

3. Data Tools

In this lesson, you will learn...

1. To convert text to columns.
2. To use **Data Validation** to restrict the type of data that can be entered into a cell.
3. To consolidate data from a number of different ranges into one new range.
4. To use **Goal Seek** to figure out the value to input to obtain a specific result.

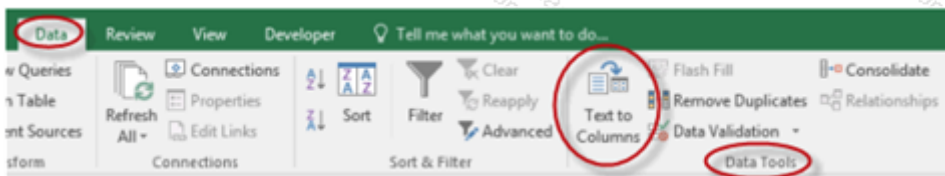
Data Tools in Microsoft Excel are simply tools which make it easy to manipulate data. Some of them are intended to save you time by extracting or joining data and others perform complex calculations. This lesson covers the most commonly used **Data Tools**.

Converting Text to Columns

If you have a list of data in which all the information appears in one column, you can use the **Text to Columns** command to convert the data to multiple columns. This is generally much easier than retyping the data!

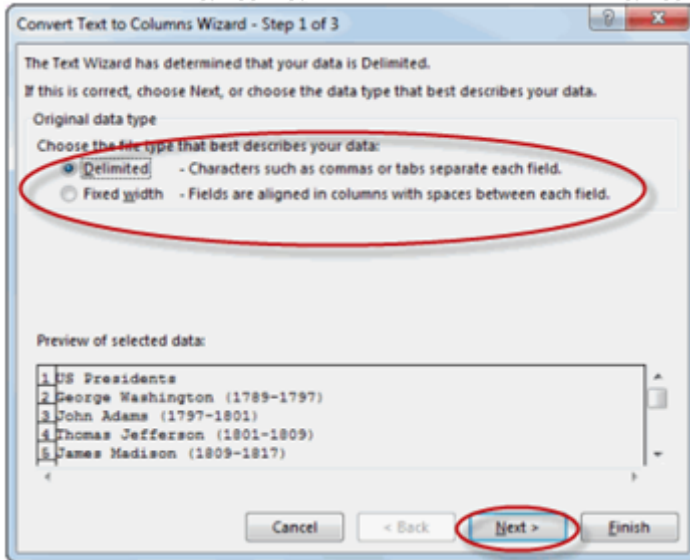
To convert text to columns in Microsoft Excel:

1. Select the column that holds the text you want to convert into multiple columns.
2. On the **Data** tab, in the **Data Tools** group, click the **Text to Columns** command:

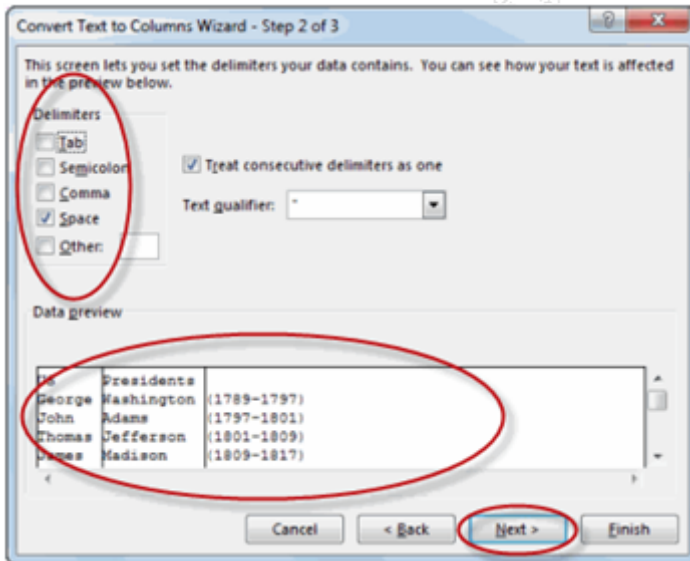


3. In the **Convert Text to Columns Wizard - Step 1 of 3** dialog box, select either **Delimited** (if your data is separated by commas, tabs, or spaces) or **Fixed**

Width (if your data contains a certain number of characters in each field). You will almost always select **Delimited** in this step. Click **Next** :

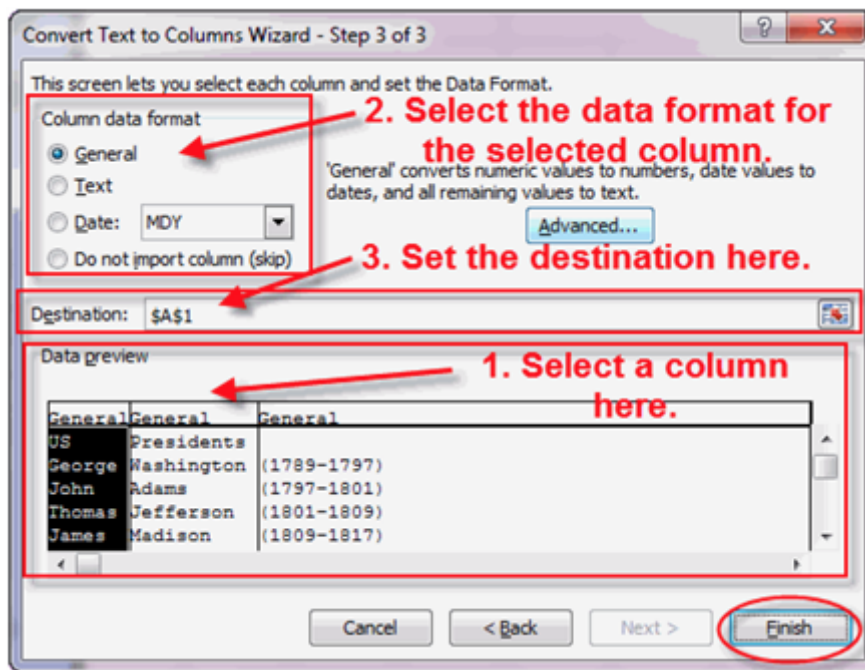


4. In the **Convert Text to Columns Wizard - Step 2 of 3** dialog box, select the **Delimiters** (assuming you selected **Delimited** in the prior step). If you aren't sure what to select, you can select and deselect the options and see the results in the **Data preview** . After making your selection(s), click **Next** :



5. In the **Convert Text to Columns Wizard - Step 3 of 3** dialog box, you can select the data format for each column or you can elect not to import a column. Simply select the column under **Data preview** and then select the **Column**

data format above. In this step, you also specify where you want the data to show up. After you make your selections, click **Finish** :



Exercise 4 Converting Text to Columns

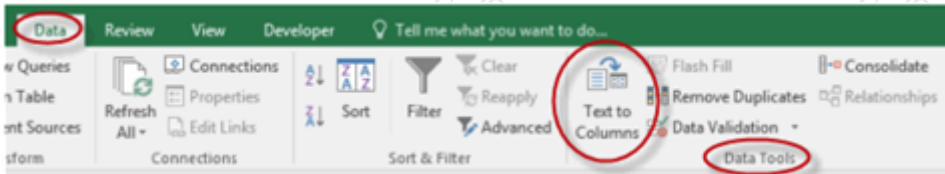
10 to 20 minutes

In this exercise, you will practice converting text to columns.

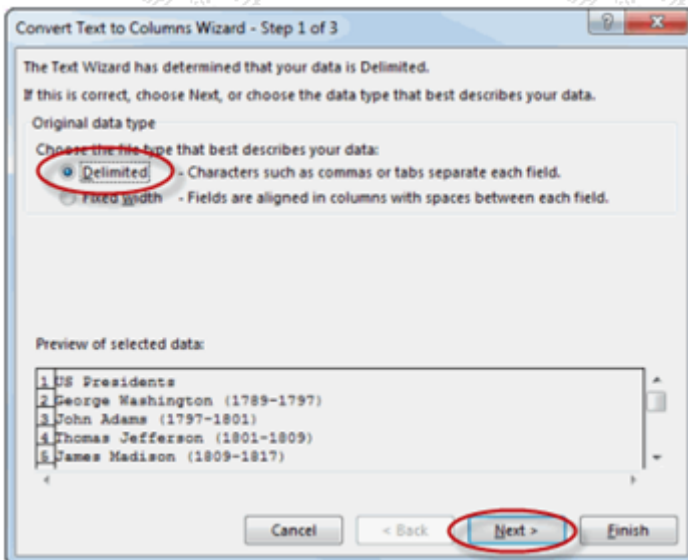
1. Open Text to Columns.xlsx from your Excel2016.3/Exercises folder.
2. In the sheet named Presidents, convert the text in column A to three columns: first name, last name, dates in office. (No worries if your instructor already used this example in their demo - it will still be good practice!)
3. In the sheet named Capitols, convert the text in column A to two columns: city and state. Put the converted data into columns C and D.
4. In the sheet named Contact Information, convert the text in column A to five columns: name, address, city, state, and zip code. (Hint: You will need to do this in two steps.)
5. In the sheet named Phone Numbers, separate the area codes by converting the text in column A to three columns.

Exercise Solution

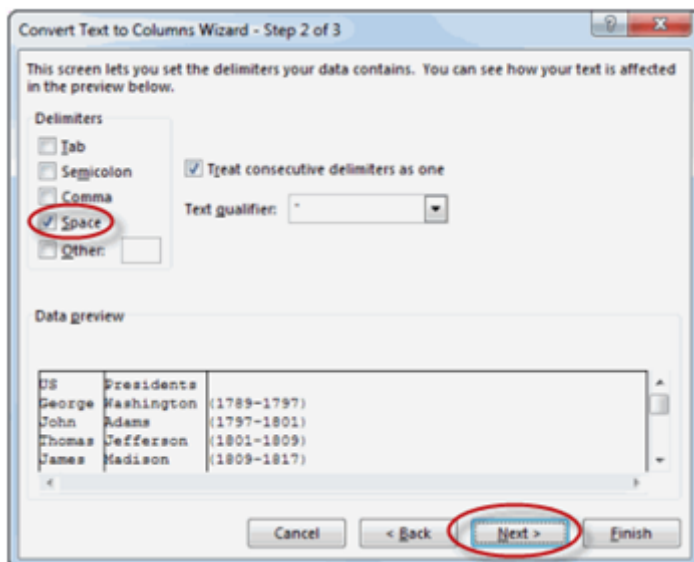
1. To convert the text in column A of the sheet named "Presidents" to three columns:
 - A. Select column A.
 - B. On the **Data** tab, in the **Data Tools** group, click the **Text to Columns** command:



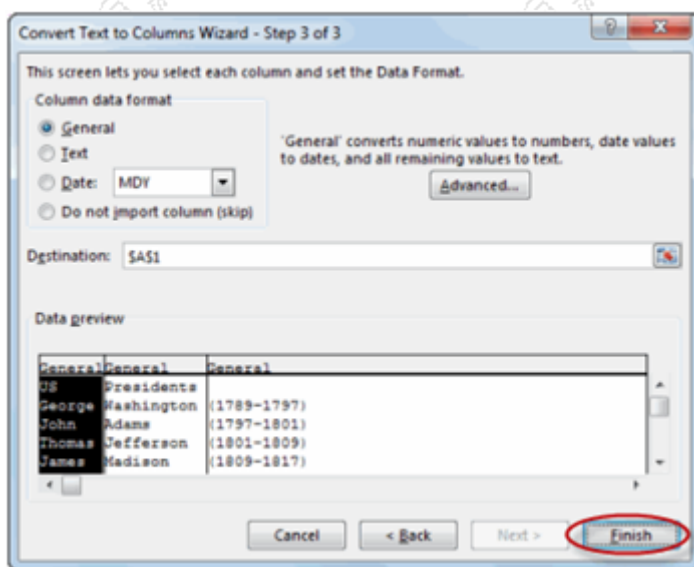
- C. In the **Convert Text to Columns Wizard - Step 1 of 3** dialog box, select **Delimited** and click **Next** :



