Notes

Assignment 4

This week "work through" Excel Unit K, Using What-if Analysis. To "work through" means reading and performing all hands-on exercises. The exercises give detailed step-by-step instructions with corresponding screen shot figures of the Excel interface tabs, menus, toolbars, dialog boxes, and correct output. You should perform all of these to learn how to complete each skill.

Objectives

Students will have mastered the material in Excel Unit K when they can:

- Define a what-if analysis
- Track a what-if analysis with Scenario Manager
- Generate a scenario summary
- Project figures using a data table
- Use Goal Seek
- Set up a complex what-if analysis with Solver
- Run Solver and summarize results
- Analyze data using the Analysis ToolPak

Unit Study Tips

Scenarios

It is a good idea to add a scenario that uses the original changing cell values to provide an easy way to return those values to the worksheet.

Note that the summary report is completely independent from your data. If you change any of the scenario values or calculations, the summary report doesn't update. You would need to recreate it.

Two-input Data Table

A two-input data table shows the resulting values when two different input values are varied in a formula. You could, for example, use a two-input data table to

calculate your monthly mortgage payment based on varying interest rates and varying loan terms, as shown in Figure K-12. In a two-input data table, different values of one input cell appear across the top row of the table, while different values of the second input cell are listed down the left column of the table. You create a two-input data table the same way that you created a one-input data table, except you enter both a row and a column input cell.

Solver

The Solver add-in is a product from Frontline Systems, Inc. Although it comes as part of Excel, they sell enhanced versions of the program as well. Check out www.solver.com to find out more.

Instead of saving Solver results as a scenario, you can select from three types of answer reports in the Solver Results window. One of the most useful is the Answer Report, which compares the original values with the Solver's final values. The report has three sections. The top section has the target cell information; it compares the original value of the target cell with the final value. The middle section of the report contains information about the adjustable cells. It lists the original and final values for all cells that were changed to reach the target value. The last report section has information about the constraints. Each constraint that was added into Solver is listed in the Formula column along with the cell address and a description of the cell data. The Cell Value column contains the Solver solution values for the cells. These values will be different from your worksheet values if you restored the original values to your worksheet rather than keeping Solver's solution. The Status column contains information on whether the constraints were binding or not binding in reaching the solution. If a solution is not binding, the slack—or how far the result is from the constraint value—is provided. Frequently, the answer report shows equality constraints as nonbinding with a slack of zero.

Using the Analysis ToolPak

The Analysis ToolPak offers 19 options for data analysis. ANOVA, or the analysis of variance, can be applied to one or more samples of data. The regression option creates a table of statistics from a least-squares regression. The correlation choice measures how strong of a linear relationship exists between two random variables. A moving average is often calculated for stock prices or any other data that is time sensitive. Moving averages display long-term trends by smoothing out short-term changes. The Random Number Generation creates a set of random numbers between values that you specify. The Rank and Percentile option creates a report of the ranking and percentile distribution.

Graded Exercises to be Submitted

- Independent Challenge 1, Hardware Payment Model, page Excel 269. Omit the Advanced Challenge Exercise part of the exercise.

- Independent Challenge 2, Capital Loan Payment Model, page Excel 270. Include the Advanced Challenge Exercise part of the exercise.

- Independent Challenge 3, Vehicle Purchase, pages Excel 270-271.

Turn in each completed exercise to me using the assignment "delivery boxes" on the Moodle course site in the Week 5 section.

For Assignment 5, you will find these 3 "delivery boxes" in the Week 5 section:

- ✓ Hardware Payment Model

- ✓ Capital Loan Payment Model

- ✓ Vehicle Purchase

A solution printout (in PDF format) is provided for each of the above files. Compare your output to the solution printout to gauge correctness. The printout identifies the items that will be checked in your submitted file.

Note that turning in assignment files to be graded by email attachment is not acceptable. Use of the Moodle assignment "delivery boxes" enables recording of grades and feedback on the Moodle course website.

Exercises submitted by midnight Thursday will be graded for feedback purposes by midnight Friday. Errors may be corrected and exercises resubmitted by midnight Saturday for full credit.

These problems are due according to the schedule given in the course syllabus, Independent Challenges 1, 2, and 3 by next Saturday evening. Note that the college requires a 20% penalty be imposed for all work submitted late in online courses.

As always, contact me by email if you have any questions or problems. If you have a question about a specific Excel exercise, you may attach your Excel file to your email. If you wish me to call you, then include your phone number in the email.

Microsoft Excel 2007 - Illustrated

UNIT K

Excel 2007

Using What –if Analysis

UNIT K
Excel 2007

Objectives

- Define a what-if analysis
- Track a what-if analysis with Scenario Manager
- Generate a scenario summary
- Project figures using a data table

UNIT K
Excel 2007

Objectives

- Use Goal Seek
- Set up a complex what-if analysis with Solver
- Run Solver and summarize results
- Analyze data using the Analysis ToolPak

Defining a What-If Analysis

- When you use a worksheet to answer the question "what if?" you are performing a what-if analysis
  - Often called a model because it acts as the basis for multiple outcomes
  - To perform a what-if analysis, you change the value in one or more input cells (contain data, not formulas), then watch the outcome

Defining a What-If Analysis (cont.)

- A dependent cell usually contains a formula whose value changes depending on the values in the input cells
  - A dependent cell can be located either in the same worksheet as the changing input value or in another worksheet

Defining a What-If Analysis (cont.)

UNIT K
Excel 2007

- Guidelines to perform a what-if analysis:
  - Understand and state the purpose of the worksheet model
  - Determine the data input value(s) that, if changed affect the dependent cell results
  - Identify the dependent cell(s), usually containing formulas
    - Will contain adjusted results as different data values are entered
  - Formulate questions you want the what-if analysis to answer
  - Perform the what-if analysis

Defining a What-If Analysis (cont.)

Data input values

	Jan	Feb	Mar	Apr	May	Jun	Total	Percent of Total Sales
U.S.	$75,598	$53,876	$59,722	$51,706	$85,083	$75,405	$897,374	30.82%
Canada	$53,776	$59,774	$61,012	$58,970	$56,211	$57,346	$349,089	26.64%
U.K.	$50,722	$54,344	$53,092	$60,096	$51,398	$34,987	$304,639	23.25%
Australia	$30,449	$45,998	$50,870	$49,346	$38,794	$43,987	$259,364	19.79%
Total	$210,545	$213,992	$222,696	$220,118	$231,486	$211,729	$1,310,486	
Percent of Total Sales	16.07%	16.33%	16.99%	16.80%	17.66%	16.16%		

