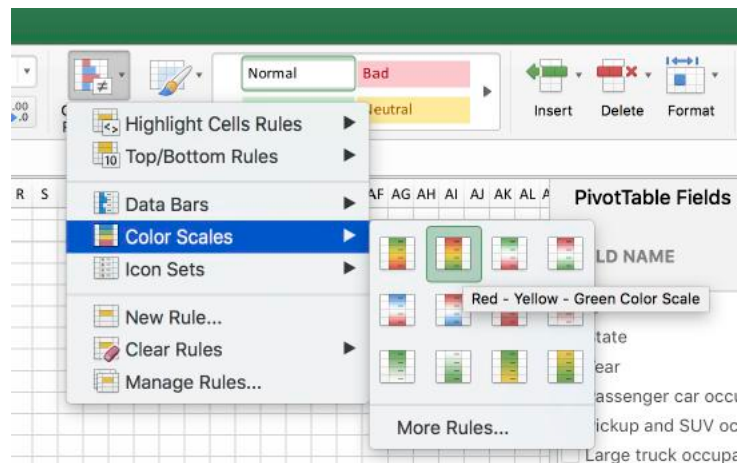
3) Using your mouse select the range of values you want to format. Select only the **"Passenger car occupants"** data and nothing else.

um of Passenger car occupants	Column Labels	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Alabama	Row Labels	579	553	520	438	386	393	398	386	370	345	356	398
Alaska		34	24	34	27	21	19	16	24	10	20	13	16
Arizona		359	452	366	300	235	200	211	240	224	231	260	271
Arkansas		273	267	261	234	226	221	189	211	166	167	191	191
California		1954	1838	1717	1366	1275	994	1001	1061	1112	1118	1161	1330
Colorado		262	199	202	203	151	162	155	150	150	175	175	199
Connecticut		138	163	146	124	107	155	105	110	127	109	108	120
Delaware		76	70	59	47	48	44	44	44	34	46	49	45
District of Columbia		17	17	15	14	9	8	11	3	5	6	6	8
Florida		1416	1293	1196	1047	931	890	746	793	768	791	924	1077
Georgia		765	762	732	638	491	495	481	477	476	458	577	587
Hawaii		47	59	42	37	34	33	19	26	21	16	19	42
Idaho		117	106	100	86	81	84	76	62	79	61	76	78
Illinois		695	635	602	472	442	419	397	410	426	386	405	436
Indiana		441	412	396	399	324	361	352	345	344	291	351	344
Iowa		241	224	211	195	166	185	156	147	156	134	120	166
Kansas		190	206	186	167	160	190	178	155	118	147	138	163
Kentucky		496	455	401	370	348	325	325	309	282	286	324	370
Louisiana		371	398	369	355	313	243	233	246	245	253	250	266
Maine		91	98	89	78	76	82	75	87	63	58	65	64
Maryland		288	334	268	259	240	218	205	227	185	177	210	199
Massachusetts		202	226	197	175	157	125	172	145	151	158	124	168
Michigan		557	529	537	436	394	405	385	418	384	363	353	402
Minnesota		282	244	231	205	188	217	182	177	175	177	163	151
Mississippi		464	404	388	340	318	275	235	243	239	264	261	288
Missouri		631	568	459	452	416	355	350	376	351	319	349	392
Montana		84	103	100	79	72	67	73	66	71	57	70	56
Nebraska		140	134	131	99	102	83	85	88	86	84	83	84
Nevada		173	187	148	102	83	95	78	93	80	90	103	92
New Hampshire		65	67	56	67	43	56	44	43	58	44	51	54
New Jersey		372	282	344	236	266	235	259	224	238	211	218	231
New Mexico		172	159	127	102	115	114	124	103	82	119	79	113
New York		634	621	573	530	474	457	415	418	444	386	392	337
North Carolina		737	757	807	687	635	571	508	523	563	553	617	605
North Dakota		48	53	40	39	70	31	42	48	42	42	36	36
Ohio		742	672	651	560	504	526	469	532	460	491	485	489
Oklahoma		350	333	277	285	271	228	268	231	239	239	235	213
Oregon		210	193	174	172	142	111	125	104	141	131	161	202
Pennsylvania		853	754	743	695	592	593	587	602	541	531	497	511
Rhode Island		45	40	35	33	32	28	31	25	29	18	17	18
South Carolina		544	482	428	400	393	335	331	324	275	330	380	374
South Dakota		83	87	57	53	59	49	48	49	50	46	46	33
Tennessee		616	620	552	479	429	431	417	441	448	410	392	436
Texas		1375	1305	1234	1173	1093	1101	1011	1115	1096	1175	1153	1236