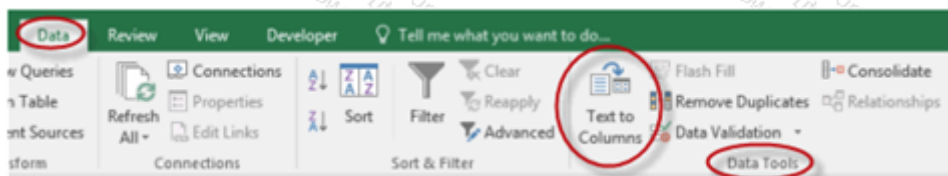
- D. In the **Convert Text to Columns Wizard - Step 2 of 3** dialog box, check **Space** and click **Next** :



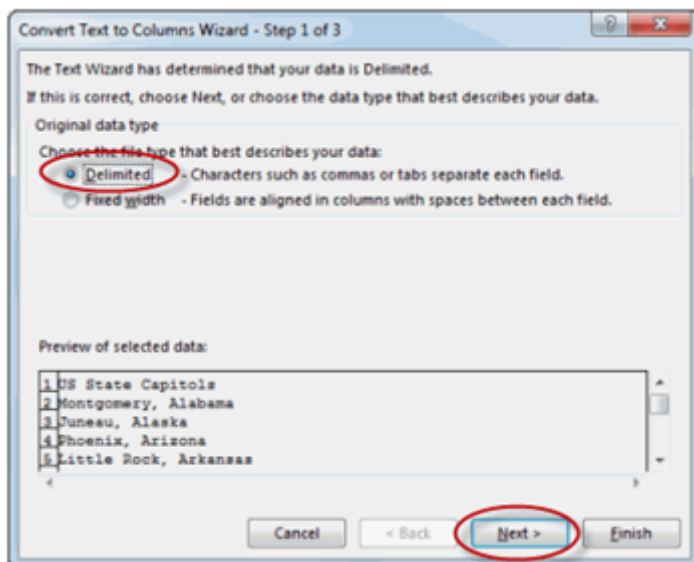
- E. In the **Convert Text to Columns Wizard - Step 3 of 3** dialog box, click **Finish** :



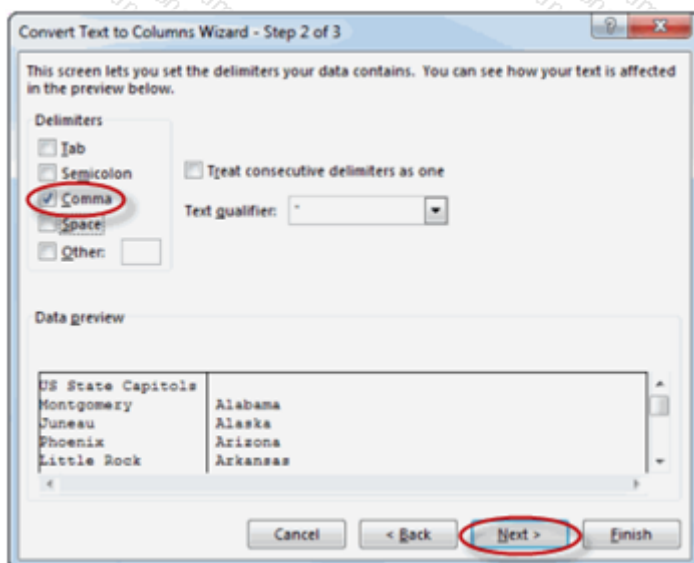
2. To convert the text in column A of the sheet named "Capitols" to two columns:
 - A. Select column A.
 - B. On the **Data** tab, in the **Data Tools** group, click the **Text to Columns** command:



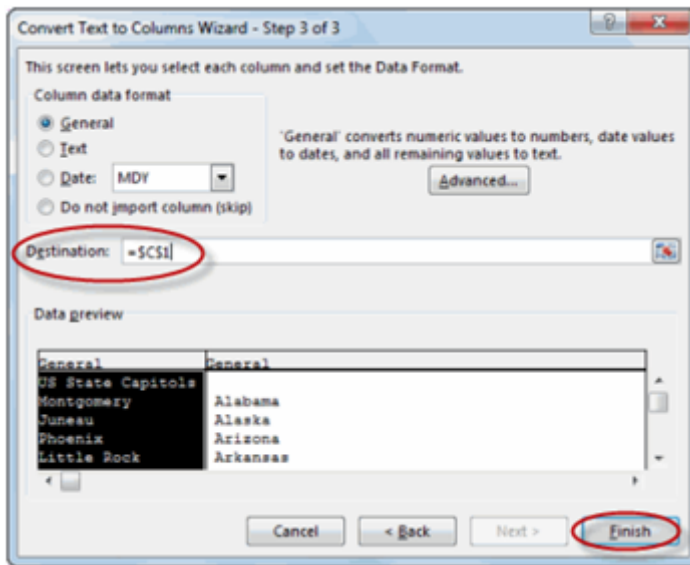
- C. In the **Convert Text to Columns Wizard - Step 1 of 3** dialog box, select **Delimited** and click **Next** :



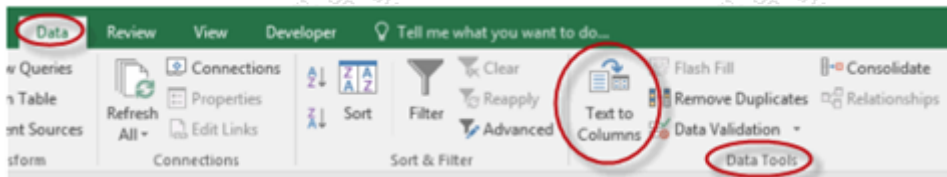
- D. In the **Convert Text to Columns Wizard - Step 2 of 3** dialog box, select **Comma** and click **Next** :



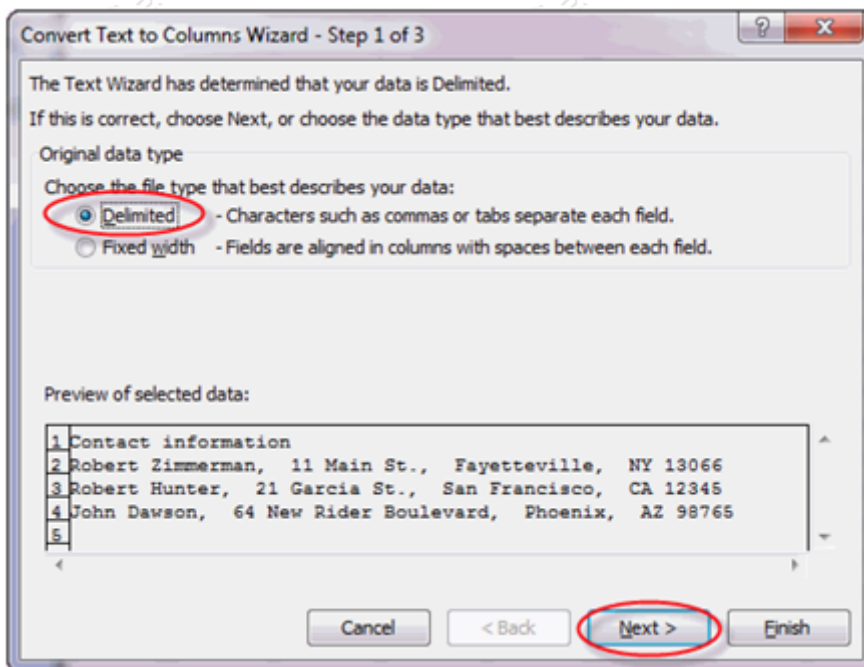
- E. In the **Convert Text to Columns Wizard - Step 3 of 3** dialog box, set the **Destination** to cell **C1** and click **Finish** :



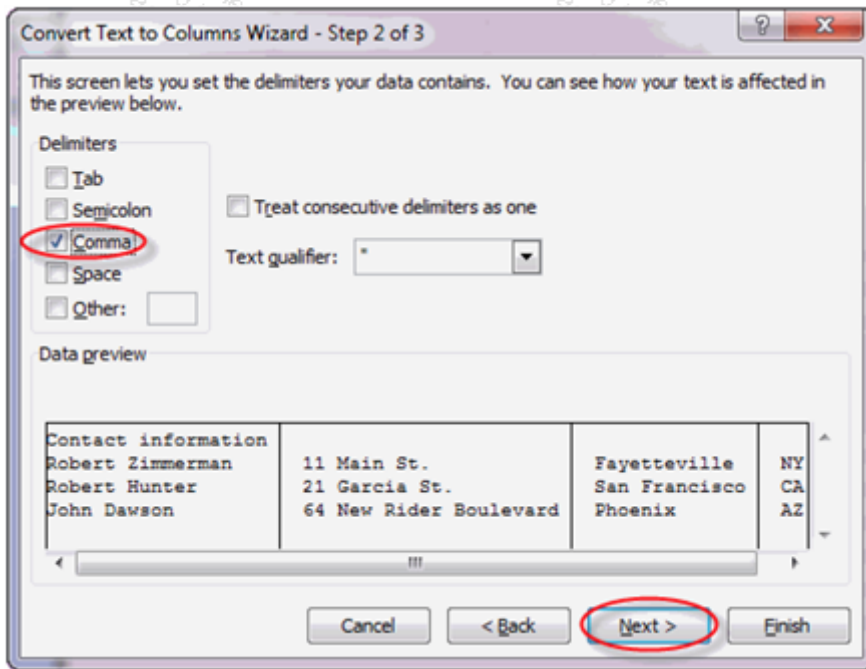
3. To convert the text in column A of the sheet named "Contact Information" to five columns:
 - A. Select column A.
 - B. On the **Data** tab, in the **Data Tools** group, click the **Text to Columns** command:



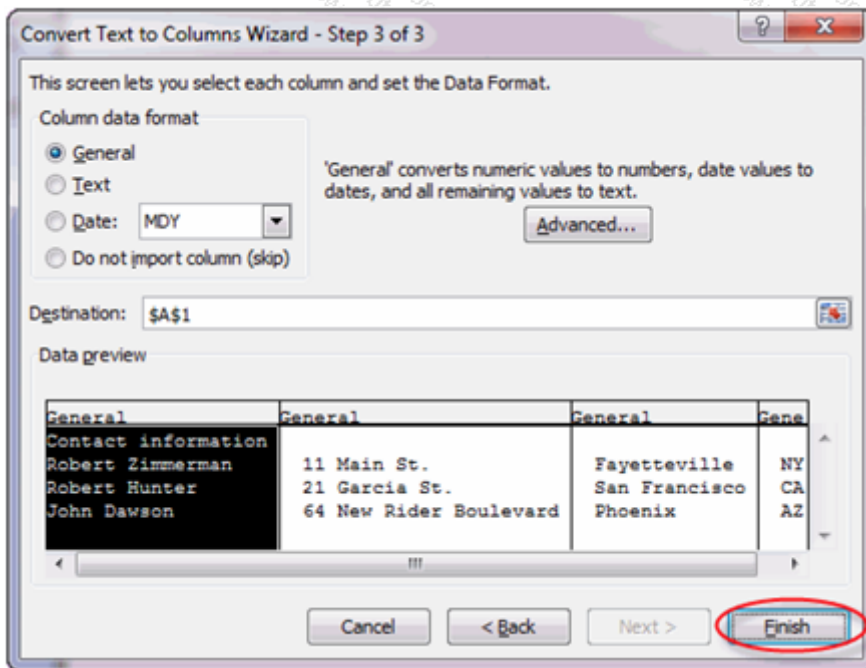
- C. In the **Convert Text to Columns Wizard - Step 1 of 3** dialog box, select **Delimited** and click **Next** :



- D. In the **Convert Text to Columns Wizard - Step 2 of 3** dialog box, select **Comma** and click **Next** :

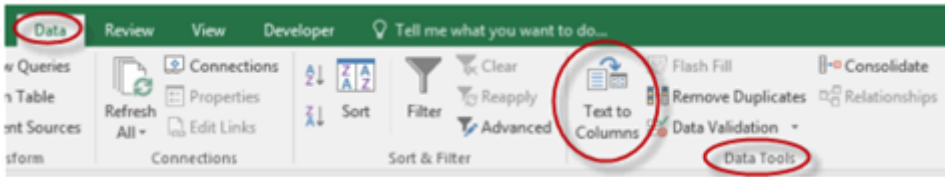


- E. In the **Convert Text to Columns Wizard - Step 3 of 3** dialog box, click **Finish** :