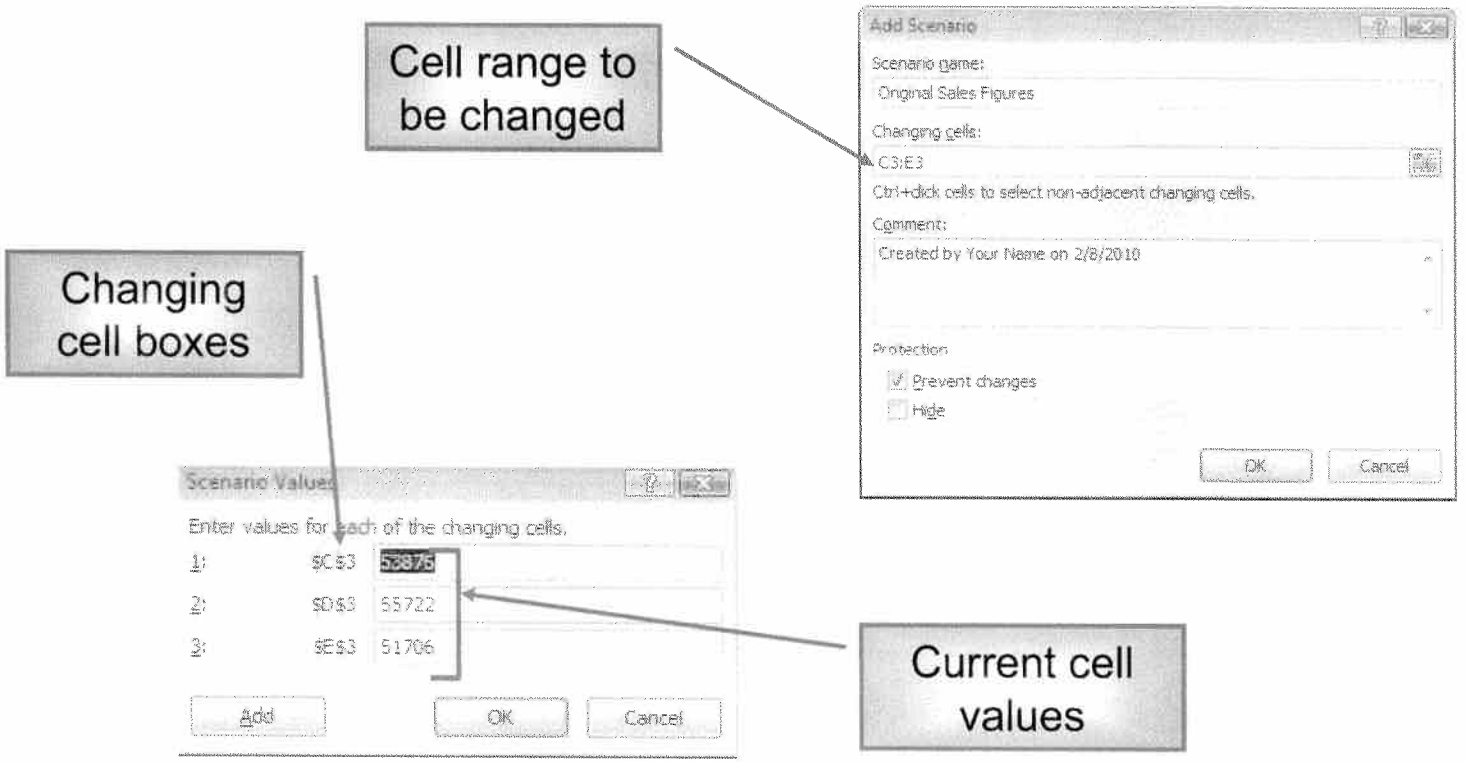
Dependent cell formulas

Tracking a What-If Analysis with Scenario Manager

UNIT K
Excel 2007

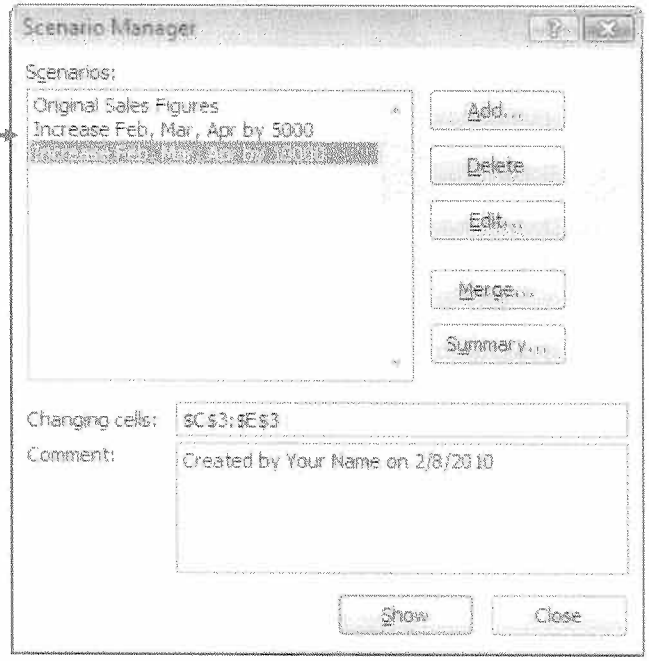
- A scenario is a set of values you use to forecast worksheet results
  - The Scenario Manager simplifies the process of what-if analysis by allowing you to name and save different scenarios with the worksheet
  - Useful when you are working with uncertain or changing variables
  - The cells that will vary in the different scenarios are called changing cells

Tracking a What-If Analysis with Scenario Manager (cont.)



Tracking a What-If Analysis with Scenario Manager (cont.)

Three scenarios



Tracking a What-If Analysis with Scenario Manager (cont.)

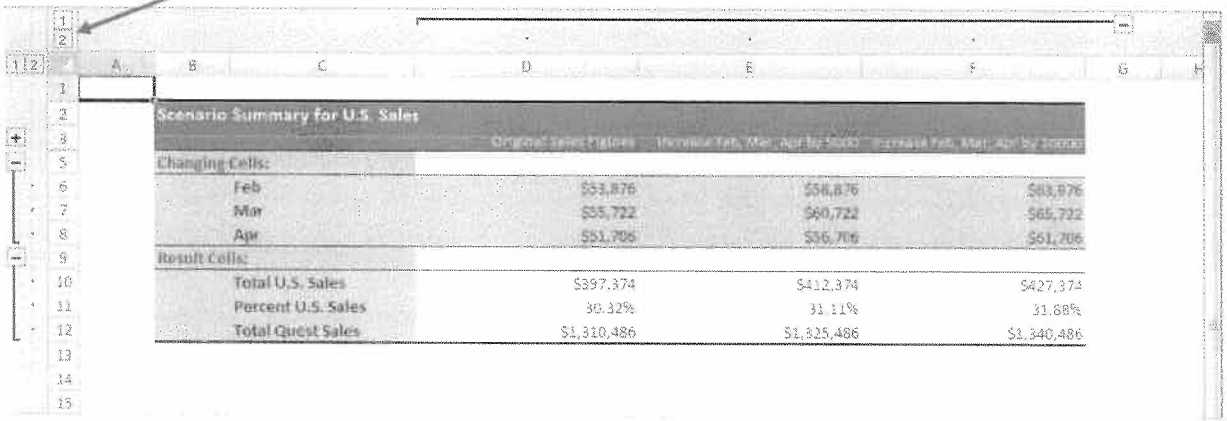
- Merging scenarios
  - To bring scenarios from another workbook into the current workbook, click the Merge button in the Scenario Manager dialog box

Generating a Scenario Summary

- A scenario summary is an Excel table that compiles data from the changing cells and corresponding result cells
  - Use to illustrate the best, worst, and most likely scenarios for a particular set of circumstances

Generating a Scenario Summary (cont.)

