What-if Analysis

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Topics to discuss

- Create a one-variable data table
- Create a two-variable data table
- Solve problems with Goal Seek
- Use Scenario Manager
- Load the Solver Add-In
- Solve Problems with Solver
Create a one-variable data table

- **What-if analysis** enables you to see how changes in variables affect calculated results.
- A **variable** is a value that can be changed to see how those changes impact other values.
- An **independent** variable is one that can be controlled directly, such as the price of an item.
- A **dependent** variable is one that may vary such as the number of items sold.
Create a One-Variable Data Table

A one-variable data table is a data-analysis tool that provides various results based on changing one variable.

Allows you to analyze different values of one variable to compare one or more calculated results that are affected by the variable.

Two important elements:
- **Input cells** contain values to be modified for what-if analysis.
- **Result cells** contain values to be modified.
Create a One-Variable Data Table

<table>
<thead>
<tr>
<th>A</th>
<th></th>
<th>B</th>
<th></th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loan Amount:</td>
<td>1</td>
<td>$20,000.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Interest Rate:</td>
<td>2</td>
<td>6.50%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pmt. Period</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Periods:</td>
<td>4</td>
<td>48</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Payment Amount:</td>
<td>5</td>
<td>$474.30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Payments:</td>
<td>6</td>
<td>$22,766.35</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Interest:</td>
<td>7</td>
<td>$2,766.35</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td></td>
<td></td>
<td>6.0%</td>
<td>6.5%</td>
<td>7.0%</td>
<td>7.5%</td>
<td>8.0%</td>
<td>8.5%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Payment Amount:</td>
<td>9</td>
<td>$474.30</td>
<td></td>
<td>$474.30</td>
<td>$474.30</td>
<td>$474.30</td>
<td>$474.30</td>
<td>$474.30</td>
<td>$474.30</td>
<td>$474.30</td>
<td>$474.30</td>
<td>$474.30</td>
<td>$474.30</td>
</tr>
<tr>
<td>Total Payments:</td>
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<td>$22,766.35</td>
<td></td>
<td>$22,766.35</td>
<td>$22,766.35</td>
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<td>$22,766.35</td>
<td>$22,766.35</td>
<td>$22,766.35</td>
</tr>
<tr>
<td>Total Interest:</td>
<td>11</td>
<td>$2,766.35</td>
<td></td>
<td>$2,766.35</td>
<td>$2,766.35</td>
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<td>$2,766.35</td>
<td>$2,766.35</td>
<td>$2,766.35</td>
<td>$2,766.35</td>
<td>$2,766.35</td>
</tr>
</tbody>
</table>

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Create a One-Variable Data Table

To perform the analysis:

- Select the entire table excluding the descriptive labels
- Click the What-If Analysis down arrow in the Data Tools group on the Data tab and select Data Table
- Type the address of the cell to be changed in the Data Table dialog box
- Click OK
Create a Two-Variable Data Table

- Use to determine the affect of two variables on a single formula result
- Summarizes important input and output cell values in multiple what-if analyses in one rectangular cell range
- Specify two input variables that Excel changes to produce the data table
- First variable must be in the left column of the table, and the second variable must be in the top row of the data table
Create a Two-Variable Data Table
Create a Two-Variable Data Table

Steps to create a two-variable data table:

- Create the data table with appropriate headings, indicating the different values of the two variables

- Create a formula in the top-left corner at the intersection of the column and row headings
  - The formula should reference the cell containing the original result formula

- Select the entire data table, including the column and row headings that contain the different values for the two variables
Create a Two-Variable Data Table

- Click the What-If Analysis down arrow in the Data Tools group on the Data tab and select Data Table
- Type the cell that contains the original value for the horizontal variable in the Row input cell box, and type the cell that contains the original value for the vertical variable in the Column input cell box
- Click OK
Solve Problems with Goal Seek

- **Goal Seek** is a method for finding one-time solutions to problems.
- It enables you to work backwards to solve a problem.
- It enables you to set the end result to determine the input to produce the result.
- The primary advantage is the dialog box that enables you to change your goals and parameters relatively easily.
Solve Problems with Goal Seek
Use Scenario Manager

- Scenario Manager enables you to specify multiple sets of assumptions, called *scenarios*, to quickly see the results of any given Scenario.

- Represents different sets of what-if conditions to be considered in assessing the outcome of spreadsheet models.
Use Scenario Manager

Increase
10% 5%
20% 10% 8% 5%
Consensus

Scenario Values
- Enter values for each of the changing cells.
- Scenario name: Optimal
- First-year sales: 20,000
- Selling price: 3.5
- Increase in sales: 0.15

Add OK Cancel
Use Scenario Manager

- You can create multiple scenarios using the Add Scenario dialog box.
- To view your scenarios, click What-If analysis in the Data Tools group on the Data tab, select Scenario Manager, and highlight the name of the Scenario you want to view in the Scenarios list and click Show.
- A *scenario summary report* is a condensed version of the scenario results.
Use Scenario Manager
Use Scenario Manager

- If you have defined many scenarios with multiple result cells, a Scenario PivotTable report may give you more flexibility in your analysis of outcomes based on your scenarios.
Use Scenario Manager

<table>
<thead>
<tr>
<th>Row</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Optimistic</td>
<td>(All)</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Row Labels</td>
<td>$G15</td>
</tr>
<tr>
<td>4</td>
<td>Consensus</td>
<td>$113,936.38</td>
</tr>
<tr>
<td>5</td>
<td>Optimistic</td>
<td>$621,521.50</td>
</tr>
<tr>
<td>6</td>
<td>Pessimistic</td>
<td>-$14,015.57</td>
</tr>
</tbody>
</table>
Load the Solver Add-in

- **Solver** is a separate program that must be installed or added in to Excel
- Once added, it appears in the Analysis group on the Data tab as shown in Figure
- To install:
  - Click the Office Button
  - Click Excel Options
  - Click Add-Ins, select Excel Add-ins from the Manage list and click GO
  - Click Solve Add-in in the Add-Ins available list and click OK
Solving Problems with Solver

- **Solver**: an add-in program that searches for the best solution to a problem with several variables
- Used to find the best way to allocate resources
- Requires three parameters:
  - **target cell** typically contains a formula that is directly or indirectly based on the adjustable cells and constraints
  - **adjustable cells** are the cells whose values are adjusted until the constraints are satisfied
  - **constraints** specify the restrictions
Solve Problems with Solver

- Define the problem
- Using identified input ranges, output cells, and constraints, Solver can minimize or maximize the input cell or set the output cell to a particular value
- Define the parameters using the Solver dialog box
Solving Problems with Solver
Solve Problems with Solver

- Stepping through Solver enables you to view the steps Solver performs.
- Saving a Solver model places the information in a small block of cells on a worksheet.
  - Keeps track of your predefined settings.
- If you want to use an existing Solver model with new or updated data, you would return to a previous Solver Model by restoring that model.