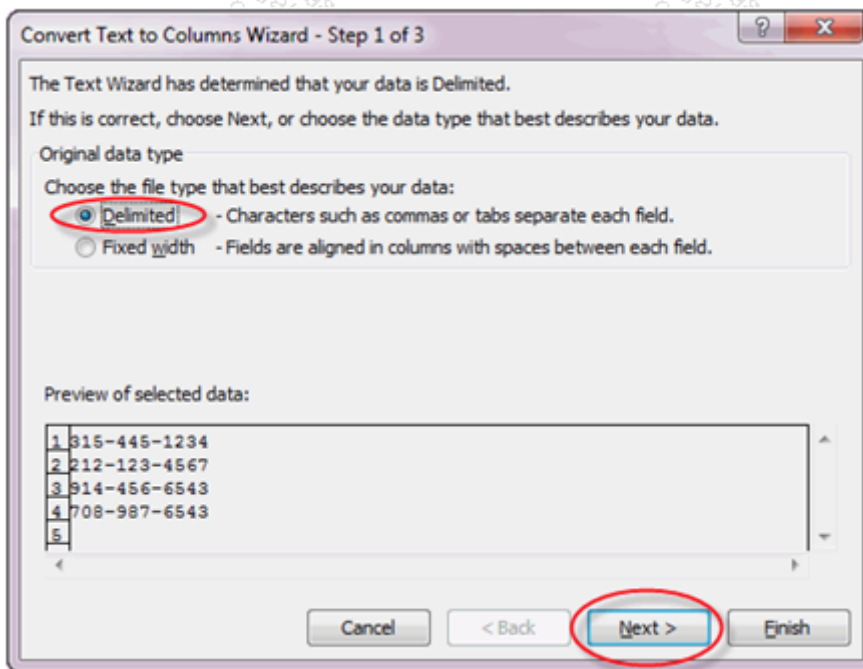


- F. Select column **D**.
- G. Click the **Text to Columns** command.
- H. In the **Convert Text to Columns Wizard - Step 1 of 3** dialog box, select **Delimited** and click **Next** .

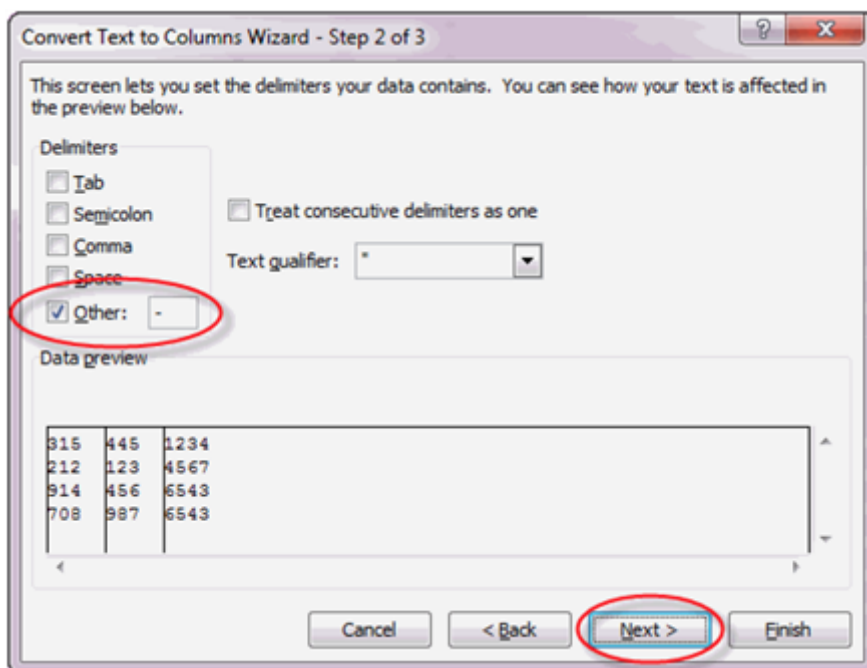
- I. In the **Convert Text to Columns Wizard - Step 2 of 3** dialog box, select **Space** and click **Next**.
 - J. In the **Convert Text to Columns Wizard - Step 3 of 3** dialog box, click **Finish**.
4. To convert the text in column A of the sheet named "Phone Numbers" to three columns:
- A. Select column A.
 - B. On the **Data** tab, in the **Data Tools** group, click the **Text to Columns** command:



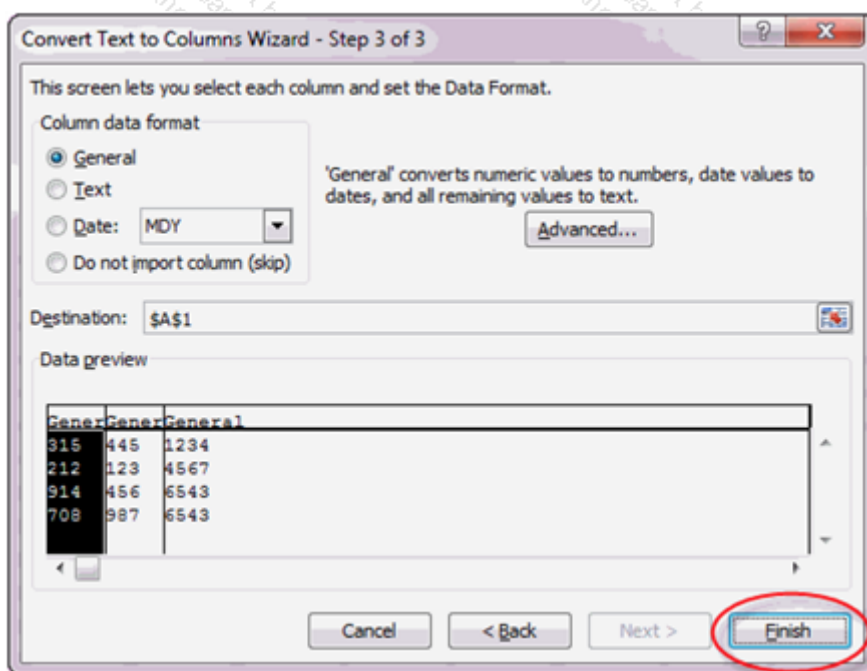
- C. In the **Convert Text to Columns Wizard - Step 1 of 3** dialog box, select **Delimited** and click **Next**:



- D. In the **Convert Text to Columns Wizard - Step 2 of 3** dialog box, select **Other**, enter a dash ("-"), and click **Next**:

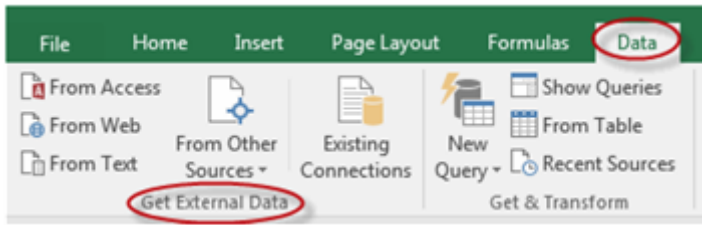


- E. In the **Convert Text to Columns Wizard - Step 3 of 3** dialog box, click **Finish** :



Linking to External Data

In Excel 2016 (and Excel 2013), you can use the options in the Get External Data group of the **Data** tab to link to data in different sources, such as text files, Microsoft Access, and the Internet.

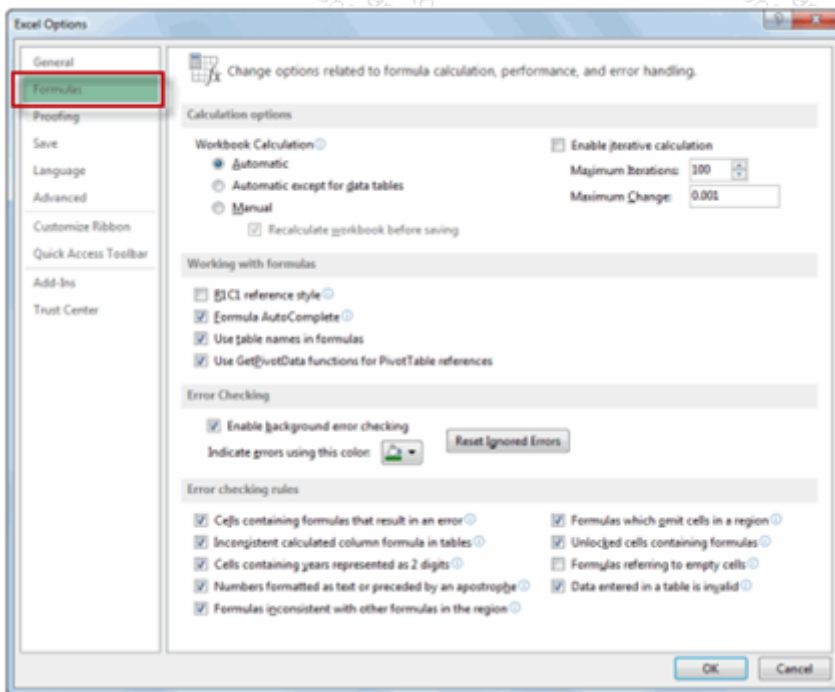


Controlling Calculation Options

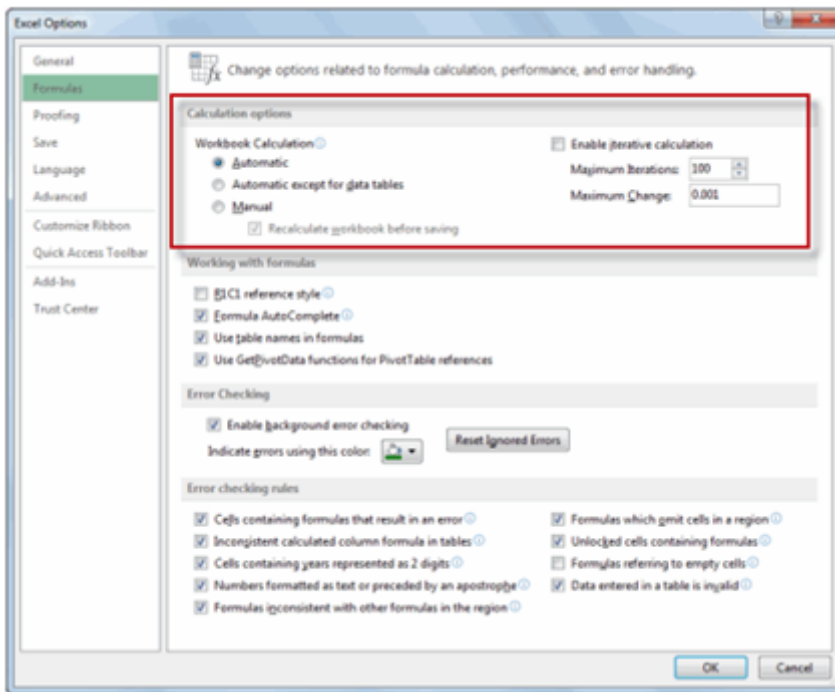
In Excel, calculation refers to Excel's ability to automatically compute formulas and display the results. You can alter the calculation options.

To control calculation options:

1. From the **File** menu tab, select **Options**.
2. In the **Excel Options** dialog box, select **Formulas** on the left.



3. Set options under **Calculation options** and click **OK** to save the changes.

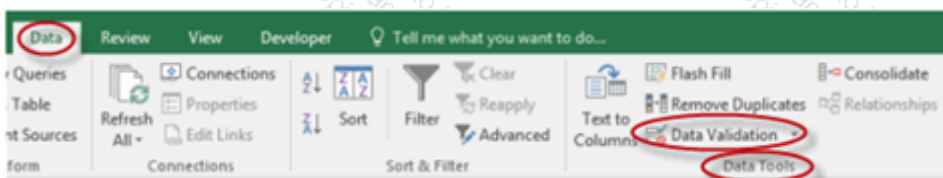


Data Validation

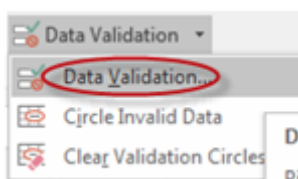
To protect against incorrect data entry, you can use data validation to restrict the type of data that can be entered into a cell. You can choose to allow only certain types of data, such as whole numbers or dates, or you can allow only items from a specified list.