Outline format



Scenario Summary for U.S. Sales			
	Original Sales Figures	Increase Feb, Mar, Apr by 5000	Increase Feb, Mar, Apr by 10000
Changing Cells:			
Feb	$53,876	$58,876	$63,876
Mar	$55,722	$60,722	$65,722
Apr	$51,706	$56,706	$61,706
Result Cells:			
Total U.S. Sales	$397,374	$412,374	$427,374
Percent U.S. Sales	30.32%	31.11%	31.88%
Total Quest Sales	$1,310,486	$1,325,486	$1,340,486

Projecting Figures Using a Data Table

- Another way to answer what-if questions in a worksheet is by using a data table
  - A data table (or one-input data table), is a range of cells that shows the resulting values when one input value is varied in a formula

Projecting Figures Using a Data Table (cont.)

UNIT K
Excel 2007

	A	B	C	D	E	F	G	H	I	J	K	L
		2011 Projected Sales									Total U.S.Sales	30.32%
		Jan	Feb	Mar	Apr	May	Jun	Total	Percent of Total Sales			
	U.S.	$75,598	$53,876	$55,722	$51,706	$85,063	$75,409	$397,374	30.32%		$ 397,374	
	Canada	$53,776	$59,774	$63,012	$58,970	$56,211	$57,346	$349,089	26.64%		$ 447,374	
	U.K.	$50,722	$54,344	$53,092	$60,096	$51,398	$34,987	$304,639	23.25%		$ 497,374	
	Australia	$30,449	$45,998	$50,870	$49,346	$38,734	$43,987	$259,384	19.79%		$ 547,374	
	Total	$210,545	$213,992	$222,690	$220,118	$231,406	$211,729	$1,310,486			$ 597,374	
	Percent of Total Sales	16.07%	16.33%	16.99%	16.80%	17.66%	16.16%					

Varying sales totals are table input values

Projecting Figures Using a Data Table (cont.)

UNIT K
Excel 2007

Percentages

	Jan	Feb	Mar	Apr	May	Jun	Total	Percent of Total Sales
U.S.	$75,598	$53,876	$55,722	$51,706	$85,063	$75,409	$397,374	30.32%
Canada	$53,776	$59,774	$63,012	$58,970	$56,211	$57,346	$349,089	26.64%
U.K.	$50,722	$54,344	$53,092	$60,096	$51,398	$34,987	$304,639	23.25%
Australia	$30,449	$43,998	$50,870	$49,346	$38,734	$43,987	$259,384	19.79%
Total	$210,545	$213,992	$222,696	$220,118	$231,406	$211,729	$1,310,486	
Percent of Total Sales	16.07%	16.33%	16.99%	16.80%	17.66%	16.16%		

$	397,374	30.32%
$	447,374	32.88%
$	497,374	35.26%
$	547,374	37.48%
$	597,374	39.55%

Completed data table

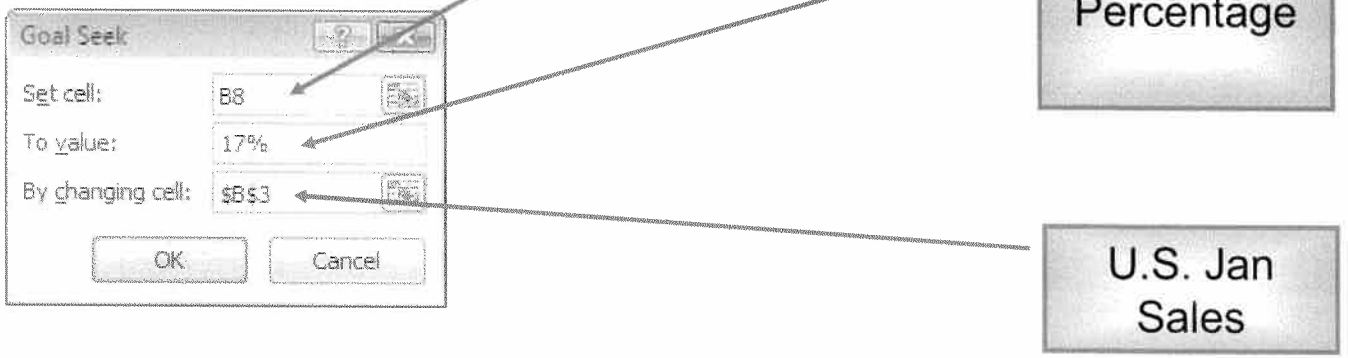
Creating a Two-Input Data Table

- A two-input data table shows the resulting values when two different input values are varied in a formula
  - In a two-input data table, different values of one input cell appear across the top row of the table, while different values of the second input cell are listed down the left column of the table

Using Goal Seek

- Goal seeking is a what-if analysis in reverse
  - To goal seek, you specify a solution, then find the input value that produces the answer you want
  - "Backing into" or backsolving a solution in this way can save a significant amount of time

Using Goal Seek (cont.)

