INTERMEDIATE EXCEL

Introduction

Microsoft Excel has many purposes. In addition to being an excellent data manager, Excel provides the means to perform complex analysis and evaluation of data. This brief handout serves to introduce some advanced data management and analytical features including *PivotTables* and *Data Forms*, *Scenario Manager*, *Solver*, and *Macros*.

Lists

Two of these advanced features, *PivotTables* and *Data Forms*, are useful when working with a *list* in Excel. A list refers to a “collection of similar data organized in a structured manner with rows and columns.” You can use Excel to manage lists; to store and update data, sort data, search for and retrieve data, summarize and compare data, and create reports. *PivotTables* are one means of comparing data and *Data Forms* are a simple means of entering, retrieving, and updating data.

PivotTables

A PivotTable is a way of analyzing data contained in a list. By using a pivot table, you can extract data and analyze it in a way not previously done by the original list; it allows for concise comparison and reporting of data contained in a list.

Elements of a PivotTable:
- **Columns Fields** – come from fields/columns in the original list
- **Row Fields** – come from fields/columns in the original list
- **Page Fields** – come from fields/columns in the original list
- **Data Fields** – numeric data that is summarized by COUNT, SUM, AVERAGE, MAX OR MIN

Setting up a PivotTable:
1. Select **Data** from the Main Menu, then select **PivotTable and PivotChart Report**.
2. The *PivotTable/PivotChart Wizard* will open up and ask a few questions to begin creating a PivotTable:
   a. Where is the data that you want to analyze? (Excel list, External data source, etc)
   b. What kind of report do you want to create? (PivotTable or PivotChart)
   c. Where is the data you want to use? (Select a range)
   d. Where do you want to put the PivotTable? (New worksheet, in Existing worksheet)
3. Once you have exited the Wizard you will essentially have a blank canvas on which you can begin building your pivot table (see figure below). Build your pivot table by clicking and dragging field elements (these should match your source lists’ column headers) from the PivotTable Toolbox to the pivot table.
   a. For example, click, drag, and drop fields you want as column headers in your pivot table where it says “Drop Column Fields Here.”
   b. When it comes to the data you want to summarize, drop that field where it says “Drop Data Fields Here.” The default summarization is SUM. If you want to change this either:
      i. RIGHT CLICK on the Field Name in the completed pivot table and select *Field Settings*, change the selection under “Summarize by:”
      ii. Or, select the *Field Settings* icon from the Toolbox and change the selection under “Summarize by:”
Begin building your pivot table

You can click and drag these fields to other locations in the pivot table or remove them from the table.

I've Got the Main PivotTable, Now What?

Format the cells as you would any other cell in Excel (select Format from the Main Menu, then select Cells OR use shortcut keys).

Make changes to the arrangement of the fields by clicking and dragging the gray field bars to other locations in the pivot table (i.e. from column fields to row fields) or remove them by clicking and dragging outside the borders of the table.

You cannot make changes to the data within a PivotTable because the data in a PivotTable is linked to the data in the original list. If changes occur to the original data, all you need to do is refresh the PivotTable to reflect these changes. To refresh, either:

1. Select the Refresh icon from the Toolbox
2. OR, if the toolbox is gone, select Data from the Main Menu, and then select Refresh (this will be grayed-out if your PivotTable is not selected)
3. OR, if the toolbox is gone, RIGHT CLICK on the PivotTable and you'll see the Refresh icon
Data Forms

Data Forms is a tool for working with a list, it essentially provides a form to access to your list, make changes, add new records, or locate records. Forms can be very useful when you are working with an exceptionally large list because they display one record from the list at a time.

Using a Data Form

1. Select at least one cell within your list.
2. Select Data from the Main Menu, then select Form
3. The Data Form will open with the data from the first records, see below

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LASTNAME</td>
<td>FIRSTNAME</td>
<td>DEPARTMENT</td>
<td>RANK</td>
<td>YEARHIRED</td>
<td>SEX</td>
</tr>
<tr>
<td>2</td>
<td>Smith</td>
<td>Alice</td>
<td>Science</td>
<td>Asst.</td>
<td>1980</td>
<td>F</td>
</tr>
<tr>
<td>3</td>
<td>Jacobs</td>
<td>Andrew</td>
<td>History</td>
<td>Full.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Connercoli</td>
<td>Angela</td>
<td>English</td>
<td>Assoc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Nelson</td>
<td>Beth</td>
<td>English</td>
<td>Full.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Doepke</td>
<td>Cheryl</td>
<td>Science</td>
<td>Full.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Bressette</td>
<td>Cheryl</td>
<td>Science</td>
<td>Inst.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Wolter</td>
<td>Christina</td>
<td>Science</td>
<td>Assoc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Vinkula</td>
<td>Claudia</td>
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<td>Asst.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Downs</td>
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<td>Asst.</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>Nelson</td>
<td>Dale</td>
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<td>Full.</td>
<td></td>
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<tr>
<td>12</td>
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<td>David</td>
<td>Science</td>
<td>Full.</td>
<td></td>
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<tr>
<td>13</td>
<td>Blackwell</td>
<td>Dean</td>
<td>English</td>
<td>Inst.</td>
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<tr>
<td>14</td>
<td>Schieb</td>
<td>Earl</td>
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</tr>
<tr>
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<td>Weeks</td>
<td>Joanie</td>
<td>English</td>
<td>Inst.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. To search for a record, select Criteria from the Form. This will clear the fields and allow you to enter the search criteria in any field. Then select Find Next (if more than one records meets you search criteria, select Find Next until you find the record you are looking for)
5. To make changes, simply highlight the text you want to change and type in the new text. Whatever data is entered when you select Close to close the Form, is what will be saved
6. To delete a record, locate the record you want to erase using the Criteria button, when you have found the correct record, select Delete
Advanced Analytical Tools

Though formulas and functions allow for fairly complex analysis of data, there are two other tools that allow for complex logical analysis of data, this usually refers to analysis that involves multiple criteria that must be met. These tools are the **Scenario Manager**, **Goal Seek** and **Solver**.