To apply data entry restrictions:

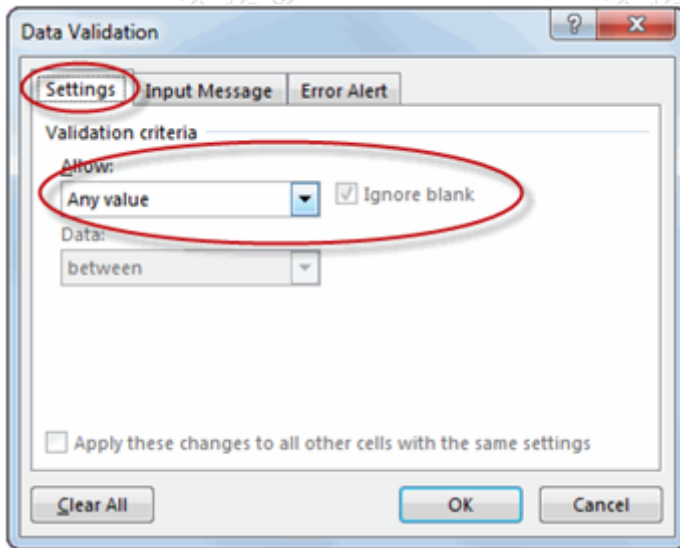
1. Select the cells for which to verify data.
2. On the **Data** tab, in the **Data Tools** group, click the **Data Validation** command:



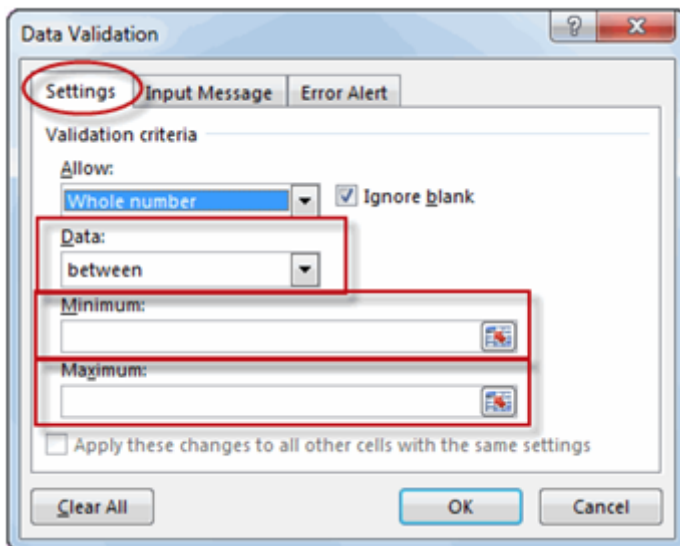
3. Click **Data Validation** :



4. In the **Data Validation** dialog box:
- A. On the **Settings** tab, choose which types of values to allow:

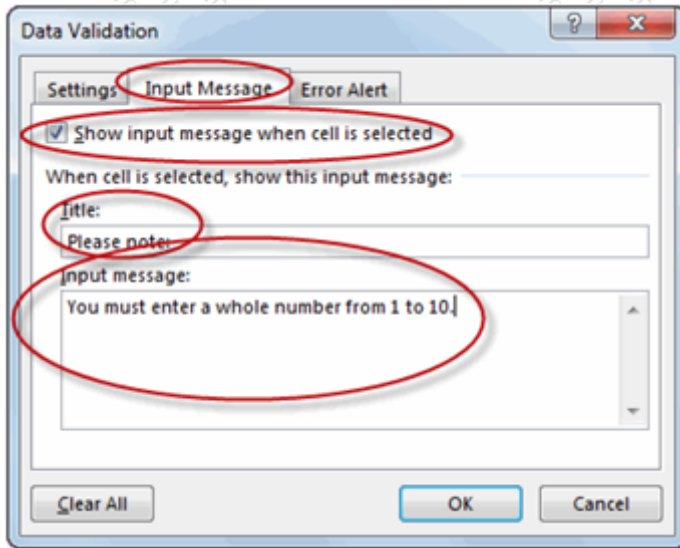


- B. Note that when you select a type of value to allow, the **Data** options change accordingly. Set the criteria (**between** , **greater or less than** , **equal to** , **Source** , etc.) for those values. You can type the criteria or select it by clicking the red arrows to the right of the data entry boxes. If you are only allowing values from a list, you must click the red arrow and select the source:

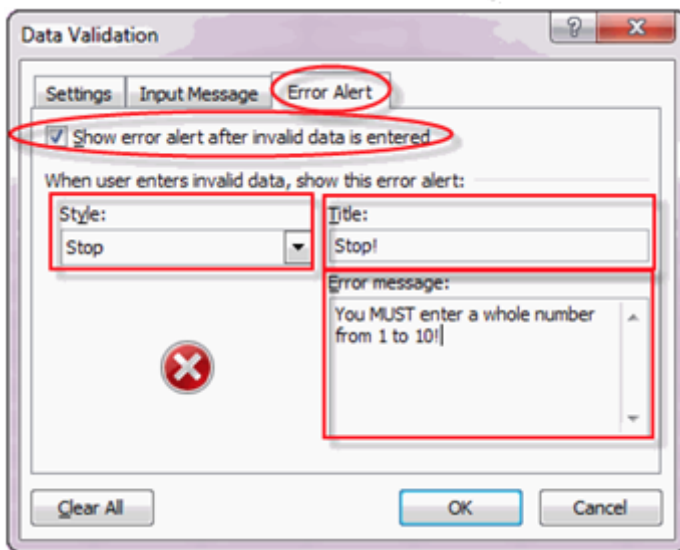


- C. If you want to, you can enter a message telling the person entering the data what the restrictions are. They will see this message when selecting any of the cells for which the restriction has been set. To enter this message, select the **Input Message**

tab, make sure that **Show input message when cell is selected** is checked, and enter the **Title** and **Input message** :



- D. You also have the option of entering an error alert that pops up when invalid data is entered. To enter an error alert, select the **Error Alert** tab, make sure that **Show error alert after invalid data is entered** is checked, and enter the **Style** (choose to stop the person from entering the data, warn them that this data does not meet the criteria, or simply let them know), **Title** , and **Input message** :



- E. Click **OK** .

Watch and follow along as your instructor demonstrates how to use **Data Validation** to set restrictions on what data can be entered.

Exercise 5 Using Data Validation

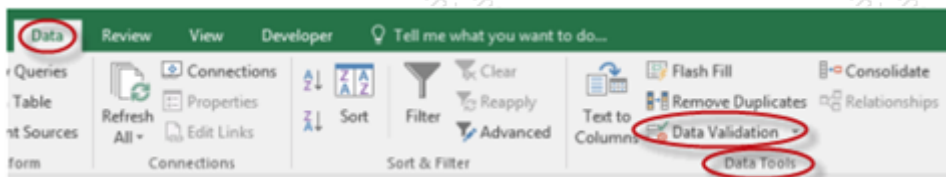
15 to 25 minutes

In this exercise, you will practice using **Data Validation** to restrict the data that can be entered in specific cells in a worksheet.

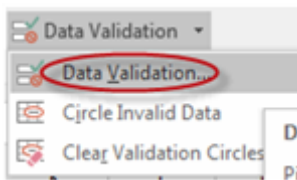
1. Open Data Validation.xlsx from your Excel2016.3/Exercises folder.
2. Use the **Data Validation** command to restrict the data that can be entered into cells **C2:C17** to the list of salespeople on the sheet named "Salespeople".
3. Use **Data Validation** to restrict the data that can be entered into cells **D2:D17** to a date in 2012.
4. Use **Data Validation** to restrict the data that can be entered into cells **E2:E17** to the list of territories on the sheet named "Territories". Enter an **Input Message** and an **Error Alert** to help the person entering data.

Exercise Solution

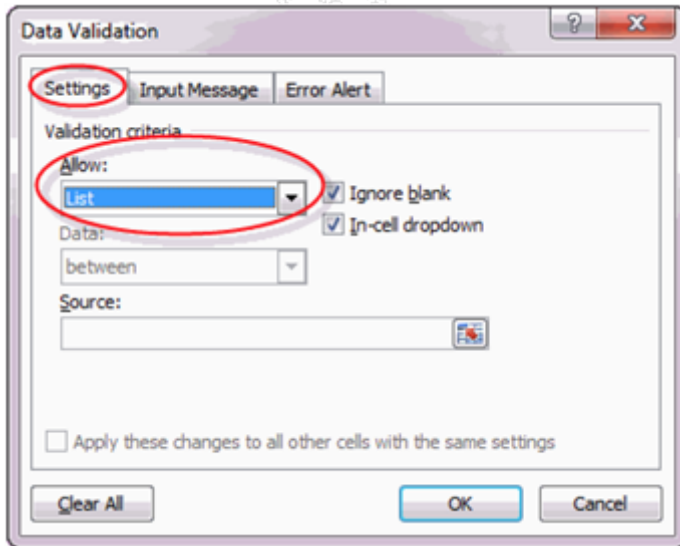
1. To restrict the data that can be entered into cells **C2:C17** to the list of salespeople on the sheet named "Salespeople":
 - A. Select cells **C2:C17**.
 - B. On the **Data** tab, in the **Data Tools** group, click the **Data Validation** command:



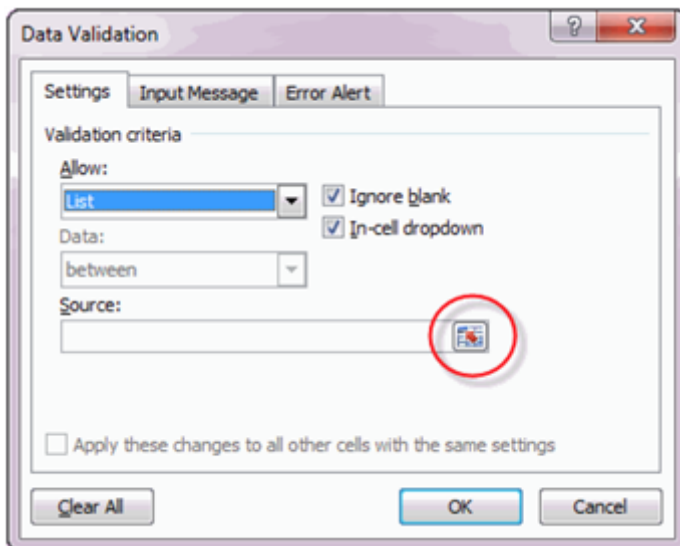
- C. Click **Data Validation** :



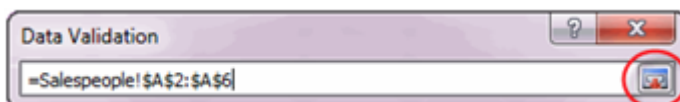
- D. In the **Data Validation** dialog box, on the **Settings** tab, under **Allow**, select **List**:



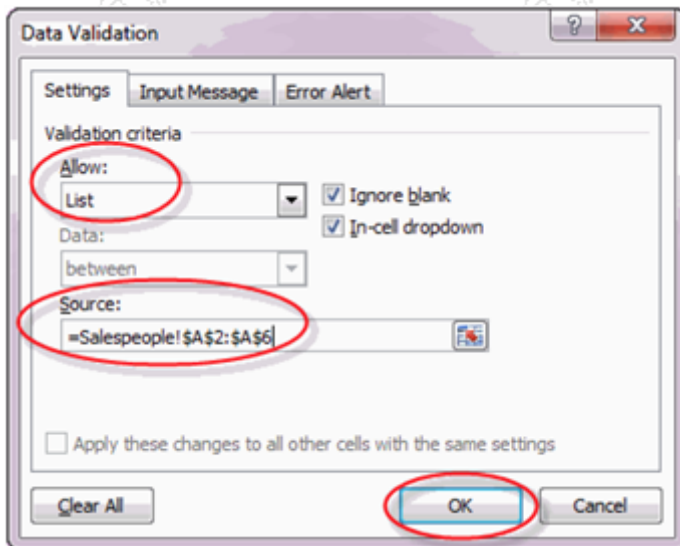
- E. Click the red arrow to the right of the **Source** data entry box to collapse the **Data Validation** dialog box.