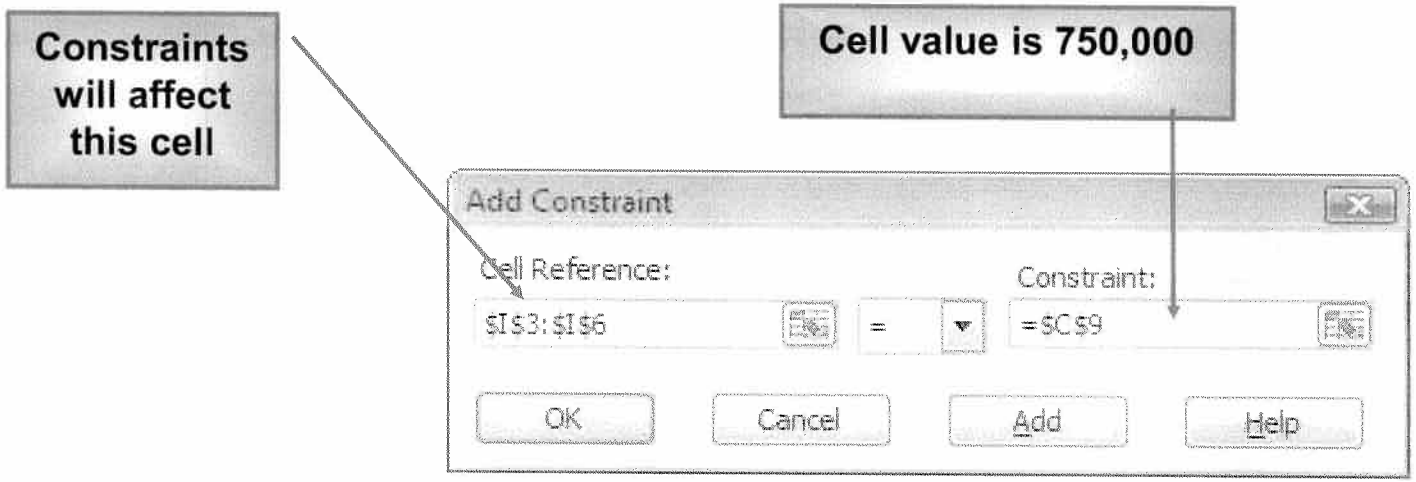


Setting up a Complex What-If Analysis with Solver

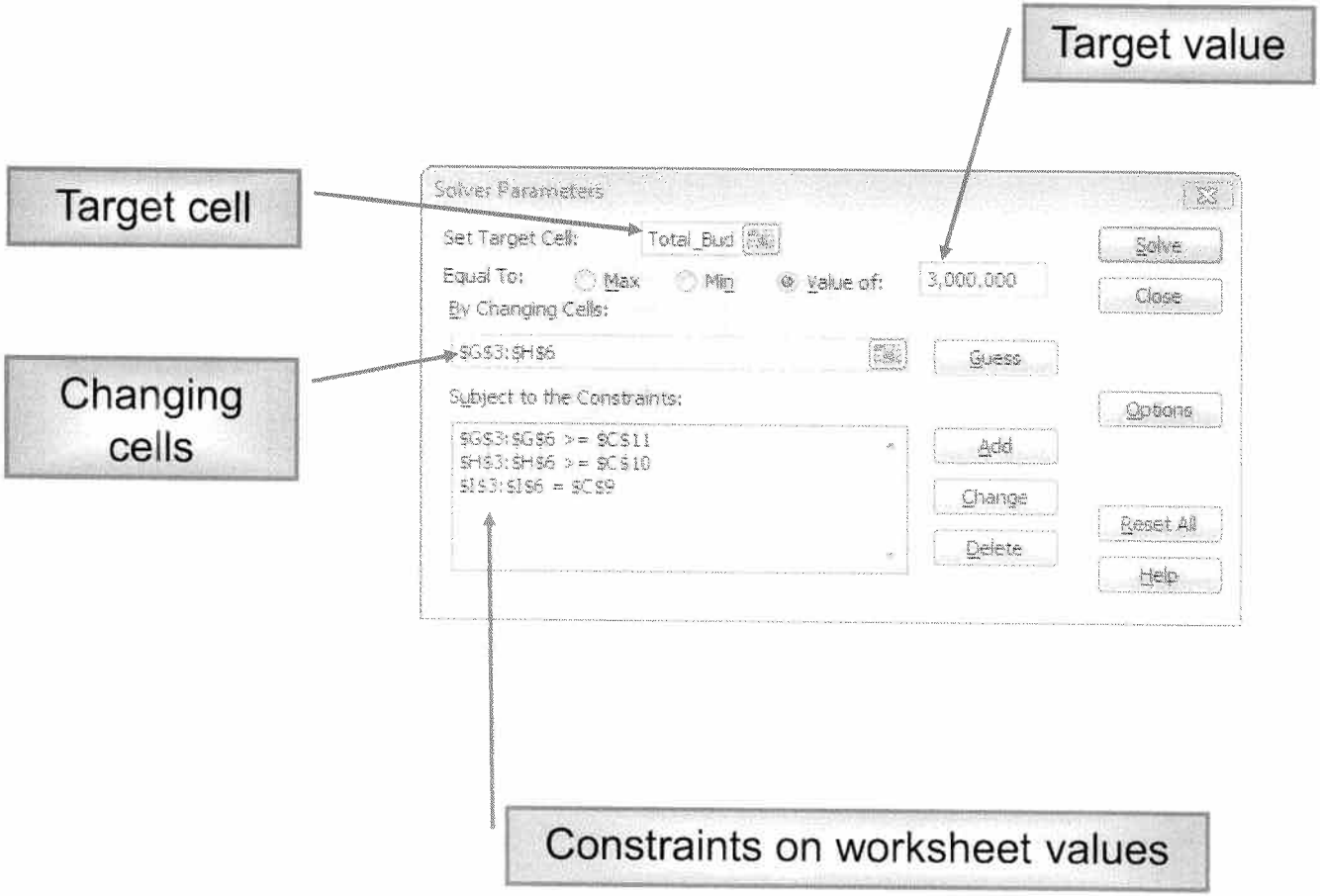
UNIT K
Excel 2007

- The Excel Solver finds the most appropriate value for a formula by changing the input values in the worksheet
  - The cell containing the formula is called the target cell
  - Solver is useful when the what-if analysis involves multiple input values or when the input values must conform to specific constraints

Setting up a Complex What-If Analysis with Solver (cont.)



Setting up a Complex What-If Analysis with Solver (cont.)

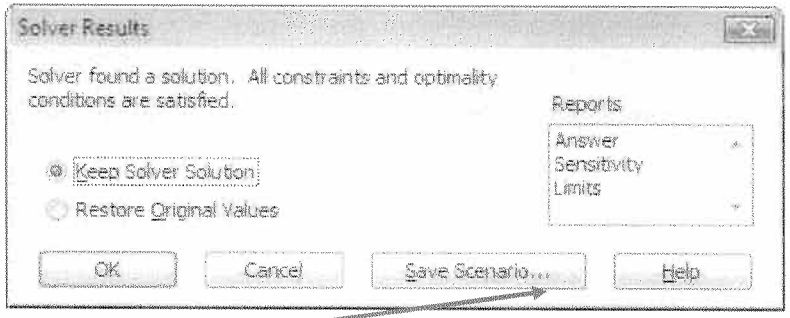


Running Solver and Summarizing Results

UNIT K
Excel 2007

- After entering all the parameters in the Solver Parameters dialog box, run the Solver to find a solution
  - Solver may not be able to find a solution that meets all of your constraints
    - In that case, enter new constraints
  - If Solver finds a solution, you can choose to create a special report or a summary displaying the solution

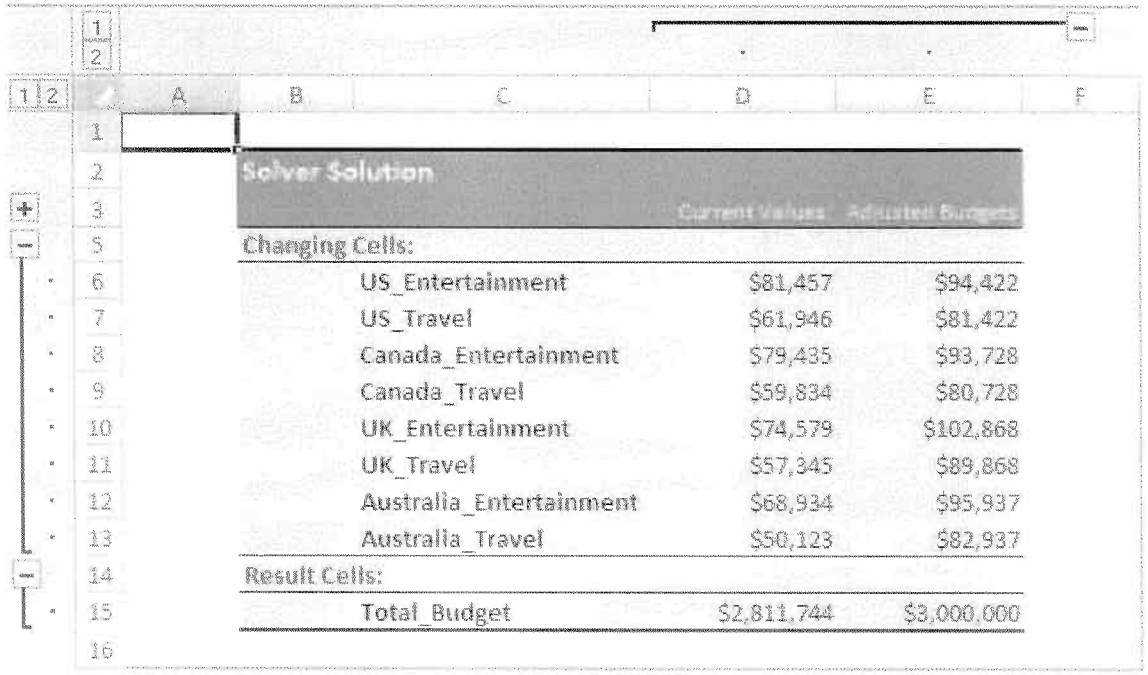
Running Solver and Summarizing Results (cont.)



