19. Eliminate the redundancy in Table 10.7.

TABLE 10.7	A table with redundancies.			
name	**address**	**city**	**state**	**stateCapital**
R. Myers	3 Maple St.	Seattle	Washington	Olympia
T. Murphy	25 Main St.	Seattle	Washington	Olympia
L. Scott	14 Park Ave.	Baltimore	Maryland	Annapolis
B. Jones	106 5th St.	Seattle	Washington	Olympia
W. Smith	29 7th Ave.	Baltimore	Maryland	Annapolis
V. Miller	4 Flower Ave.	Chicago	Illinois	Springfield

20. Eliminate the redundancy in Table 10.8, a table of members of the U.S. House of Representatives. (***Note:*** The value of *numColleges* is the number of colleges in the representative's state.)

TABLE 10.8	A table with redundancies.			
name	**state**	**party**	**statePop**	**numColleges**
J. Dingell	Michigan.	Democratic	10.2	97
E. Cantor	Virginia	Republican	7.8	83
J. Moran	Virginia	Democratic	7.8	83
J. Sarbanes	Maryland	Democratic	5.8	97
S. Hoyer	Maryland	Democratic	5.8	97
F. Wolf	Virginia	Republican	7.8	83

21. The database Justices.accdb in the Programs\Ch10\Databases folder was current as of January 1, 2010. If some justices have retired and new justices have been appointed since then, update the database.

Solutions to Practice Problems 10.2

1. No. The city must be from a country appearing in the Countries table.

2. Yes.

3. Yes.

4. No. Only the records for Pakistan and Indonesia can be deleted.

CHAPTER 10 SUMMARY

1. A *table* is a group of data items arranged in a rectangular array, with each row containing the same categories of information. Each row is called a *record*. Each category (column) is called a *field*. A *database* is a collection of one or more tables that are usually related.

2. A *BindingSource control* can be used to bind a table of a database to a program.

3. *Database Explorer* in VB Express and *Server Explorer* in Visual Studio can be used to view the table from a database that has been connected to a program.

4. *LINQ* can be used to set criteria for information retrieval from a table.

5. A sequence of records resulting from the execution of a LINQ query can be displayed in a *DataGridView control*.

6. A *primary key* is a field or set of fields that uniquely identifies each record of a table. The *Rule of Entity Integrity* states that no record can have a null entry in a primary key and that entries for primary keys must be unique. A *foreign key* is a field or set of fields in one table that refers to a primary key in another table. The *Rule of Referential Integrity* states that each value in the foreign key must also appear in the primary key in the related table.

7. The *Join operator* links two tables based on matching field values.

8. A *navigation toolbar*, which has icons on its buttons similar to those on a DVD player, can be used to view records, alter records, delete records, and add new records to a database table. A *BindingNavigator control* binds the navigation toolbar to the table via a Binding-Source control. Searching for records in the table can be facilitated with the *Position property* and the *Find methods* of the BindingSource control.

9. Some fundamental design principles help database designers create efficient databases.

CHAPTER 10 PROGRAMMING PROJECTS

VideoNote

Richard's catering (Homework)

1. The database Microland.accdb is maintained by the Microland Computer Warehouse, a mail-order computer-supply company. Tables 10.9 through 10.11 show parts of three tables in the database. The table Customers identifies each customer by an ID number and gives, in addition to the name and address, the total amount of purchases during the current year prior to today. The table Inventory identifies each product in stock by an ID number and gives, in addition to its description and price (per unit), the quantity in stock at the beginning of the day. The table Orders gives the orders received today. Suppose that it is now the end of the day. Write a program that uses the three tables to do the following two tasks.

TABLE 10.9   First three records of the Customers table.