- F. Navigate to the sheet named Salespeople, select cells **A2:A6**, and then click the red arrow at the right of the collapsed **Data Validation** dialog box to restore it:



G. Back in the main **Data Validation** dialog box, click **OK** :



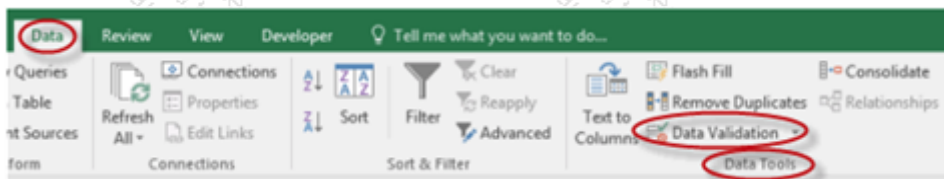
H. Note that selecting any of cells **C2:C17** in the sheet named "Sales" opens a drop-down list from which you can select one of the allowed entries:

Customer	Sale	Salesperson	Date
Smith Supplies	\$ 795.00	Barbie Doll	
Pete's Plumbing	\$ 495.00	Barb Wire	
Flowers for All	\$ 350.00	Jim Shorts	
Kelly's Kitchen	\$ 654.00	Justin Case	
Larry's Landscaping	\$ 321.00	Brandy Wine	
Dave's Diner	\$1,013.00		

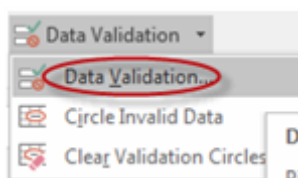
2. To restrict the data that can be entered into cells **D2:D17** to a date in 2012:

A. Select cells **D2:D17**.

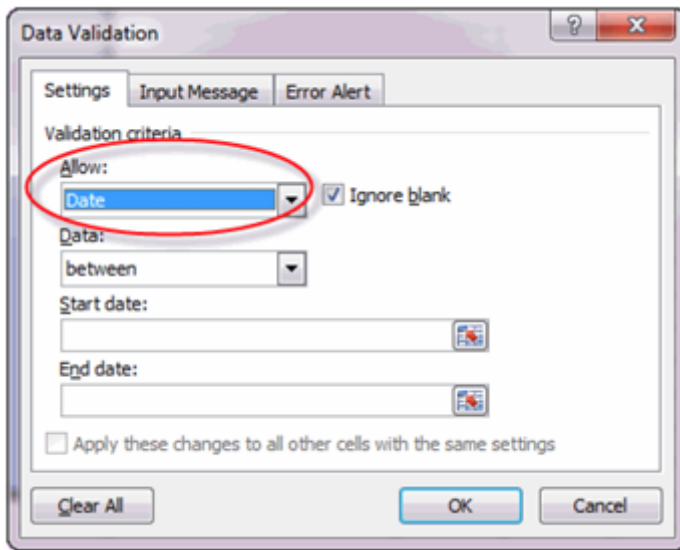
B. On the **Data** tab, in the **Data Tools** group, click the **Data Validation** command:



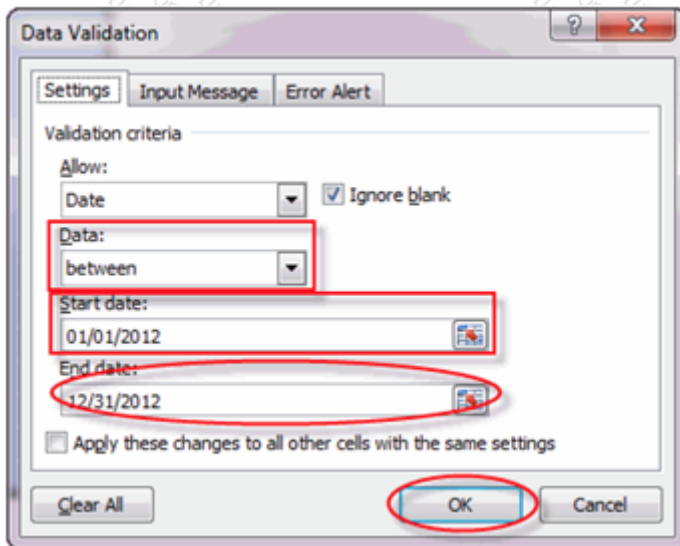
C. Click **Data Validation** :



D. In the **Data Validation** dialog box, on the **Settings** tab, under **Allow** , select **Date** :

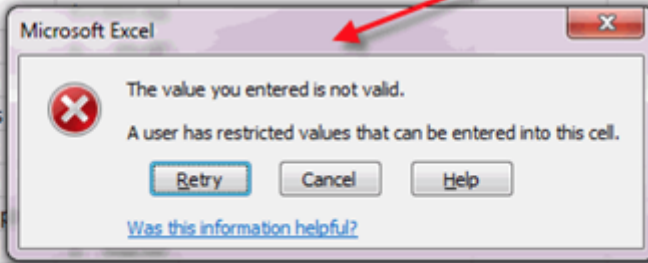


- E. Under **Data** , select **between** . Under **Start date** , enter "1/1/12" and under **End date** , enter "12/31/12". Click **OK** :



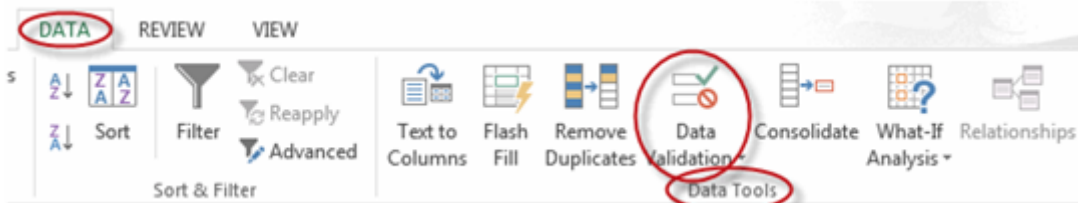
- F. Only dates in 2012 are allowed in cells **D2:D17** now. Entering another date will result in an error message:

Customer	Sale	Salesperson	Date of Sale	Territory
Smith Supplies	\$ 795.00	Brandy Wine	03/07/2012	
Pete's Plumbing	\$ 495.00		09/02/2012	
Flowers for All	\$ 350.00		05/05/2012	
Kelly's Kitchen	\$ 654.00		2/3/13	
Larry's Landscaping	\$ 321.00			
Dave's Diner				
Perfect Paving				
Kelly's Kitchen				
Smith Supplies				
Perfect Paving				
Kelly's Kitchen				
Larry's Landscaping				
Flowers for All				
Smith Supplies	\$ 24.00			

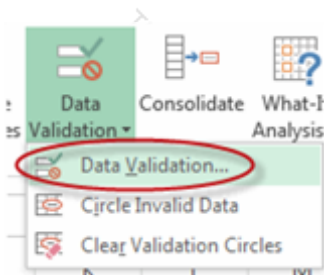


3. To restrict the data that can be entered into cells **E2:E17** to the list of territories on the sheet named "Territories", and to enter an **Input Message** and an **Error Alert** to help the person entering data:

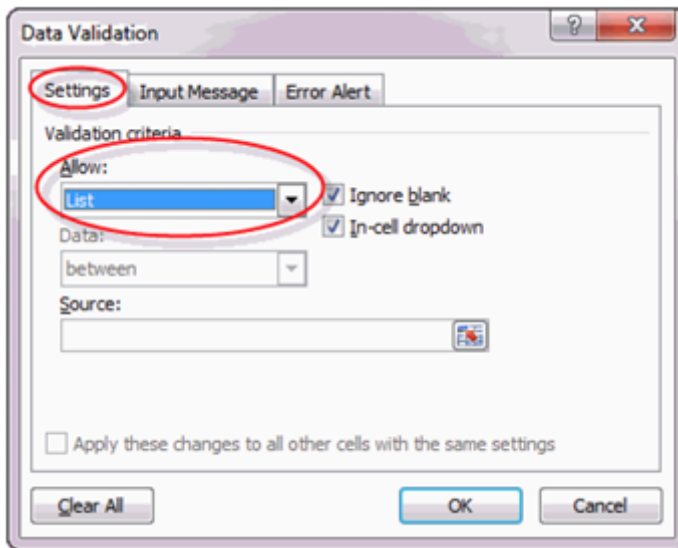
- A. Select cells **E2:E17**.
- B. On the **Data** tab, in the **Data Tools** group, click the **Data Validation** command:



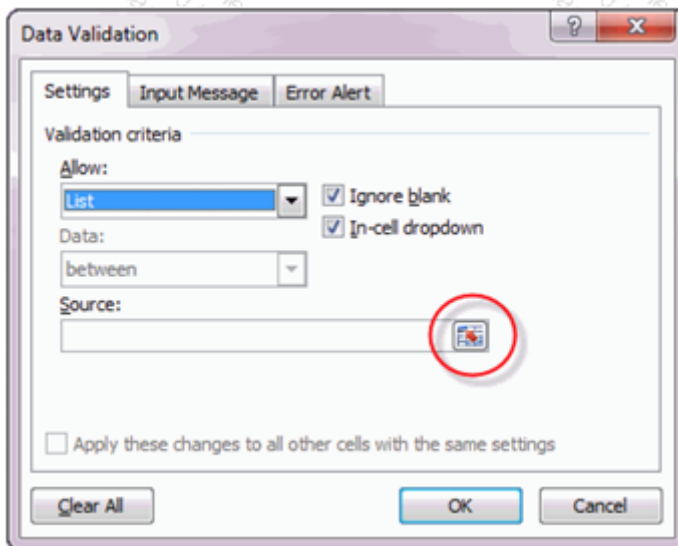
- C. Click **Data Validation** :



- D. In the **Data Validation** dialog box, on the **Settings** tab, under **Allow** , select **List** :



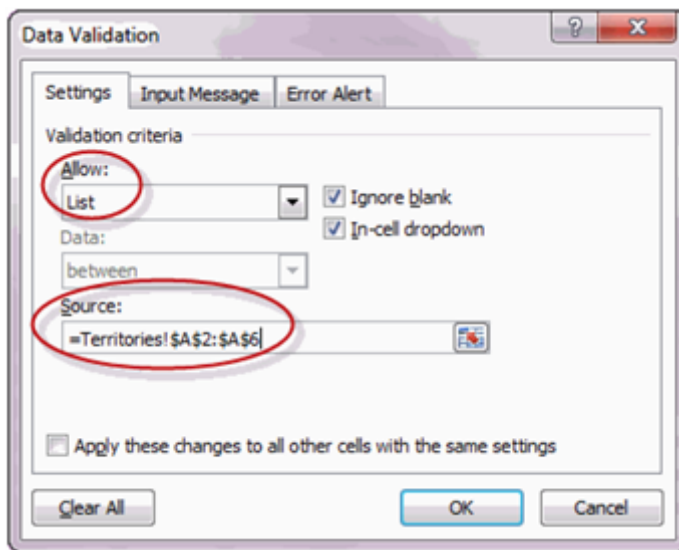
- E. Click the red arrow to the right of the **Source** data entry box to collapse the **Data Validation** dialog box:



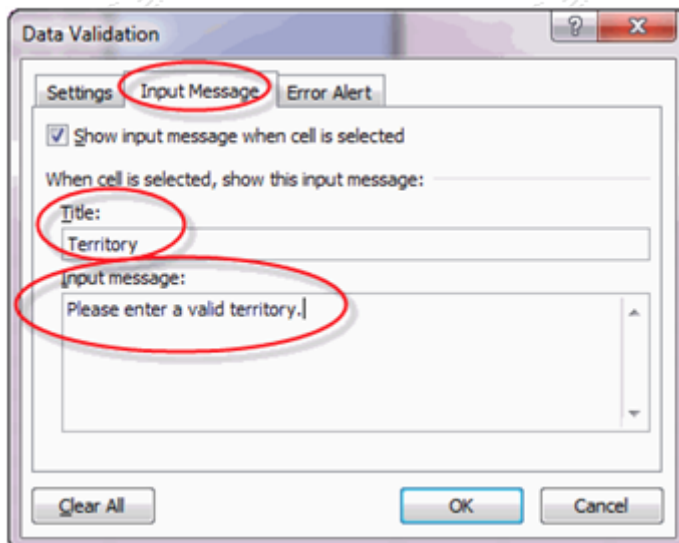
- F. Navigate to the sheet named Territories and select cells **A2:A6**:



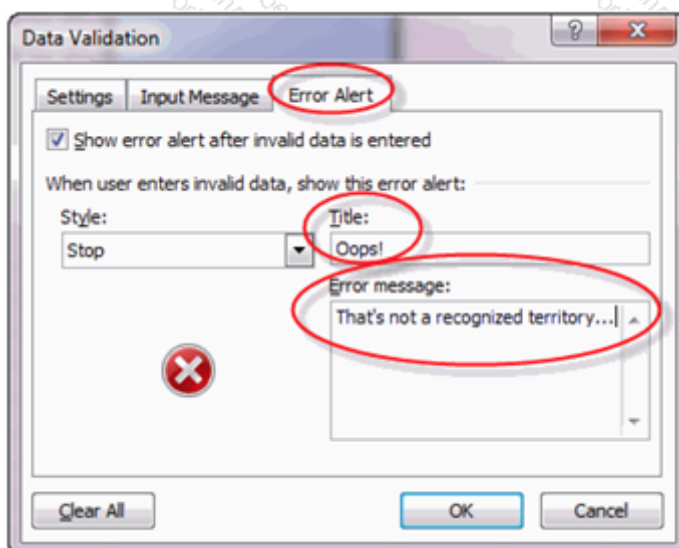
- G. Click the red arrow at the right of the **Data Validation** dialog box to restore it:



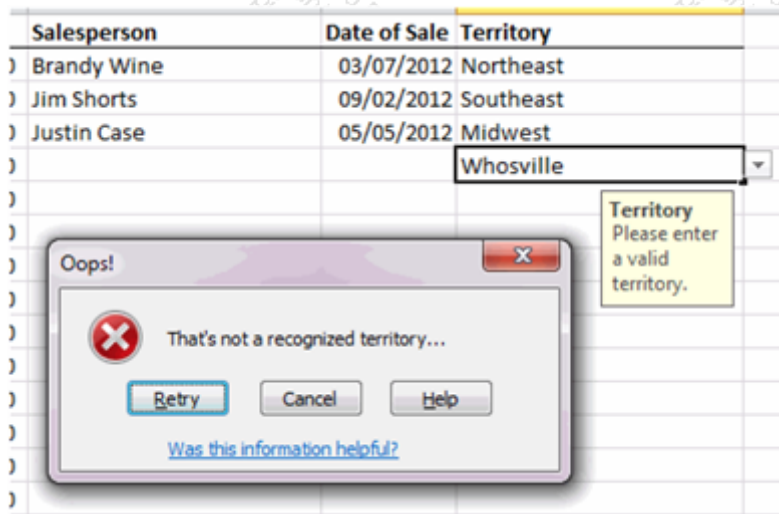
H. Select the **Input Message** tab and enter a **Title** and an **Input message** :



I. Select the **Error Alert** tab, enter a **Title** and an **Error message** , and then click **OK** :



- J. Note that selecting any of the cells **E2:E17** in the sheet named "Sales" opens a drop-down list from which you can select one of the allowed entries. In addition, your **Input Message** is displayed and entering an invalid entry results in your **Error Message** popping up:

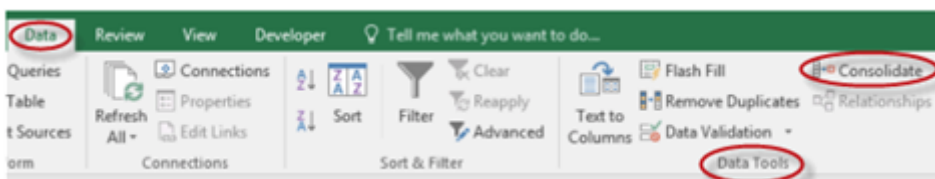


Consolidating Data

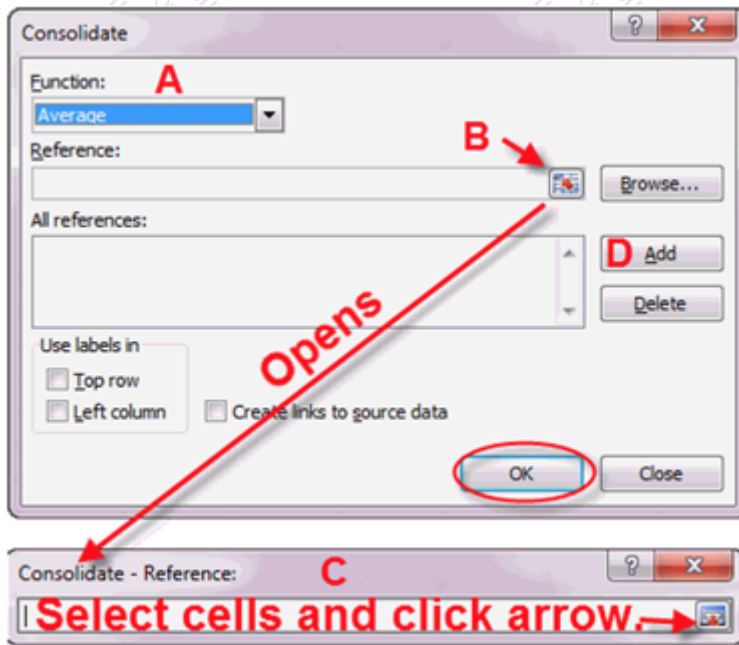
Use the **Consolidate** command to join values from a number of different ranges into one new range. You can use **Consolidate** to sum the values in other ranges, to get an average of the values, to find the min or max value, and more.

To consolidate data from different ranges:

1. On the **Data** tab, in the **Data Tools** group, click the **Consolidate** command:



2. In the **Consolidate** dialog box:
 - A. Select the **Function** to use.
 - B. Click the red arrow to the right of the **Reference** data entry box.
 - C. Select the first series of cells you want to consolidate and then click the red arrow in the **Consolidate - Reference** dialog box to return to the **Consolidate** dialog box.
 - D. Click **Add** to add the series of cells to the **All references** box.
 - E. Repeat steps B, C, and D until you have selected all series of cells that you want to consolidate.
 - F. Click **OK**:



Watch and follow along as your instructor demonstrates how to consolidate data.

Exercise 6 Consolidating Data

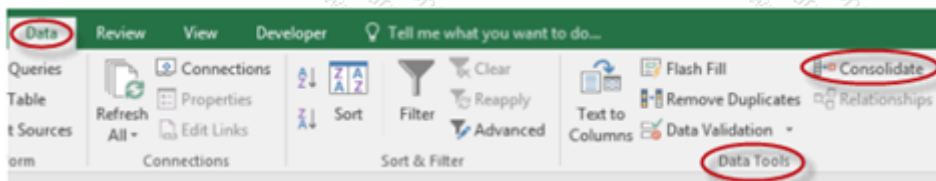
15 to 25 minutes

In this exercise, you will consolidate students' grades on four different exams to show their average, lowest, and highest grades on a summary sheet.

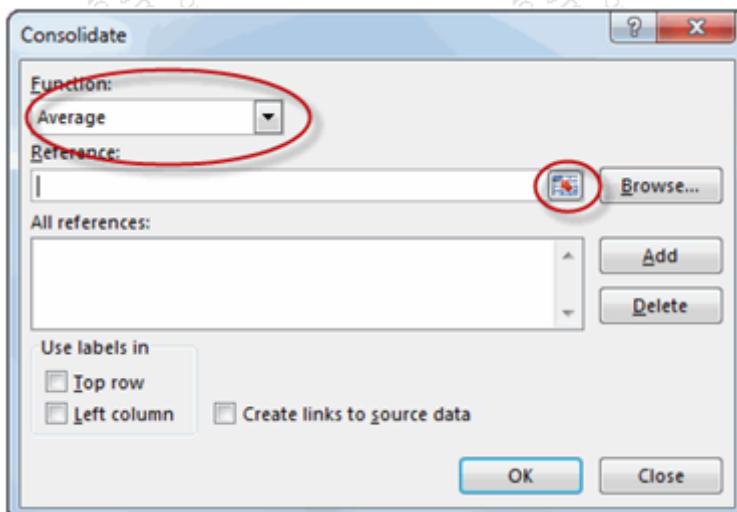
1. Open Consolidate.xlsx from your Excel2016.3/Exercises folder.
2. Students' grades on four exams are stored on the first four sheets in this workbook. Use the **Consolidate** command to show the average, lowest, and highest grade for each student on the sheet named Consolidate.

Exercise Solution

1. To show the average grade for each student:
 - A. On the sheet named Consolidate, select cells **B2:B11**.
 - B. On the **Data** tab, in the **Data Tools** group, click the **Consolidate** command:

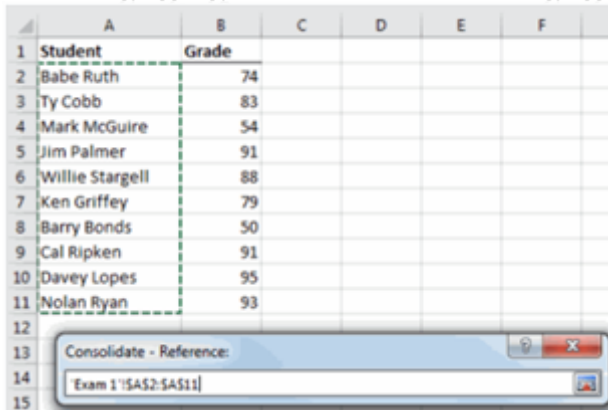


- C. In the **Consolidate** dialog box, set the **Function** to **Average** and then click the red arrow to the right of the **Reference** data entry box:

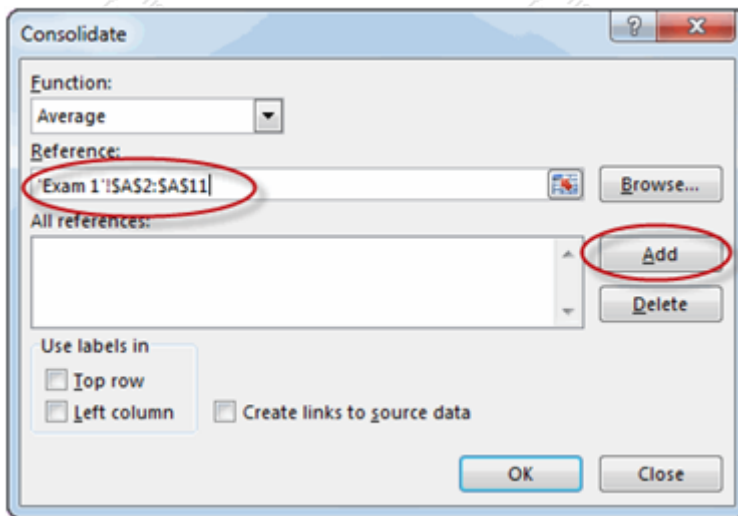


- D.