Click to create a summary of Solver's answer

Running Solver and Summarizing Results (cont.)

Summary



Solver Solution		
	Current Values	Adjusted Budgets
Changing Cells:		
US_Entertainment	$81,457	$94,422
US_Travel	$61,946	$81,422
Canada_Entertainment	$79,435	$93,728
Canada_Travel	$59,834	$80,728
UK_Entertainment	$74,579	$102,868
UK_Travel	$57,345	$89,868
Australia_Entertainment	$68,934	$95,937
Australia_Travel	$50,123	$82,937
Result Cells:		
Total_Budget	$2,811,744	$3,000,000

Analyzing Data Using the Analysis ToolPak

UNIT K
Excel 2007

- The Analysis ToolPak is an Excel add-in that contains many statistical analysis tools.
- The Descriptive Analysis tool in the Data Analysis dialog box generates a statistical report including mean, median, mode, minimum, maximum, and sum for an input range you specify on your worksheet.

Analyzing Data Using the Analysis ToolPak (cont.)

UNIT K
Excel 2007

Statistical Report

	A	B	C
1	Total Projected Sales	Jan - Jun	
2			
3	Mean	331290.6	
4	Standard Error	32557.35	
5	Median	326864	
6	Mode	#N/A	
7	Standard Deviation	65114.7	
8	Sample Variance	4.24E+09	
9	Kurtosis	-0.5431	
10	Skewness	0.342015	
11	Range	152666.3	
12	Minimum	259384	
13	Maximum	412050.3	
14	Sum	1325162	
15	Count	4	
16			

Summary

UNIT K
Excel 2007

- Track a what-if analysis with Scenario Manager
- Show multiple scenarios using a scenario summary
- Use data tables to project figures
- Use Goal seek to "backsolve"
- Use Solver to perform complex what-if analysis involving multiple inputs

Computer Loan Model

Loan Amount	$	100,000
Annual Interest Rate		6.00%
Term in Months		48
Monthly Payment:	$	2,348.50
Total Payments:	$	112,728.14
Total Interest:	$	12,728.14

Cell names have been created for cells B4:B11 based on the labels in cells A4:A11

Cells B9:B11 are Result cells for Scenario Summary for $100,000 Hardware Purchase

Scenario Summary for $100,000 Hardware Purchase			
	6% 4Yr	5.75% 3 Yr	5.5% 2 Yr
Changing Cells:			
Annual_Interest_Rate	6.00%	5.75%	5.50%
Term_in_Months	48	36	24
Result Cells:			
Monthly_Payment	$ 2,348.50	$ 3,030.88	$ 4,409.57
Total_Payments	$ 112,728.14	$ 109,111.65	$ 105,829.57
Total_Interest	$ 12,728.14	$ 9,111.65	$ 5,829.57

Scenarios have been created to calculate monthly payments on a loan under three sets of loan possibilities

Soft Solutions

Cell B5 is the column input cell

Loan Amount	€1,000,000.00
Annual Interest Rate	4.18%
Term in Months	60
Monthly Payment:	€18,500.00
Total Payments:	€1,110,000.00
Total Interest:	€110,000.00

The monthly payment from cell B9 is referenced in cell A13

	120	180
6.00%	€11,102.05	€8,438.57
6.25%	€11,228.01	€8,574.23
6.50%	€11,354.80	€8,711.07
6.75%	€11,482.41	€8,849.09
7.00%	€11,610.85	€8,988.28
7.25%	€11,740.10	€9,128.63
7.50%	€11,870.18	€9,270.12
7.75%	€12,001.06	€9,412.76
8.00%	€12,132.76	€9,556.52

The range B14:C22 is formatted as currency using the € symbol and two decimal places

In the range A13:C22, a two-input data table uses 10- and 15-year terms

A two input data table has been generated.

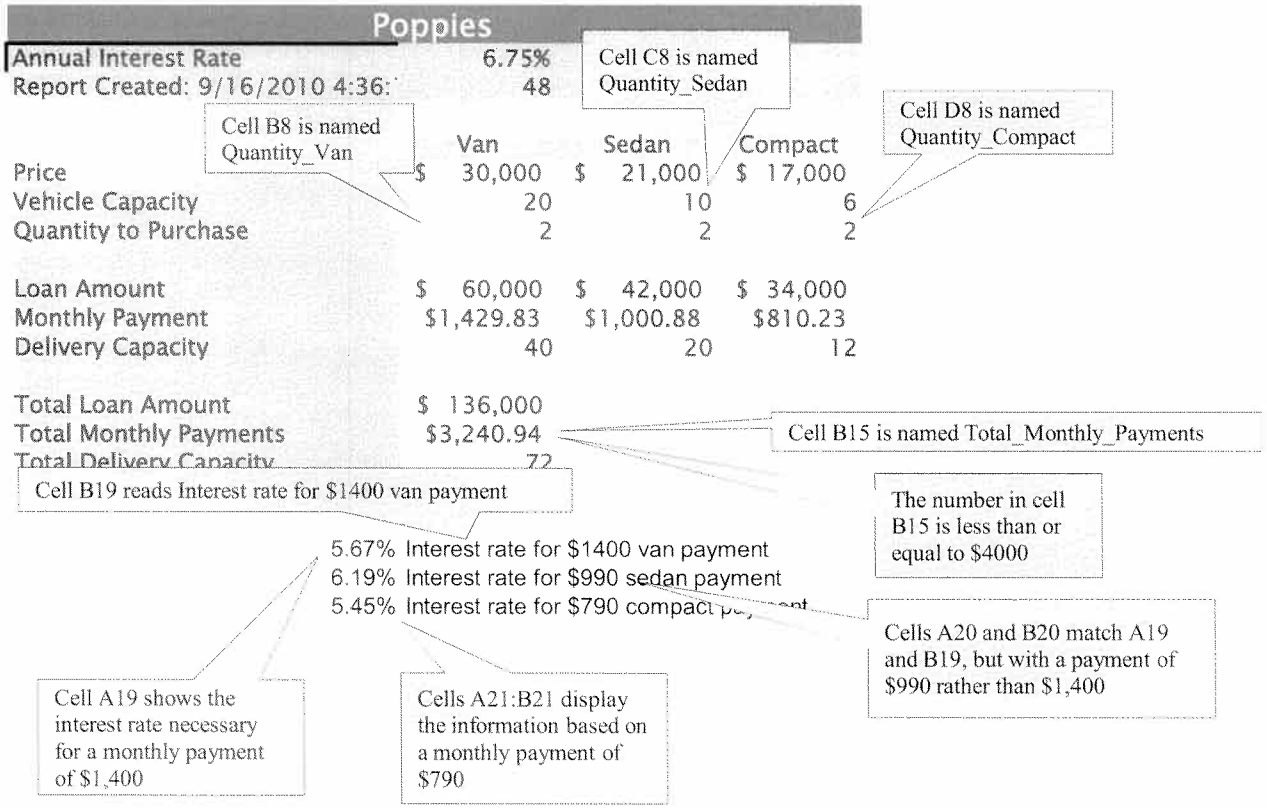
The range E5:E13 is formatted with the € symbol and two decimal places

Interest Rate	
6.00%	€19,332.80
6.25%	€19,449.26
6.50%	€19,566.15
6.75%	€19,683.46
7.00%	€19,801.20
7.25%	€19,919.36
7.50%	€20,037.95
7.75%	€20,156.96
8.00%	€20,276.39

A one-input data table with various interest rates for a 5-year loan appears in the range D4:E13. Rates vary from 6% to 8% in increments of .25%.