4) Select the “Home” tab then click on the “Conditional Formatting” button.



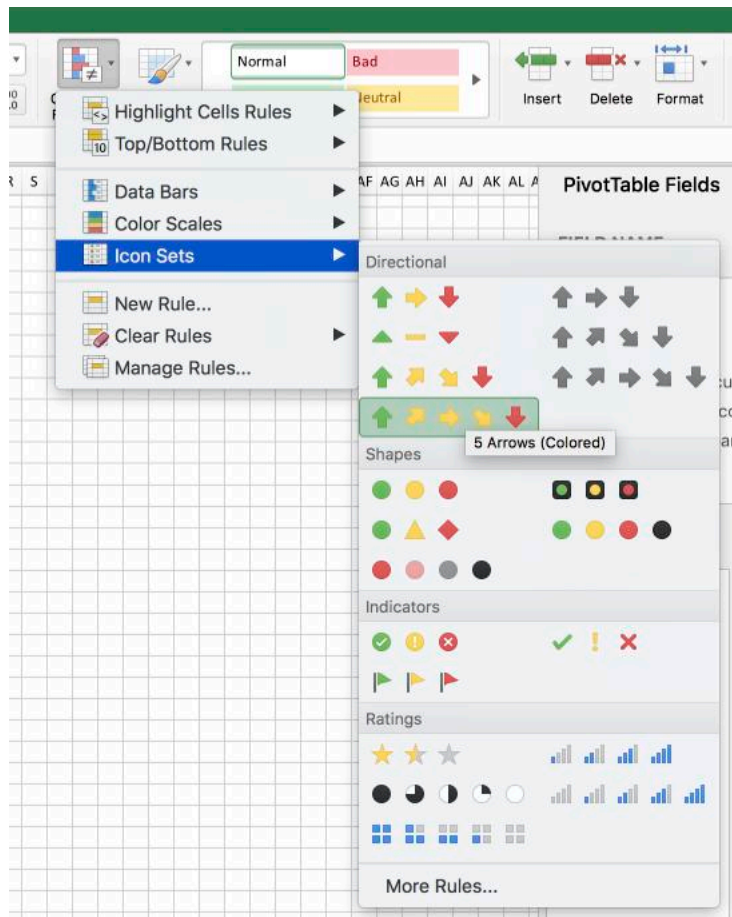
5) Next a pop-up list will appear displaying several options. Select “Color Scales>Red-Yellow-Green Color Scale”.



6) The cells of our PivotTable should now be colored based on their values. Red for high values and green for low values.