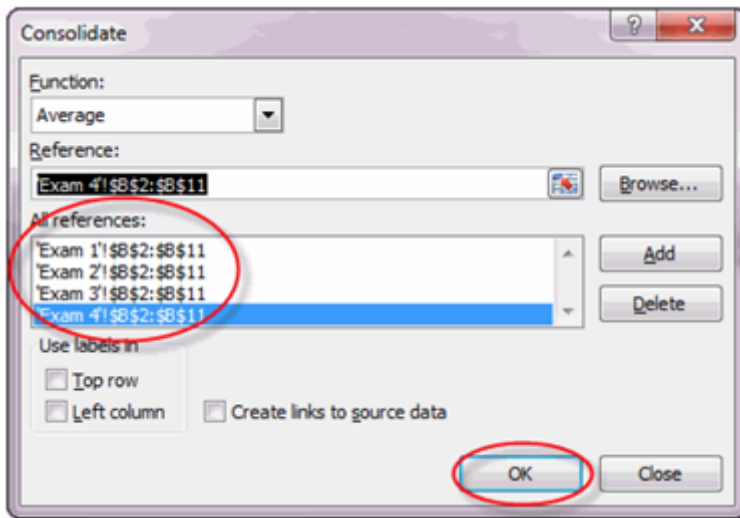
Navigate to the sheet named Exam 1 and select cells **B2:B11** and then click the red arrow at the right of the **Consolidate - Reference** dialog box:



E. Back in the **Consolidate** dialog box, click **Add** :

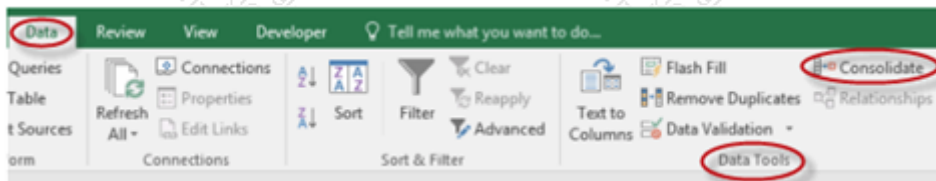


- F. Repeat steps C, D, and E, selecting cells **B2:B11** on the sheets named Exam 2, Exam 3, and Exam 4.
- G. Now that all four series of data have been added to the **All references** box, click **OK** :

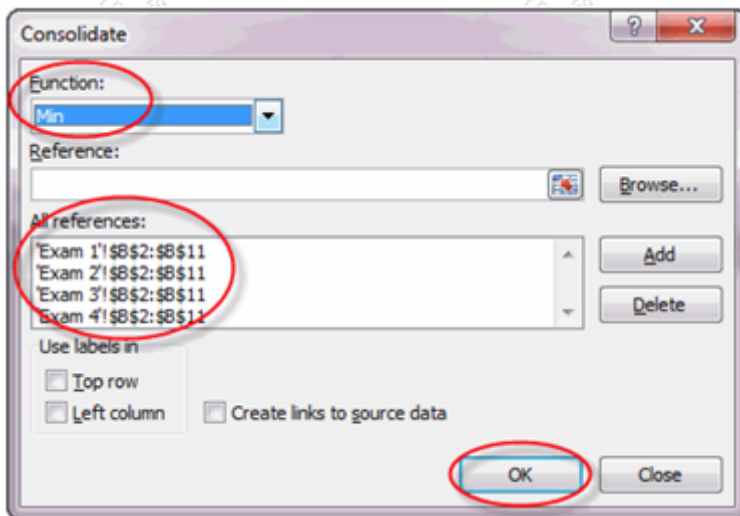


2. To show the lowest grade for each student:

- A. On the sheet named Consolidate, select cells C2:C11.
- B. On the **Data** tab, in the **Data Tools** group, click the **Consolidate** command:

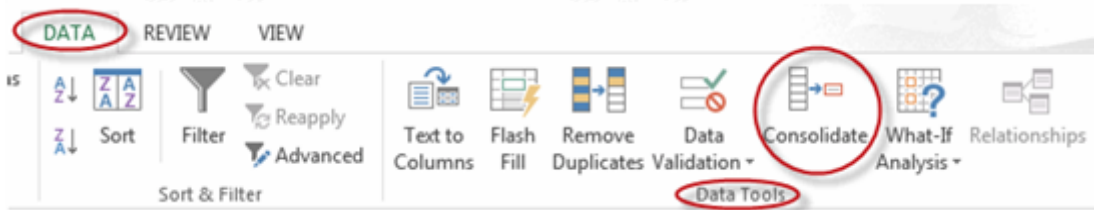


- C. In the **Consolidate** dialog box, set the **Function** to **Min**. Note that the series of data from the prior exercise already appears in the **All references** box. Were we using different data, you could delete these references and add others. As we are using the same data in this exercise, simply click **OK**:

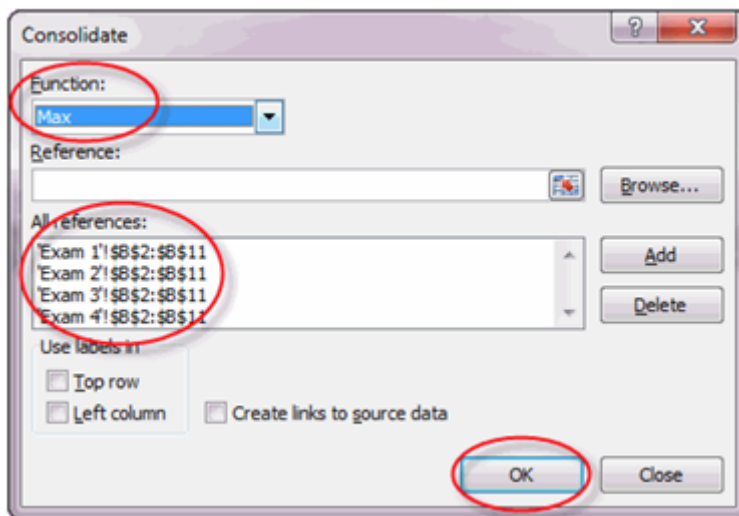


3. To show the highest grade for each student:

- A. On the sheet named Consolidate, select cells **D2:D11**.
- B. On the **Data** tab, in the **Data Tools** group, click the **Consolidate** command:



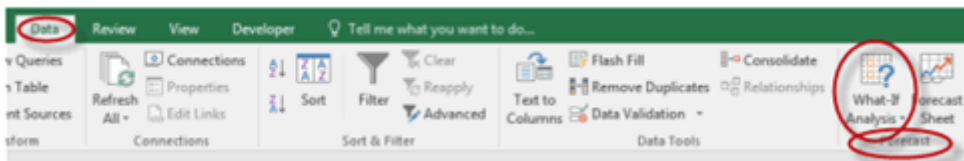
- C. In the **Consolidate** dialog box, set the **Function** to **Max**. Once again, as we are using the same data as in the prior exercises and it already appears in the **All references** box, simply click **OK**:



Goal Seek

If you know the result of a formula but not the value of a specific variable on which the formula depends, you can use **Goal Seek** to adjust the variable to display the desired value. **Goal Seek** can only adjust one variable in a formula, so if a formula depends on more than one variable, you will need to decide which variable to adjust. To use **Goal Seek**:

1. On the **Data** tab, in the **Forecast** group (the **Data Tools** group in Excel 2013), click the **What-If-Analysis** command:

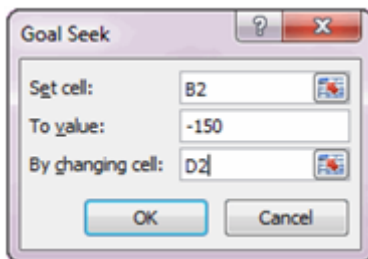


2. Click **Goal Seek** :

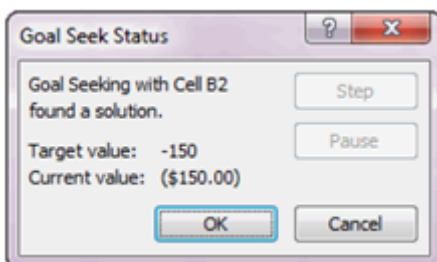


3. In the **Goal Seek** dialog box:

- A. In the **Set cell** box, enter the cell for which you know the result (if you selected this cell before clicking **Goal Seek** , then it is already filled in).
- B. In the **To value** box, enter the value for the cell above.
- C. In the **By changing cell** box, enter the cell to adjust in order to obtain the value. (Remember, this cell must be related via a formula to the cell above or else changing one won't impact the other.)
- D. Click **OK** :



4. In the **Goal Seek Status** dialog box, after the calculation has completed, click **OK** to accept the change or **Cancel** to reject it:



Watch and follow along as your instructor demonstrates how to use **Goal Seek**.

Exercise 7 Using Goal Seek

15 to 25 minutes

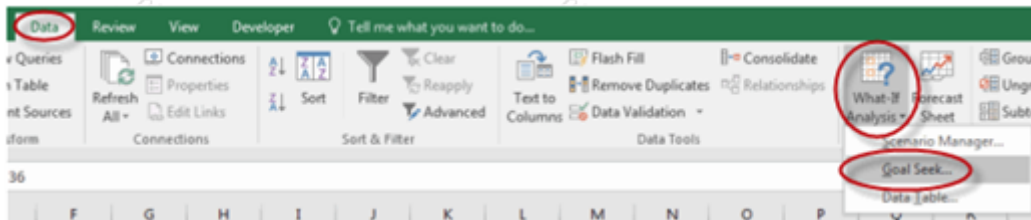
In this exercise, you will practice using **Goal Seek** to adjust the number of periods it will take to pay off a loan based on varied payments and to figure out what grade a student needs on their final exam to achieve a target grade for a course.

1. Open Goal Seek.xlsx from your Excel2016.3/Exercises folder.
2. The worksheet named Loans contains information on four loans. The **Payment** is calculated via the PMT formula. Use **Goal Seek** to determine:
 - A. How many months (periods) it will take to pay off your boat if you can only pay \$100 per month.
 - B. How many months (periods) it will take to pay off your first car if you can only pay \$250 per month.
 - C. How many months (periods) it will take to pay off your second car if you can pay \$200 per month.
 - D. How many months (periods) it will take to pay off your house if you can pay \$1,000 per month.
3. The worksheet named Grades contains scores for a number of students on four exams, an empty column where the score for the fifth exam will go, and a column showing the average score on all exams. Use **Goal Seek** to figure out:
 - A. What grade Babe Ruth needs to get on the last exam to raise his final grade to 90.
 - B. What grade Barry Bonds needs to get on the last exam to achieve a passing grade (65).
 - C.

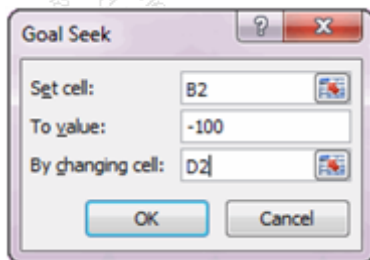
What the lowest grade Cal Ripken can get on the last exam to finish with a final grade of 90.

Exercise Solution

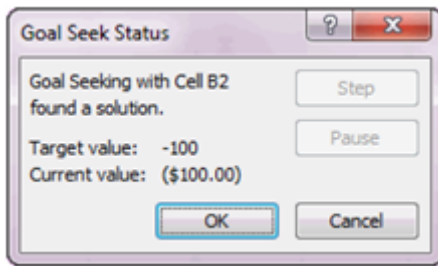
1. To determine how many months it will take to pay off your boat if you can only pay \$100 per month:
 - A. On the **Data** tab, in the **Forecast** group (the **Data Tools** group in Excel 2013), click the **What-If-Analysis** command and then click **Goal Seek** :



- B. In the **Goal Seek** dialog box:
 - i. In the **Set cell** box, enter cell **B2**.
 - ii. In the **To value** box, enter **-100**.
 - iii. In the **By changing cell** box, enter **D2**:
 - iv. Click **OK** :



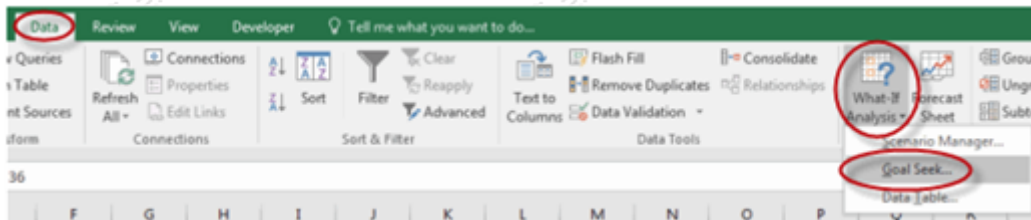
- C. In the **Goal Seek Status** dialog box, after the calculation has completed, click **OK** to accept the change:



D. The correct result is 63 months.

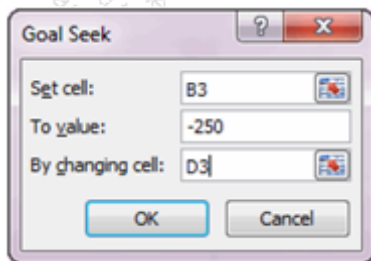
2. To determine how many months it will take to pay off your first car if you can only pay \$250 per month:

A. On the **Data** tab, in the **Forecast** group (the **Data Tools** group in Excel 2013), click the **What-If-Analysis** command and then click **Goal Seek** :

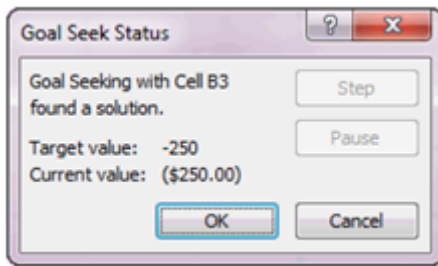


B. In the **Goal Seek** dialog box:

- i. In the **Set cell** box, enter cell **B3**.
- ii. In the **To value** box, enter **-250**.
- iii. In the **By changing cell** box, enter **D3**:
- iv. Click **OK** :



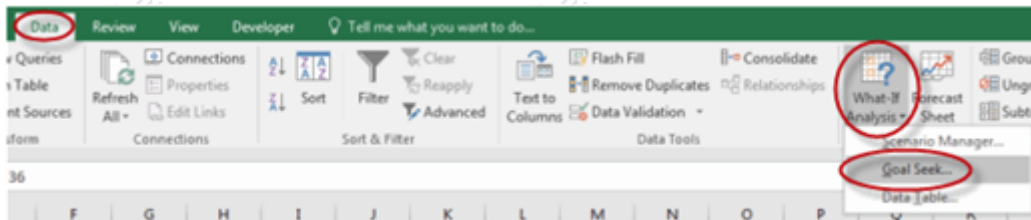
C. In the **Goal Seek Status** dialog box, after the calculation has completed, click **OK** to accept the change:



D. The correct result is 148 months.

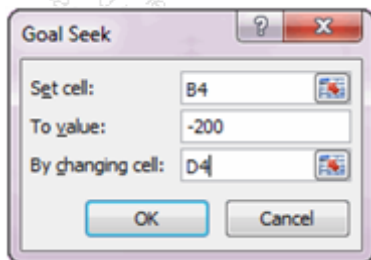
3. To determine how many months it will take to pay off your second car if you can pay \$200 per month:

A. On the **Data** tab, in the **Forecast** group (the **Data Tools** group in Excel 2013), click the **What-If-Analysis** command and then click **Goal Seek** :

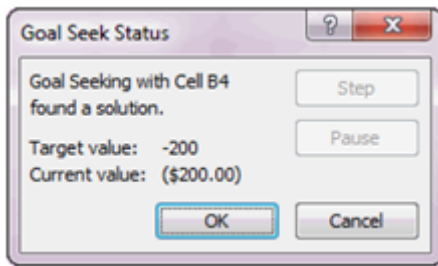


B. In the **Goal Seek** dialog box:

- i. In the **Set cell** box, enter cell **B4**.
- ii. In the **To value** box, enter **-200**.
- iii. In the **By changing cell** box, enter **D4**:
- iv. Click **OK** :



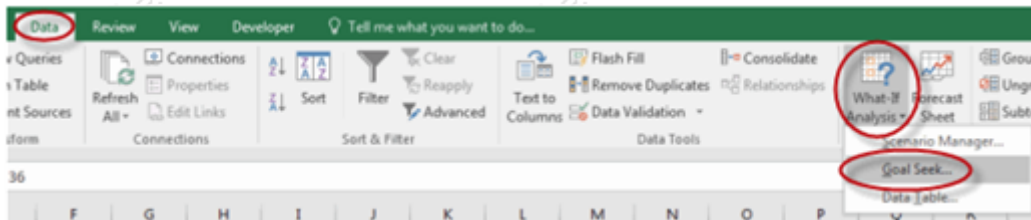
C. In the **Goal Seek Status** dialog box, after the calculation has completed, click **OK** to accept the change:



D. The correct result is 42 months.

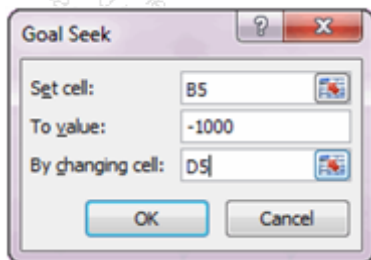
4. To determine how many months it will take to pay off your house if you can pay \$1,000 per month:

A. On the **Data** tab, in the **Forecast** group (the **Data Tools** group in Excel 2013), click the **What-If-Analysis** command and then click **Goal Seek** :

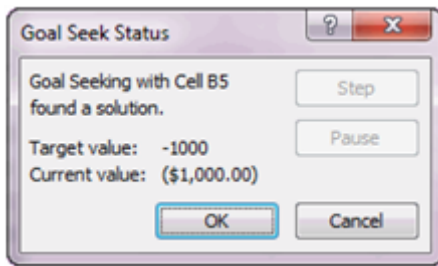


B. In the **Goal Seek** dialog box:

- i. In the **Set cell** box, enter cell **B5**.
- ii. In the **To value** box, enter **-1000**.
- iii. In the **By changing cell** box, enter **D5**:
- iv. Click **OK** :



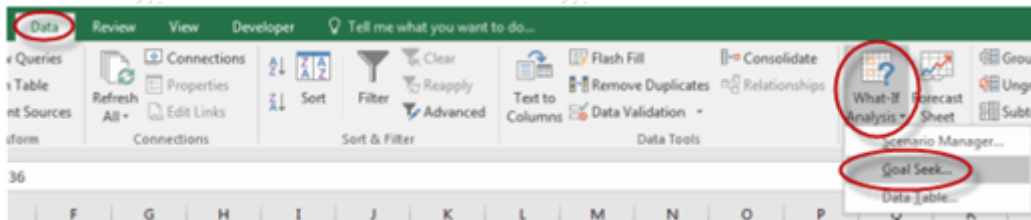
C. In the **Goal Seek Status** dialog box, after the calculation has completed, click **OK** to accept the change:



D. The correct result is 252 months.

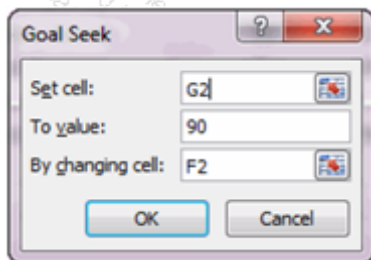
5. To figure out what grade Babe Ruth needs to get to raise his final grade to 90, go to the sheet named Grades and then:

A. On the **Data** tab, in the **Forecast** group (the **Data Tools** group in Excel 2013), click the **What-If-Analysis** command and then click **Goal Seek** :

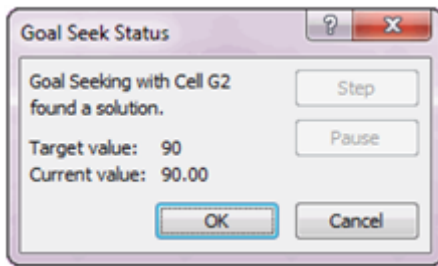


B. In the **Goal Seek** dialog box:

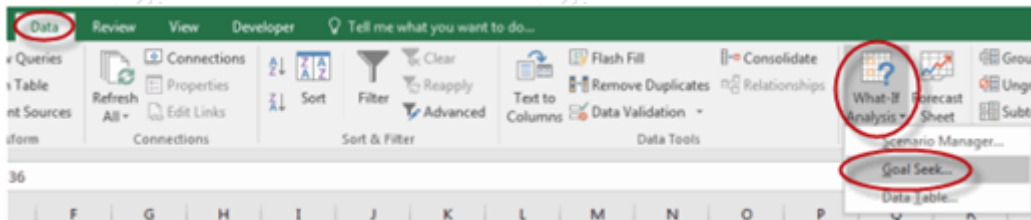
- i. In the **Set cell** box, enter cell **G2**.
- ii. In the **To value** box, enter **90**.
- iii. In the **By changing cell** box, enter **F2**:
- iv. Click **OK** :



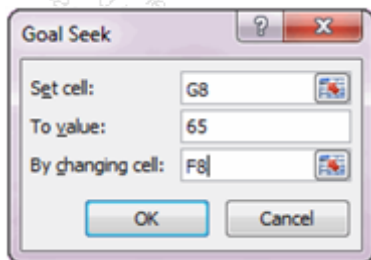
C. In the **Goal Seek Status** dialog box, after the calculation has completed, click **OK** to accept the change:



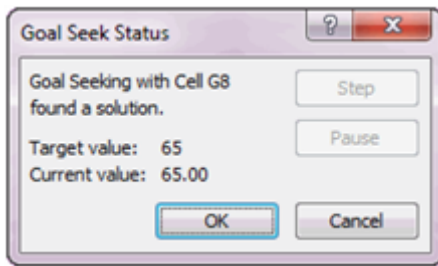
- D. Babe Ruth needs a 100 on the final exam to raise his average to 90.
6. To figure out what grade Barry Bonds needs to get on the last exam to achieve a passing grade (65):
- A. On the **Data** tab, in the **Forecast** group (the **Data Tools** group in Excel 2013), click the **What-If-Analysis** command and then click **Goal Seek** :



- B. In the **Goal Seek** dialog box:
- In the **Set cell** box, enter cell **G8**.
 - In the **To value** box, enter **65**.
 - In the **By changing cell** box, enter **F8**:
 - Click **OK** :

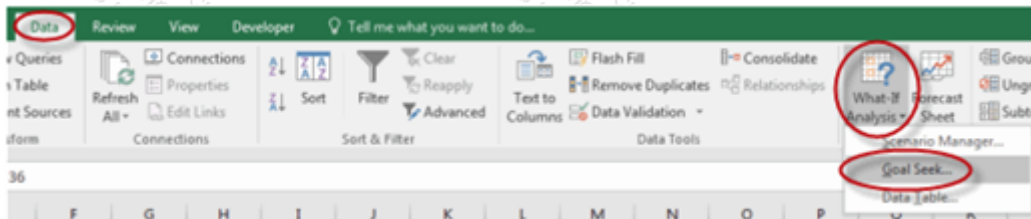


- C. In the **Goal Seek Status** dialog box, after the calculation has completed, click **OK** to accept the change:

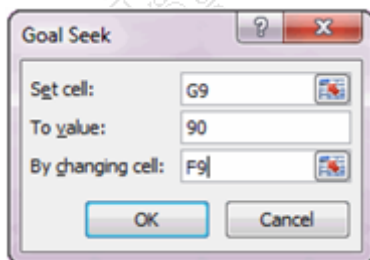


- D. Barry Bonds needs a 133 on the final exam to achieve a passing grade. Poor Barry Bonds.
7. To figure out the lowest grade Cal Ripken can get on the last exam to finish with a final grade of 90:

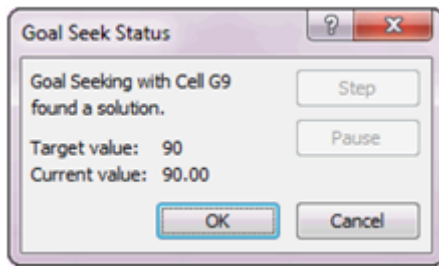
- A. On the **Data** tab, in the **Forecast** group (the **Data Tools** group in Excel 2013), click the **What-If-Analysis** command and then click **Goal Seek** :



- B. In the **Goal Seek** dialog box:
- In the **Set cell** box, enter cell **G9**.
 - In the **To value** box, enter **90**.
 - In the **By changing cell** box, enter **F9**:
 - Click **OK** :



- C. In the **Goal Seek Status** dialog box, after the calculation has completed, click **OK** to accept the change:



- D. Cal Ripken needs at least a 79 on the final exam to finish with a final grade of 90.

Conclusion

In this lesson, you learned to convert text to columns, to use **Data Validation** to restrict the type of data that can be entered into a cell, to consolidate data from a number of different ranges into one new range, and to use **Goal Seek** to figure out the value to input to obtain a specific result.