The interest rate needed for a total payment amount of €1,100,000 appears in cell B10

Your Name

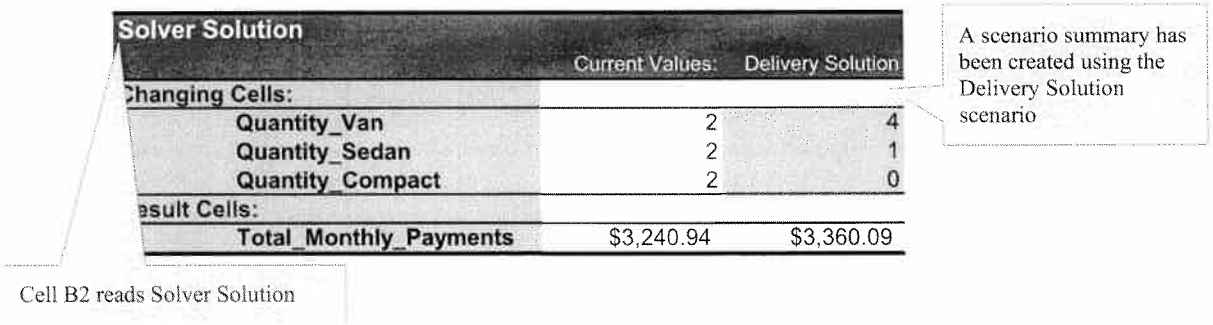

Poppies
Annual Interest Rate 6.75%
Report Created: 9/16/2010 4:36: 48
Cell C8 is named Quantity_Sedan
Cell B8 is named Quantity_Van
Cell D8 is named Quantity_Compact
Van Sedan Compact
Price $ 30,000 $ 21,000 $ 17,000
Vehicle Capacity 20 10 6
Quantity to Purchase 2 2 2
Loan Amount $ 60,000 $ 42,000 $ 34,000
Monthly Payment $1,429.83 $1,000.88 $810.23
Delivery Capacity 40 20 12
Total Loan Amount $ 136,000
Total Monthly Payments $3,240.94
Total Delivery Capacity 72
Cell B15 is named Total_Monthly_Payments
Cell B19 reads Interest rate for $1400 van payment
The number in cell B15 is less than or equal to $4000
5.67% Interest rate for $1400 van payment
6.19% Interest rate for $990 sedan payment
5.45% Interest rate for $790 compact
Cells A20 and B20 match A19 and B19, but with a payment of $990 rather than $1,400
Cell A19 shows the interest rate necessary for a monthly payment of $1,400
Cells A21:B21 display the information based on a monthly payment of $790

Your Name

Solver Solution		
	Current Values:	Delivery Solution
Changing Cells:		
Quantity_Van	2	4
Quantity_Sedan	2	1
Quantity_Compact	2	0
Result Cells:		
Total_Monthly_Payments	$3,240.94	$3,360.09

A scenario summary has been created using the Delivery Solution scenario

Cell B2 reads Solver Solution



Solver Solution		
	Current Values:	Delivery Solution
Changing Cells:		
Quantity_Van	2	4
Quantity_Sedan	2	1
Quantity_Compact	2	0
Result Cells:		
Total_Monthly_Payments	$3,240.94	$3,360.09

A scenario summary has been created using the Delivery Solution scenario

Cell B2 reads Solver Solution

UNIT
K
Excel 2007

Analyzing Data Using the Analysis ToolPak

The Analysis ToolPak is an Excel add-in that contains many statistical analysis tools. The Descriptive Analysis tool in the Data Analysis dialog box generates a statistical report including mean, median, mode, minimum, maximum, and sum for an input range you specify on your worksheet. After reviewing the projected sales figures for the Quest regions, Kate decides to statistically analyze the projected regional sales totals submitted by the managers. You use the Analysis ToolPak to help her generate the sales statistics. You begin by displaying the original sales figures.

STEPS

TROUBLE
If Data Analysis is not on your Data tab, install the Analysis ToolPak add-in. Click the Microsoft Office button, click Excel Options, click Add-Ins, make sure that Excel Add-ins appears in the Manage box, click Go, select the Analysis ToolPak check box, then click OK.

1. **Click the Projected Sales sheet tab, click the Data tab, click the What-if Analysis button in the Data Tools group, click Scenario Manager, with the Original Sales Figures scenario selected click Show, then click Close**

2. **Click the Data Analysis button in the Analysis group**
   The Data Analysis dialog box opens, listing the available analysis tools.

3. **Click Descriptive Statistics, then click OK**
   The Descriptive Statistics dialog box opens, as shown in Figure K-21.

4. **With the insertion point in the Input Range text box, select cells H3:H6 on the worksheet**
   You have told Excel to use the total projected sales cells in the statistical analysis. You need to specify that the data is grouped in a column and the results should be placed on a new worksheet named Region Statistics.

QUICK TIP
Selecting the New Worksheet Ply option places the statistical output on a new worksheet in the workbook.

5. **Click the Columns option button in the Grouped By: area if necessary, click the New Worksheet Ply option button in the Output options section if necessary, then type Region Statistics in the text box**
   Next, you need to add the summary statistics to the new worksheet.

6. **Click the Summary statistics check box to select it, then click OK**
   The statistics are generated and placed on the new worksheet named Region Statistics. Table K-1 describes some of the statistical values provided in the worksheet. Column A is not wide enough to view the labels, and the worksheet needs a descriptive title.

QUICK TIP
If there are fewer than four data values, the Kurtosis will display the DIV/0! error value.

7. **Widen column A to display the column labels, then edit the contents of cell A1 to read Total Projected Sales Jan - Jun**
   Figure K-22 shows statistical values for the total projected sales.

8. **Enter your name in the center section of the Region Statistics footer, save the workbook, then preview and print the report**

9. **Close the workbook and exit Excel**

Choosing the right tool for your data analysis

The Analysis ToolPak offers 19 options for data analysis. ANOVA, or the analysis of variance, can be applied to one or more samples of data. The regression option creates a table of statistics from a least-squares regression. The correlation choice measures how strong of a linear relationship exists between two random variables. A moving average is often calculated for stock prices or any other data that is time sensitive. Moving averages display long-term trends by smoothing out short-term changes. The Random Number Generation creates a set of random numbers between values that you specify. The Rank and Percentile option creates a report of the ranking and percentile distribution.