ants	Column Labels											
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
	579	553	520	438	386	393	398	386	370	345	356	398
	34	24	34	27	21	19	16	24	10	20	13	16
	359	452	366	300	235	200	211	240	224	231	260	271
	273	267	261	234	226	221	189	211	166	167	191	191
	1954	1838	1717	1366	1275	994	1001	1061	1112	1118	1161	1330
	262	199	202	203	151	162	155	150	150	175	175	199
	138	163	146	124	107	155	105	110	127	109	108	120
	76	70	59	47	48	44	44	44	34	46	49	45
	17	17	15	14	9	8	11	3	5	6	6	8
	1416	1293	1196	1047	931	890	746	793	768	791	924	1077
	765	762	732	638	491	495	481	477	476	458	577	587
	47	59	42	37	34	33	19	26	21	16	19	42
	117	106	100	86	81	84	76	62	79	61	76	78
	695	635	602	472	442	419	397	410	426	386	405	436
	441	412	396	399	324	361	352	345	344	291	351	344
	241	224	211	195	166	185	156	147	156	134	120	166
	190	206	186	167	160	190	178	155	118	147	138	163
	496	455	401	370	348	325	325	309	282	286	324	370
	371	398	369	355	313	243	233	246	245	253	250	266
	91	98	89	78	76	82	75	87	63	58	65	64
	288	334	268	259	240	218	205	227	185	177	210	199
	202	226	197	175	157	125	172	145	151	158	124	168
	557	529	537	436	394	405	385	418	384	363	353	402
	282	244	231	205	188	217	182	177	175	177	163	151
	464	404	388	340	318	275	235	243	239	264	261	288
	631	568	459	452	416	355	350	376	351	319	349	392
	84	103	100	79	72	67	73	66	71	57	70	56
	140	134	131	99	102	83	85	88	86	84	83	84
	173	187	148	102	83	95	78	93	80	90	103	92
	65	67	56	67	43	56	44	43	58	44	51	54
	372	282	344	236	266	235	259	224	238	211	218	231
	172	159	127	102	115	114	124	103	82	119	79	113
	634	621	573	530	474	457	415	418	444	386	392	337
	737	757	807	687	635	571	508	523	563	553	617	605
	48	53	40	39	70	31	42	48	42	42	36	36
	742	672	651	560	504	526	469	532	460	491	485	489
	350	333	277	285	271	228	268	231	239	239	235	213
	210	193	174	172	142	111	125	104	141	131	161	202
	853	754	743	695	592	593	587	602	541	531	497	511
	45	40	35	33	32	28	31	25	29	18	17	18
	544	482	428	400	393	335	331	324	275	330	380	374
	83	87	57	53	59	49	48	49	50	46	46	33
	616	620	552	479	429	431	417	441	448	410	392	436
	1375	1305	1234	1173	1093	1101	1011	1115	1096	1175	1153	1236
	119	123	100	102	97	104	92	84	73	97	102	94
	43	50	27	39	43	38	30	35	31	19	20	29
	456	490	460	414	370	343	327	344	354	313	329	320
	312	306	252	243	204	211	185	165	187	189	245	204
	170	187	190	156	148	136	144	151	132	100	91	94
	430	362	375	298	248	269	252	281	231	233	252	278
	52	65	34	59	36	39	37	40	27	43	34	20

7) You can combine several Conditional Formatting rules to make more complex graphics. Lets add an arrow to each cell to illustrate the numeric trend. Repeat steps 3 & 4. When the pop-up list of formatting options appears select "Icon Sets>5 Arrows (colored)"

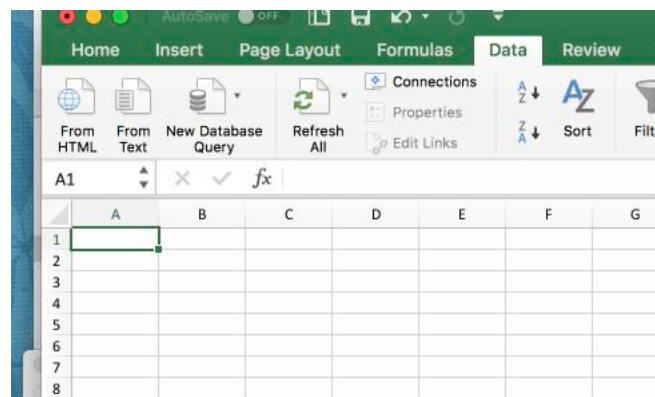


8) Our pivotTable now illustrates a heat table and trend arrows.

