EXAMPLE 2.7 Using INDEX and MATCH for a Left Table Lookup

Suppose that, in the *Sales Transactions* database, we wish to find the customer ID associated with a specific transaction code. Refer back to Figure 2.8 or the Excel workbook. Suppose that we enter the transaction code in cell K2, and want to display the customer ID in cell K4. Use the formula in cell K4:

=INDEX(A4:A475,MATCH(K2,D4:D475,0),1)

Here, the MATCH function is used to identify the row number in the table range that matches the transaction code exactly, and the INDEX function uses this row number and column 1 to identify the associated customer ID.

Spreadsheet Add-Ins for Business Analytics

Microsoft Excel will provide most of the computational support required for the material in this book. Excel (Windows only) provides an add-in called the *Analysis Toolpak,* which contains a variety of tools for statistical computation, and *Solver*, which is used for optimization. These add-ins are not included in a standard Excel installation. To install them, click the *File* tab and then *Options* in the left column. Choose *Add-Ins* from the left column. At the bottom of the dialog, make sure *Excel Add-ins* is selected in the *Manage:* box and click *Go*. In the *Add-Ins* dialog, if *Analysis Toolpak*, *Analysis Toolpak VBA,* and *Solver Add-in* are not checked, simply check the boxes and click *OK*. You will not have to repeat this procedure every time you run Excel in the future.

In addition, many third-party add-ins are available to support analytic procedures in Excel. One add-in, Frontline Systems' *Analytic Solver Platform*, offers many other capabilities for both predictive and prescriptive analytics. See the Preface for instructions on how to download and install this software. We will use both the included Excel add-ins and *Analytic Solver Platform* throughout this book, so we encourage you to download and set up these add-ins on your computer at this time.

Key Terms

Absolute address
Discount rate
Net present value (discounted cash flow)
Relative address

Problems and Exercises

1. The Excel file *Firm Data* shows the prices charged and different product sizes. Prepare a worksheet using VLOOKUP function that will compute the invoice to be sent to a customer when any product type, size, and order quantity are entered.

2. The Excel file *Store and Regional Sales Database* provides sales data for computers and peripherals showing the store identification number, sales region, item number, item description, unit price, units sold, and month when the sales were made during the fourth quarter of last year.[3] Modify the

[3]Based on Kenneth C. Laudon and Jane P. Laudon, *Essentials of Management Information Systems*, 9th ed. (Upper Saddle River, NJ: Prentice Hall, 2011).

spreadsheet to calculate the total sales revenue for each of the eight stores as well as each of the three sales regions.

3. The Excel file *President's Inn Guest Database* provides a list of customers, rooms they occupied, arrival and departure dates, number of occupants, and daily rate for a small bed-and-breakfast inn during one month.[4] Room rates are the same for one or two guests; however, additional guests must pay an additional $20 per person per day for meals. Guests staying for seven days or more receive a 10% discount. Modify the spreadsheet to calculate the number of days that each party stayed at the inn and the total revenue for the length of stay.

4. The worksheet *Base Data* in the Excel file *Credit Risk Data* provides information about 425 bank customers who had applied for loans. The data include the purpose of the loan, checking and savings account balances, number of months as a customer of the bank, months employed, gender, marital status, age, housing status and number of years at current residence, job type, and credit-risk classification by the bank.[5]
   a. Use the COUNTIF function to determine (1) how many customers applied for new-car, used-car, business, education, small-appliance, and furniture loans and (2) the number of customers with checking account balances less than $500.
   b. Modify the spreadsheet using IF functions to include new columns, classifying the checking and savings account balances as low if the balance is less than $250, medium if between $250 but less than $2000, and high otherwise.

5. A manager needs to identify some information from the *Purchase Orders* Excel file but has only the order number. Modify the Excel file to use the VLOOKUP function to find the item description and cost per order for the following order numbers: Aug11008, Sep11023, and Oct11020.

6. A pharmaceutical manufacturer has projected net profits for a new drug that is being released to the market over the next five years:

Year	Net Profit
1	$(300,000,000)
2	$(145,000,000)
3	$50,000,000
4	$125,000,000
5	$530,000,000

   Use a spreadsheet to find the net present value of these cash flows for a discount rate of 3%.

7. Example 1.4 in Chapter 1 described a scenario for new product sales that can be characterized by a formula called a Gompertz curve: $S = ae^{be^{ct}}$. Develop a spreadsheet for calculating sales using this formula for $t = 0$ to 160 in increments of 10 when $a = 15000$, $b = -8$, and $c = -0.05$.

8. Example 1.8 in Chapter 1 provided data from an experiment to identify the relationship between sales and pricing, coupon, and advertising strategies. Enter the data into a spreadsheet and implement the model in the example within your spreadsheet to estimate the sales for each of the weekly experiments. Compute the average sales for the three stores, and find the differences between the averages and the model estimates for each week.

9. The following exercises use the *Purchase Orders* database. Use MATCH and/or INDEX functions to find the following:
   a. The row numbers corresponding to the first and last instance of item number 1369 in column C (be sure column C is sorted by order number).
   b. The order cost associated with the first instance of item 1369 that you identified in part (a).
   c. The total cost of all orders for item 1369. Use the answers to parts (a) and (b) along with the SUM function to do this. In other words, you should use the appropriate INDEX and MATCH functions within the SUM function to find the answer. Validate your results by applying the SUM function directly to the data in column G.

[4]Based on Kenneth C. Laudon and Jane P. Laudon, *Essentials of Management Information Systems*.
[5]Based on Efraim Turban, Ranesh Sharda, Dursun Delen, and David King, *Business Intelligence: A Managerial Approach*, 2nd ed. (Upper Saddle River NJ: Prentice Hall, 2011).

10. Use INDEX and MATCH functions to fill in a table that extracts the amounts shipped between each pair of cities in the Excel file *General Appliance Corporation*. Your table should display as follows, and the formula for the amount should reference the names in the From and To columns:

From	To	Amount
Marietta	Cleveland	0
Marietta	Baltimore	350
Marietta	Chicago	0
Marietta	Phoenix	850
Minneapolis	Cleveland	150
Minneapolis	Baltimore	0
Minneapolis	Chicago	500
Minneapolis	Phoenix	150

11. A firm is considering the purchase of a new technology that is expected to produce an annual net saving in labor costs of $8000 in each of the six years. The initial cost is $30000, and annual maintenance cost is $1000. The company can access the required fund at the current market interest rate of 14% per annum compounded annually. By calculating NPV of the proposed expenditure, decide whether the technology should be purchased.

Case: Performance Lawn Equipment

Elizabeth Burke has asked you to do some preliminary analysis of the data in the *Performance Lawn Equipment* database. First, she would like you to edit the worksheets *Dealer Satisfaction* and *End-User Satisfaction* to display the total number of responses to each level of the survey scale across all regions for each year. Second, she wants a count of the number of failures in the worksheet *Mower Test*. Next, Elizabeth has provided you with prices for PLE products for the past 5 years:

Year	Mower Price ($)	Tractor Price ($)
2010	150	3,250
2011	175	3,400
2012	180	3,600
2013	185	3,700
2014	190	3,800

Create a new worksheet in the database to compute gross revenues by month and region, as well as worldwide totals, for each product using the data in *Mower Unit Sales* and *Tractor Unit Sales*. Finally, she wants to know the market share for each product and region based on the PLE and industry sales data in the database. Create and save these calculations in a new worksheet. Summarize all your findings in a report to Ms. Burke.