Notes

FIGURE K-21: Descriptive Statistics dialog box

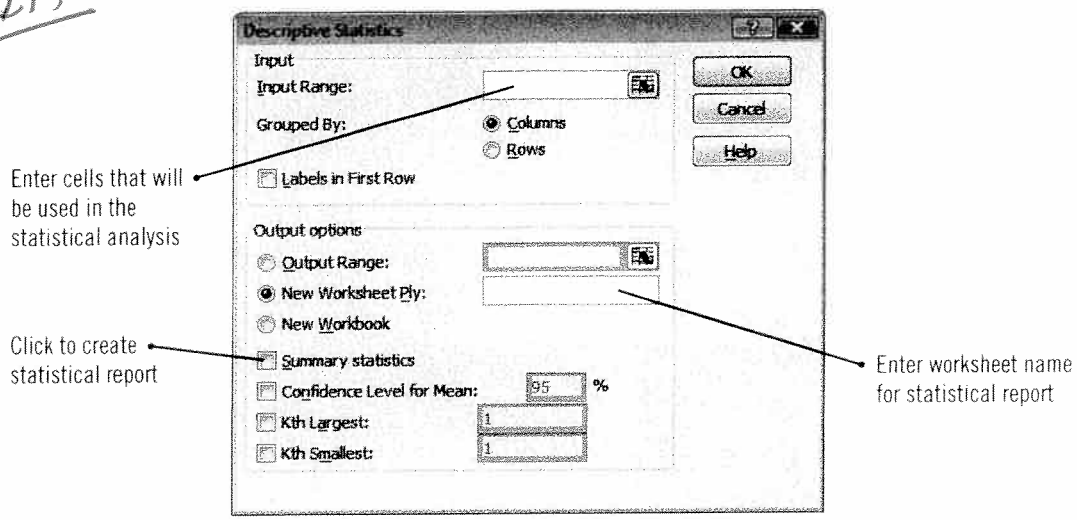


FIGURE K-22: Region Statistics worksheet

New title

	A	B	C
1	Total Projected Sales: Jan - Jun		
2			
3	Mean	331290.6	
4	Standard Error	32557.35	
5	Median	326864	
6	Mode	#N/A	
7	Standard Deviation	65114.7	
8	Sample Variance	4.24E+09	
9	Kurtosis	-0.5431	
10	Skewness	0.342015	
11	Range	152666.3	
12	Minimum	259384	
13	Maximum	412050.3	
14	Sum	1325162	
15	Count	4	
16			

TABLE K-1: Descriptive Statistics

Mean	The average of a set of numbers
Median	The middle value of a set of numbers
Mode	The most common value in a set of numbers
Standard Deviation	The measure of how widely spread the values in a set of numbers are. If the values are all close to the mean, the standard deviation is close to zero.
Range	The difference between the largest and smallest values in a set of numbers
Minimum	The smallest value in a set of numbers
Maximum	The largest value in a set of numbers
Sum	The total of the values in a set of numbers
Count	The number of values in a set of numbers
Skewness	The measure of the asymmetry of the values in a set of numbers
Sample Variance	The measure of how scattered the values in a set of numbers are from an expected value
Kurtosis	The measure of the peakedness or flatness of a distribution of data

SKILLS REVIEW (CONTINUED)

c. Change the contents of cell A1 to **Repair Cost Per Model**. Delete row 9 containing the kurtosis error information. (This was generated because you only have three data values.) Compare your worksheet to Figure K-27.

d. Add your name to the center section of the worksheet footer, then preview and print the worksheet.

e. Save and close the workbook, then exit Excel.

FIGURE K-27

	A	B	C
1	Repair Cost Per Model		
2			
3	Mean	5983.333	
4	Standard Error	1626.239	
5	Median	7125	
6	Mode	#N/A	
7	Standard Deviation	2816.728	
8	Sample Variance	7933958	
9	Skewness	-1.52429	
10	Range	5275	
11	Minimum	2775	
12	Maximum	8050	
13	Sum	17950	
14	Count	3	
15			

INDEPENDENT CHALLENGE 1

You are the manager for Image Pro, a graphic design firm based in Chicago. You are planning a computer hardware upgrade for the graphic designers in the company. Your manager has asked you to research the monthly cost for a $100,000 equipment loan to purchase the new computers. You will create a worksheet model to determine the monthly payments based on several different interest rates and loan terms, using data from the company's bank. Using Scenario Manager, you will create the following three scenarios: a four-year loan at 6.0%; a three-year loan at 5.75%; and a two-year loan at 5.5%. You will also prepare a scenario summary report outlining the payment details for your manager.

a. Start Excel, open the file EX K-3.xlsx from the drive and folder where you store your Data Files, then save it as **Hardware Payment Model**.

b. Create cell names for the cells B4:B11 based on the labels in cells A4:A11, using the Create Names from Selection dialog box.

c. Use Scenario Manager to create scenarios that calculate the monthly payment on a $100,000 loan under the three sets of loan possibilities listed below. (*Hint*: Create three scenarios using cells B5:B6 as the changing cells.)

Scenario Name	Interest Rate	Term
6.0% 4 Yr	.06	48
5.75% 3 Yr	.0575	36
5.5% 2 Yr	.055	24

d. Show each scenario to make sure it performs as intended, then display the 6.0% 4 Yr scenario.

e. Generate a scenario summary titled **Scenario Summary for $100,000 Hardware Purchase**. Use cells B9:B11 as the Result cells.

f. Delete the Current Values column in the report, and delete the notes at the bottom of the report.

g. Enter your name in the center section of the Scenario Summary sheet footer. Save the workbook, then preview and print the scenario summary.

Advanced Challenge Exercise

- Create a copy of the Loan sheet. Name the new sheet **My Loan**.
- Create a new scenario in the copied sheet called **Local**, using an interest rate and term available at a local lending institution.
- Merge the scenario from the My Loan sheet into the Loan sheet. (*Hint*: Use the Merge option in the Scenario Manager dialog box.)
- Verify that the Local scenario displays in the Scenario Manager dialog box of the Loan sheet, then generate a scenario summary titled **Advanced Scenario Summary**, using cells B9:B11 as the Result cells. Delete the Current Values column in the report and the notes at the bottom.
- Enter your name in the center section of the Scenario Summary 2 sheet footer, save the workbook, then preview and print the Advanced Scenario Summary in landscape orientation.

h. Close the workbook, then exit Excel.

▼ INDEPENDENT CHALLENGE 2

You are a VP at Soft Solutions, a software development company based in Dublin. The company president has asked you to prepare a loan summary report for a business expansion. You need to develop a model to show what the monthly payments would be for a €1,000,000 loan with a range of interest rates. You will create a one-input data table that shows the results of varying interest rates in 0.25% increments, then you will use Goal Seek to specify a total payment amount for this loan application.

a. Start Excel, open the file EX K-4.xlsx from the drive and folder where you store your Data Files, then save it as **Capital Loan Payment Model**.

b. Reference the monthly payment amount from cell B9 in cell E4, and format the contents of cell E4 as hidden.

c. Using cells D4:E13, create a one-input data table structure with varying interest rates for a 5-year loan. Use cells D5:D13 for the interest rates, with 6% as the lowest possible rate and 8% as the highest. Vary the rates in between by 0.25%. Use Figure K-28 as a guide.

d. Generate the data table that shows the effect of varying interest rates on the monthly payments. Use cell B5, the Annual Interest Rate, as the column input cell. Format cells E5:E13 as currency with the €English (Ireland) symbol and two decimal places.