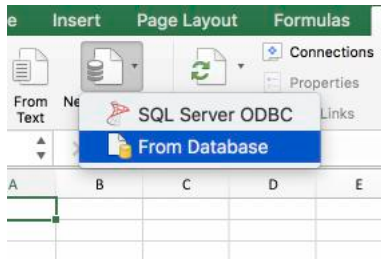
ants	Column	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
		579	553	520	438	386	393	398	386	370	345	356	398
		34	24	34	27	21	19	16	24	10	20	13	16
		359	452	366	300	235	200	211	240	224	231	260	271
		273	267	261	234	226	221	189	211	166	167	191	191
		1954	1838	1717	1366	1275	994	1001	1061	1112	1118	1161	1330
		262	199	202	203	151	162	155	150	150	175	175	199
		138	163	146	124	107	155	105	110	127	109	108	120
		76	70	59	47	48	44	44	34	46	49	49	45
		17	17	15	14	9	8	11	3	5	6	6	8
		1416	1293	1196	1047	931	890	746	793	768	791	924	1077
		765	762	732	638	491	495	481	477	476	458	577	587
		47	59	42	37	34	33	19	26	21	16	19	42
		117	106	100	86	81	84	76	62	79	61	76	78
		695	635	602	472	442	419	397	410	426	386	405	436
		441	412	396	399	324	361	352	345	344	291	351	344
		241	224	211	195	166	185	156	147	156	134	120	166
		190	206	186	167	160	190	178	155	118	147	138	163
		496	455	401	370	348	325	325	309	282	286	324	370
		371	398	369	355	313	243	233	246	245	253	250	266
		91	98	89	78	76	82	75	87	63	58	65	64
		288	334	268	259	240	218	205	227	185	177	210	199
		202	226	197	175	157	125	172	145	151	158	124	168
		557	529	537	436	394	405	385	418	384	363	353	402
		282	244	231	205	188	217	182	177	175	177	163	151
		464	404	388	340	318	275	235	243	239	264	261	288
		631	568	459	452	416	355	350	376	351	319	349	392
		84	103	100	79	72	67	73	66	71	57	70	56
		140	134	131	99	102	83	85	88	86	84	83	84
		173	187	148	102	83	95	78	93	80	90	103	92
		65	67	56	67	43	56	44	43	58	44	51	54
		372	282	344	236	266	235	259	224	238	211	218	231
		172	159	127	102	115	114	124	103	82	119	79	113
		634	621	573	530	474	457	415	418	444	386	392	337
		737	757	807	687	635	571	508	523	563	553	617	605
		48	53	40	39	70	31	42	48	42	42	36	36
		742	672	651	560	504	526	469	532	460	491	485	489
		350	333	277	285	271	228	268	231	239	239	235	213
		210	193	174	142	111	125	104	141	131	131	161	202
		853	754	743	695	592	593	587	602	541	531	497	511
		45	40	35	33	32	28	31	25	29	18	17	18
		544	482	428	400	393	335	331	324	275	330	380	374
		83	87	57	53	59	49	48	49	50	46	46	33
		616	620	552	479	429	431	417	441	448	410	392	436
		1375	1305	1234	1173	1093	1101	1011	1115	1096	1175	1153	1236
		119	123	100	102	97	104	92	84	73	97	102	94
		43	50	27	39	43	38	30	35	31	19	20	29
		456	490	460	414	370	343	327	344	354	313	329	320
		312	306	252	243	204	211	185	165	187	189	245	204
		170	187	190	156	148	136	144	151	132	100	91	94
		430	362	375	298	248	269	252	281	231	233	252	278
		52	65	34	59	36	39	37	40	27	43	34	20