### Scenario Manager

The Scenario Manager is useful when you want to perform what-if analysis that requires changing more than one element at the same time. It allows you to set up several scenarios that can be viewed at any time in order to evaluate to find the best option.

**Using the Scenario Manager:**

1. Select **Tools** from the **Main Menu**, then select **Scenarios**
2. In the *Scenario Manager Dialog Box*, select **Add** to create a new scenario
3. Select all cells from your worksheet that will change in your scenario (collapse the Dialog Box to do so, if necessary)
4. Give your scenario a meaningful comment that describes the outcome which it is trying to achieve
5. When you click **OK**, the *Scenario Value Dialog Box* will open
6. Set the values of this scenario and click **OK** (if you want to continue building related scenarios, click **Add** to be taken to the Scenario Manager Dialog Box to create a new scenario)

![Add Scenario Dialog Box]

**To view a Scenario:**

1. Select **Tools** from the **Main Menu**, then select **Scenarios**
2. Select the Scenario you want to view and then select **Show**, this will automatically make the appropriate changes to your sheet. Print out the sheet to create a report that reflects the scenario.
Goal Seek

Goal Seek allows you to automate a slightly different form of what-if analysis. Goal Seek allows you to specify a desired outcome and then determines what the guiding factors must be to achieve that outcome (i.e., I want to make $250 dollars, how many items must I sell?)

Using Goal Seek:

1. Select Tools from the Main Menu, then select Goal Seek. This will open the Goal Seek Dialog Box
2. Enter the cell reference that contains your target value
3. Enter what you would like that target value to be
4. Enter the cell reference of the cell which can be changed to achieve the desired outcome
5. Select OK

Complex Analysis: The Solver

The Solver is an Excel add-in, it is a program that “automatically calculates a maximum or minimum value of a cell by changing other cells that are ‘connected’ to it by a formula.” Setting up an appropriate Solver requires some careful thought, particularly when setting constraints or limits.

Elements of the Solver:
- **Target Cell** – the cell you want to maximize, minimize, or change to a specific value
- **Adjustable Cells** – the cells that can be changed to achieve the desired result in the Target Cell
- **Constraint** – these are value or arguments that set certain limits to how the problem is solved

Using the Solver:

1. Select Tools from the Main Menu, then select Solver, this opens the Solver Parameters Dialog Box
2. Enter the cell reference of the Target Cell, and the desired outcome (maximum, minimum, or specific value)
3. Enter the cell references of the Changing Cells (if you are unsure, you can select Guess, this will guess at the cells that can change based on a formula connected to the Target Cell)
4. Set the Constraints. Select Add to create a new constraint then select OK (constraints are typically represented by <= (less than or equal to), >= (greater than or equal to), = (equal to), Int (integers only), and bin (binary numbers only)

**Note:** If you do not see Solver under the Tools menu, it must be installed. To install the Solver, select Tools from the Main Menu, then select Add-Ins. Then select the Solver from the list and click OK.

To Run the Solver:
You have set-up a solution using the Solver, but now you must run it to find a solution:

1. If the Solver Parameters Dialog Box is open, select Solve. If the Dialog Box is no longer open, select the Solver from the Tools menu, your original parameters remain as you set them earlier, then select Solve.
2. The Solver Results Dialog Box will then open. If you like the solution, select Keep Solver Solution and then select Save Scenario. If you want to try again and adjust your solution, select Restore Original Values and then select OK.
To Generate a Report/Printout of the Solution:

1. Open the **Solver** from the **Tools** menu, then select **Solve**
2. Select **Answer** from the option under **Reports**, then select **OK**
3. The **Answer Report** will appear on a new sheet labeled **Answer Report 1**
4. Print the Answer Report as you would print any sheet

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**Macros**

A macro allows you to automate a task or process. If you realize you are performing repetitive tasks, you can create a short cut for the task using Macros, which records actions or clicks of the mouse.

1. Select **Tools** from the **Main Menu**, point to **Macros**, and then select **Record New Macro**
2. Give your macro a meaningful name
3. Indicate where this macro should be stored (if you store it in a workbook, it will only be available when that workbook is active)
4. Give the macro a meaningful description (in addition to the name)
5. If you would like to, you can assign a short cut key to run the macro (this can also be done later)
6. Click **OK** to start recording, you’ll see this icon while you are recording
7. Perform all actions you wanted to record for your macro
8. Select the Stop button when you are finished

**Running the Macro/Macro Options:**

After you have recorded a macro, you can set up a button on the sheet to run the macro or you can set up a short cut key connected to a specific macro.

**Assigning a macro to a button:**

1. Select **View** from the **Main Menu**, then select **Toolbars**, from the list, select **Forms**

2. Click the **Button** button from the toolbar, your cursor will change to a crosshair, click and drag to insert the button where and how big you would like it
3. The **Assign Macro Dialog Box** will automatically open
4. Click on the macro from the list that you would like to assign to this button, then click **OK**
5. You can rename the Button simply by highlighting the button and typing over the old name (like a text box)

**Assigning a macro to a short cut key:**

1. Select **Tools** from the **Main Menu**, then select **Macro** and then **Macros**
2. This will open the **Macros Dialog Box**, select the desired Macro from the list and then select **Options**
3. You’ll then see an option to create a short cut key (corresponding with the Control (Ctrl) key from the keyboard)