FIGURE K-28

	A	B	C	D	E
1	Soft Solutions				
2					
3					
4	*Loan Amount*	€1,000,000.00		Interest Rate	
5	*Annual Interest Rate*	6.00%		6.00%	
6	*Term in Months*	60		6.25%	
7				6.50%	
8				6.75%	
9	Monthly Payment:	€19,332.80		7.00%	
10	Total Payments:	€1,159,968.09		7.25%	
11	Total Interest:	€159,968.09		7.50%	
12				7.75%	
13				8.00%	
14					

e. Select cell B10 and use Goal Seek to find the interest rate necessary for a total payment amount of €1,110,000. Use cell B5, the Annual Interest Rate, as the By changing cell. Accept the solution found by Goal Seek.

Advanced Challenge Exercise

- Reference the monthly payment amount from cell B9 in cell A13, and format the contents of cell A13 as hidden.
- Using cells A13:C22, create a two-input data table structure with varying interest rates for 10- and 15-year terms. Use Figure K-29 as a guide.
- Generate the data table that shows the effect of varying interest rates and loan terms on the monthly payments. (*Hint*: Use cell B6, Term in Months, as the row input cell, and cell B5, the Annual Interest Rate, as the column input cell).
- Format cells B14:C22 as currency with the €English (Ireland) symbol and two decimal places.

FIGURE K-29

	A	B	C	D	E	F
1	Soft Solutions					
2						
3						
4	*Loan Amount*	€1,000,000.00			Interest Rate	
5	*Annual Interest Rate*	4.18%			6.00%	€19,332.80
6	*Term in Months*	60			6.25%	€19,449.26
7					6.50%	€19,566.15
8					6.75%	€19,683.46
9	Monthly Payment:	€18,500.00			7.00%	€19,801.20
10	Total Payments:	€1,110,000.00			7.25%	€19,919.36
11	Total Interest:	€110,000.00			7.50%	€20,037.95
12					7.75%	€20,156.96
13			120	180	8.00%	€20,276.39
14	6.00%					
15	6.25%					
16	6.50%					
17	6.75%					
18	7.00%					
19	7.25%					
20	7.50%					
21	7.75%					
22	8.00%					
23						

f. Enter your name in the center section of the worksheet footer, save the workbook, then preview and print the worksheet.

g. Close the workbook, then exit Excel.

▼ INDEPENDENT CHALLENGE 3

You are the owner of Poppies, a florist based in Boston. You are considering adding local delivery service to your business. You decide on a plan to purchase a combination of vans, sedans, and compact cars that can deliver a total of 90 floral orders. You want to first look at how the interest rate affects the monthly payments for each vehicle type you are considering purchasing. To do this, you use Goal Seek. You need to keep the total monthly payments for all of the vehicles at or below $4000. You use Solver to help find the best possible combination of vehicles. You produce a worksheet summarizing your analysis.

a. Start Excel, open the file EX K-5.xlsx from the drive and folder where you store your Data Files, then save it as **Vehicle Purchase**.

INDEPENDENT CHALLENGE 3 (CONTINUED)

b. Use Goal Seek to find the interest rate that produces a monthly payment for the van purchase of $1,400, and write down the interest rate that Goal Seek finds. Record the interest rate in cell A19, enter **Interest rate for $1400 van payment** in cell B19, then reset the interest rate to its original value.

c. Use Goal Seek to find the interest rate that produces a monthly payment for the sedan purchase of $990. Record the interest rate in cell A20, enter **Interest rate for $990 sedan payment** in cell B20, then reset the interest rate to its original value.

d. Use Goal Seek to find the interest rate that produces a monthly payment for the compact purchase of $790. Record the interest rate in cell A21, enter **Interest rate for $790 compact payment** in cell B21, then reset the interest rate to its original value.

e. Name cell B8 **Quantity_Van**, name cell C8 **Quantity_Sedan**, name cell D8 **Quantity_Compact**, and name cell B15 **Total_Monthly_Payments**. Use Solver to set the total delivery capacity of all vehicles to 90. Use the quantity to purchase, cells B8:D8, as the changing cells. Specify that cells B8:D8 must be integers that are greater than or equal to 0. Make sure that the total monthly payments amount in cell B15 is less than or equal to $4000.

f. Generate a scenario named Delivery Solution with the Solver values and restore the original values in the worksheet. Create a scenario summary using the Delivery Solution scenario, delete the notes at the bottom of the solution, and edit cell B2 to contain **Solver Solution**.

g. Enter your name in the center footer section of each worksheet. Save the workbook, then preview and print each sheet.

h. Close the workbook, then exit Excel.

REAL LIFE INDEPENDENT CHALLENGE

You decide to take out a loan for a new car. You haven't decided whether to finance the car for three, four, or five years. You will create scenarios for car loans with the different terms, using interest rates at your local lending institution. You will summarize the scenarios to make them easy to compare.

a. Start Excel, open the file EX K-6.xlsx from the drive and folder where you store your Data Files, then save it as **Car Payment**.

b. Research the interest rates for 3-year, 4-year, and 5-year auto loans at your local lending institution. Record your 48-month interest rate in cell B5 of the worksheet. Change the data in cell B4 to the price of a car you would like to purchase, then widen columns as necessary.

c. Create cell names for the cells B4:B11 based on the labels in cells A4:A11.

d. Create a scenario named **48 months** to calculate the monthly payment for your loan amount, using the 48-month term and the corresponding interest rate at your lending institution.

e. Create a scenario named **36 months** to calculate the monthly payment for your loan amount, using the 36-month term and the corresponding interest rate at your lending institution.

f. Create a scenario named **60 months** to calculate the monthly payment for your loan amount, using the 60-month term and the corresponding interest rate at your lending institution.

g. Generate a scenario summary titled **Scenario Summary for Car Purchase** that summarizes the payment information in cells B9:B11 for the varying interest rates and terms. Delete the Current Values column in the report and the notes at the bottom of the report.

h. Enter your name in the center section of the scenario summary footer, save the workbook, then preview and print the scenario summary.

i. Create a two-input data table on the Loan sheet using the terms 36, 48, and 60. Use 12 rates, beginning with the lowest rate and incrementing by the difference between the lowest and second lowest rates. Use Figure K-30 as a guide.

j. Enter your name in the center section of the Loan sheet footer, change the page orientation to landscape, save the workbook, then preview and print the Loan sheet.

k. Close the workbook, then exit Excel.

FIGURE K-30

	Term		
	36	48	60
6.86%	$ 616.26	$ 477.63	$ 394.70
6.93%	$ 616.90	$ 478.28	$ 395.36
7.00%	$ 617.54	$ 478.92	$ 396.02
7.07%	$ 618.18	$ 479.57	$ 396.68
7.14%	$ 618.82	$ 480.23	$ 397.35
7.21%	$ 619.46	$ 480.88	$ 398.01
7.28%	$ 620.11	$ 481.53	$ 398.67
7.35%	$ 620.75	$ 482.18	$ 399.33
7.42%	$ 621.39	$ 482.83	$ 400.00
7.49%	$ 622.03	$ 483.48	$ 400.66
7.56%	$ 622.68	$ 484.14	$ 401.33
7.63%	$ 623.32	$ 484.79	$ 402.00