External Data Sources

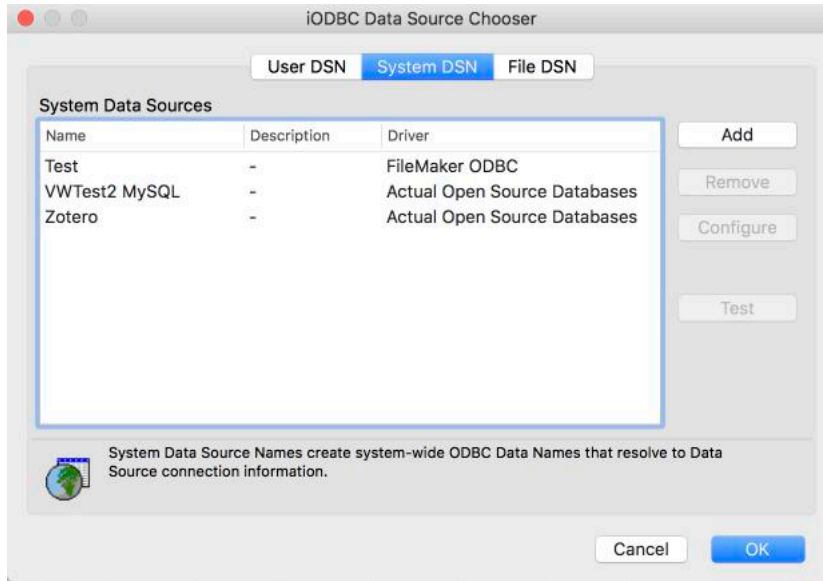
1) Open the worksheet or workbook you want to import your data into. Then select the “Data” tab.



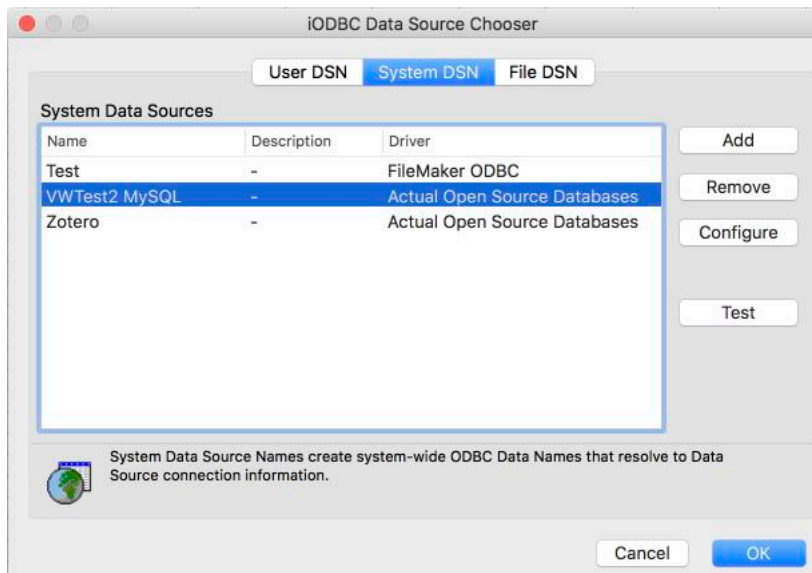
2) Next click on the “New Database Query” button. When the pop-up menu appears select “From Database”