CustID	Name	Street	City	AmtPurchases
1	Michael Smith	2 Park St	Dallas, TX 75201	234.50
2	Brittany Jones	5 2nd Ave.	Tampa, FL 33602	121.90
3	Warren Pease	7 Maple St.	Boston, MA 02101	387.20

TABLE 10.10   First three records of the Inventory table.

itemID	description	price	quantity
PL208	Visual Basic	89.50	12
SW109	MS Office Upgrade	195.95	2
HW913	Scanner	49.95	8

TABLE 10.11   First four records of the Orders table.

custID	itemID	quantity
3	SW109	1
1	PL208	3
1	HW913	2
2	PL208	1

(a) Display in a list box the items that are out of stock and those that must be reordered to satisfy today's orders. See Fig. 10.25(a).

(b) Display in a list box bills for all customers who ordered during the day. Each bill should show the customer's name, address, items ordered (with costs), and total cost of the order. See Fig. 10.25(b).
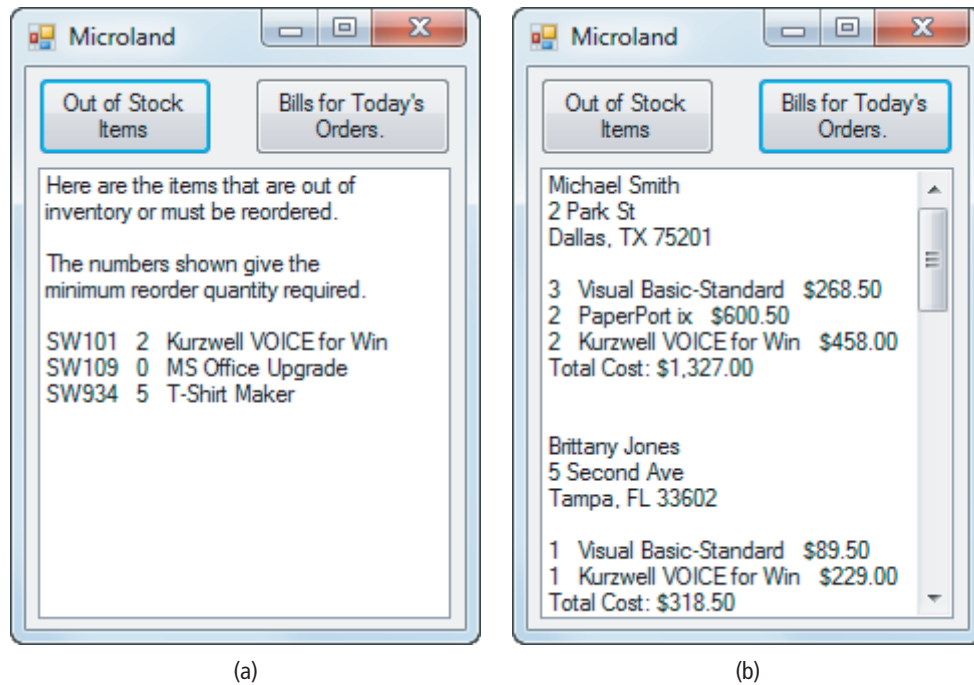

FIGURE 10.25 Output of Programming Project 1.

2. *Grade Book.* A teacher maintains a database containing two tables—Students and Grades. The Students table has three fields: *studentID*, *lastName*, and *firstName*. The Grades table has four fields: *studentID*, *firstExam*, *secondExam*, and *finalExam*. At the beginning of the semester, the Students table is filled in completely with a record for each student in a class, and the Grades table has a record for each student that contains only the student's ID number. (**Note:** The database is contained in the file Gradebook.accdb from the folder Ch10\Databases.) Write a program that allows the instructor to record and process the grades for the semester. The program should do the following:

(a) Use a navigation toolbar to fill the Grades table.

(b) After all grades have been entered, display a DataGridView control showing the name of each student and his or her semester average. The semester average should be calculated as (firstExam + secondExam + 2 · finalExam)/4. See Fig. 10.26.

FIGURE 10.26 Possible outcome of Programming Project 2.