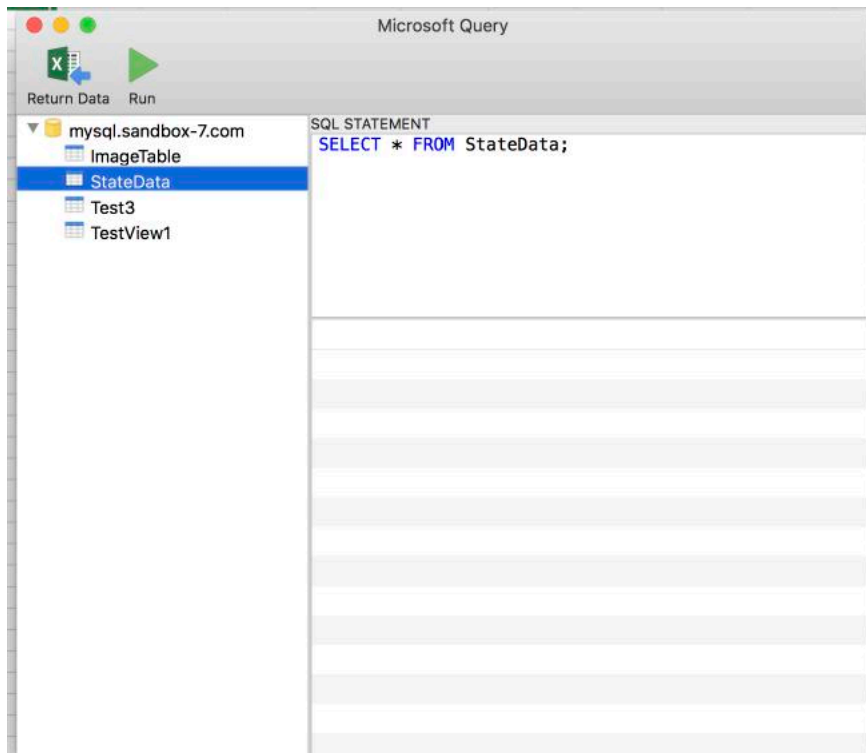
3) The iODBC Data Source Chooser dialog box will appear.



4) Select the database connection you would like to use.



5) Next the Microsoft Query dialog will open asking you to select the table you want to import. As you select tables an SQL statement will be created to import the table you requested.



6) Once you have selected the table click the **“Run”** button and the SQL Query will run showing you what will be imported. If the data looks correct click the **“Return Data”** button.

The screenshot shows the Microsoft Query interface after the query has been executed. The SQL STATEMENT remains `SELECT * FROM StateData;`. The table below displays the data retrieved from the StateData table.

	State	Population	Year	
1	Alabama	2138093	1910	
2	Alabama	2348174	1920	
3	Alabama	2646248	1930	
4	Alabama	2832961	1940	
5	Alabama	3061743	1950	
6	Alabama	3266740	1960	
7	Alabama	3444165	1970	
8	Alabama	3893888	1980	
9	Alabama	4040587	1990	
10	Alabama	4447100	2000	
11	Alabama	4779736	2010	
12	Alaska	64356	1910	
13	Alaska	55036	1920	
14	Alaska	59278	1930	

7) Next the Import Data dialog will open. Click on either **“Existing Sheet”** or **“New Sheet”** depending on where you want your data to be returned.

Import Data

Where do you want to put the data?

☒ Existing sheet:

☐ New sheet

☐ PivotTable

Properties... Parameters... Cancel OK

8) The table should now successfully imported into your spread sheet.

	A	B	C	D
1	State	Population	Year	
2	Alabama	2138093	1910	
3	Alabama	2348174	1920	
4	Alabama	2646248	1930	
5	Alabama	2832961	1940	
6	Alabama	3061743	1950	
7	Alabama	3266740	1960	
8	Alabama	3444165	1970	
9	Alabama	3893888	1980	
10	Alabama	4040587	1990	
11	Alabama	4447100	2000	
12	Alabama	4779736	2010	
13	Alaska	64356	1910	
14	Alaska	55036	1920	
15	Alaska	59278	1930	
16	Alaska	72524	1940	
17	Alaska	128643	1950	
18	Alaska	226167	1960	
19	Alaska	300382	1970	
20	Alaska	401851	1980	
21	Alaska	550043	1990	
22	Alaska	626932	2000	
23	Alaska	710231	2010	
24	Arizona	204354	1910	
25	Arizona	334162	1920	
26	Arizona	435573	1930	
27	Arizona	499261	1940	
28	Arizona	749587	1950	
29	Arizona	1302161	1960	
30	Arizona	1770900	1970	
31	Arizona	2718215	1980	
32	Arizona	3665228	1990	
33	Arizona	5130632	2000	
34	Arizona	6392017	2010	
35	Arkansas	1574449	1910	
36	Arkansas	1752204	1920	
37	Arkansas	1854482	1930	
38	Arkansas	1949387	1940	
39	Arkansas	1909511	1950	