

Homework 4

Relational Databases

Due Wednesday, May 31, 2006

Student ID: _____

Lab Section: _____

Name: _____

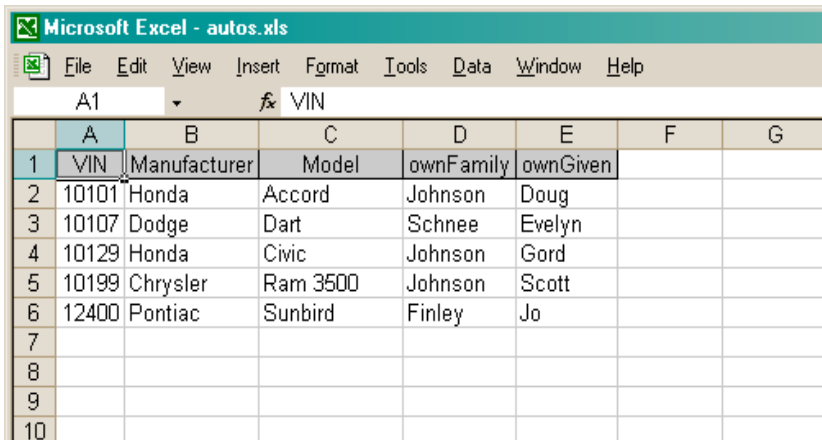
All questions are worth 2 points, unless otherwise specified!

Spreadsheet programs are a very popular tool. They allow us to define formulas and perform arithmetic with the cell contents to automatically calculate tables of values. However, they are also useful for storing lists. In fact, Microsoft was surprised to find out several years ago that many Excel users said that list management was one of the more important features of Excel.

1. Consider this list of cars and their owners. This list is shown as a single 2-dimensional table, stored in the spreadsheet program Excel. Circle the term that best describes this database:

flat file database

relational database

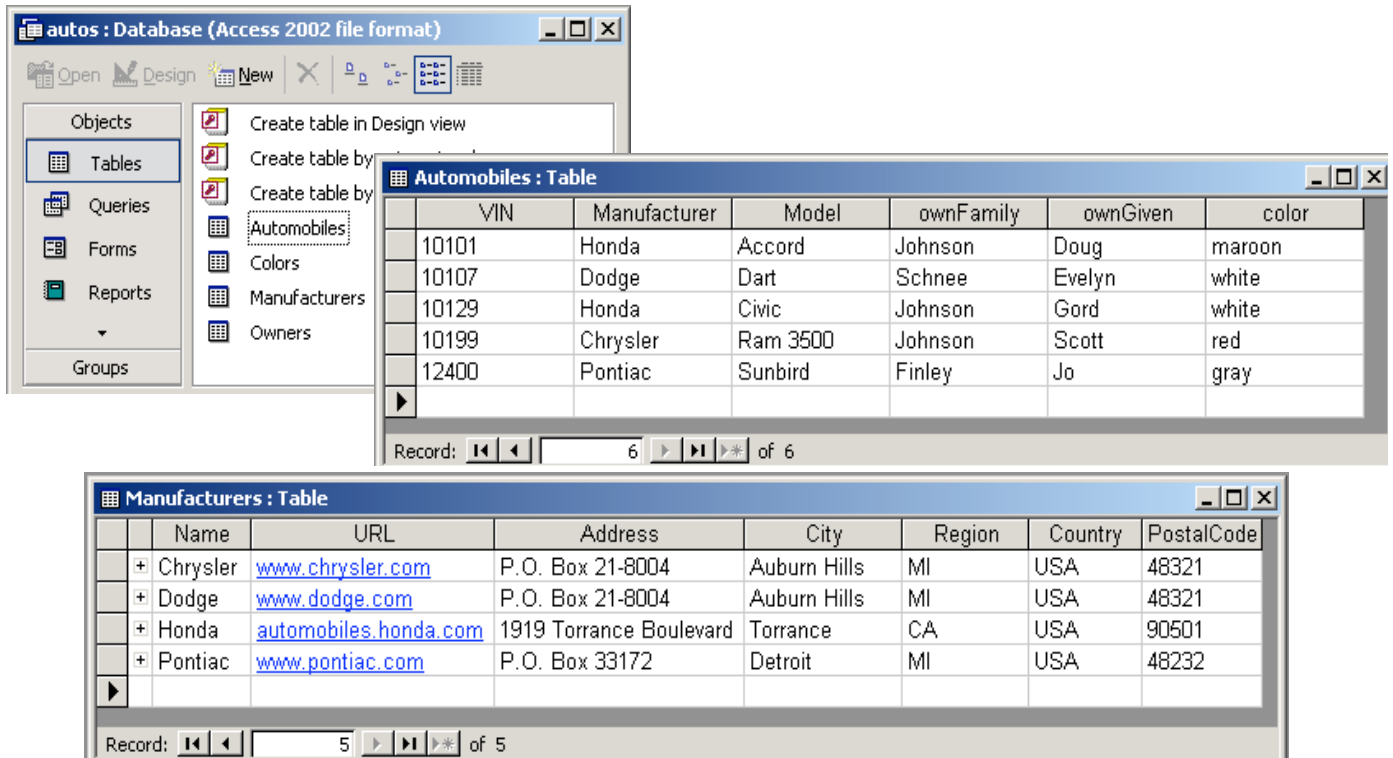


The screenshot shows a Microsoft Excel spreadsheet titled "Microsoft Excel - autos.xls". The spreadsheet contains a table with the following data:

	A	B	C	D	E	F	G
1	VIN	Manufacturer	Model	ownFamily	ownGiven		
2	10101	Honda	Accord	Johnson	Doug		
3	10107	Dodge	Dart	Schnee	Evelyn		
4	10129	Honda	Civic	Johnson	Gord		
5	10199	Chrysler	Ram 3500	Johnson	Scott		
6	12400	Pontiac	Sunbird	Finley	Jo		
7							
8							
9							
10							

2. If we wanted to store more information about each car, we could add more columns, one per additional attribute. For example, we might add year, color, manufacturer's URL, and manufacturer's mailing address. Also, we might add more cars to the list; for example to include all cars registered in Seattle. Describe one redundancy-related problem that would arise as a result of these changes. Identify the redundancy, and then describe why it is a problem.

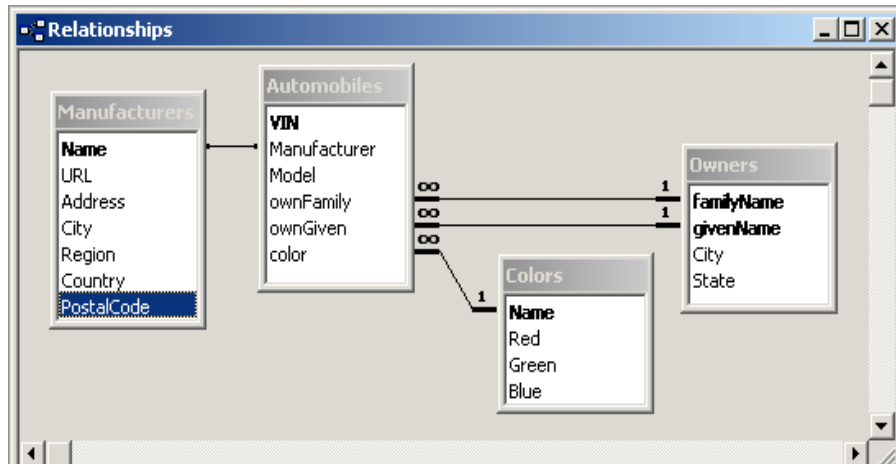
Consider the database shown below, implemented in Access. It contains data similar to that of the previous problem.



3. How many tables are defined in this database? _____
4. How many attributes are defined for each entity in the Automobiles table? _____
5. The attributes Automobiles.Manufacturer and Manufacturers.Name refer to values of the same type, that is, the set of manufacturer names. In the Automobiles table, attribute Manufacturer is most likely which of the following? Circle the correct answer.

Primary Key Foreign Key
6. Given the information shown here, could we merge entities from the Automobiles and Manufacturers tables with an SQL JOIN operation based on the Vehicle Identification Number (VIN)? Briefly describe why or why not.

The relationship between the tables in the autos database from the previous page is shown here.



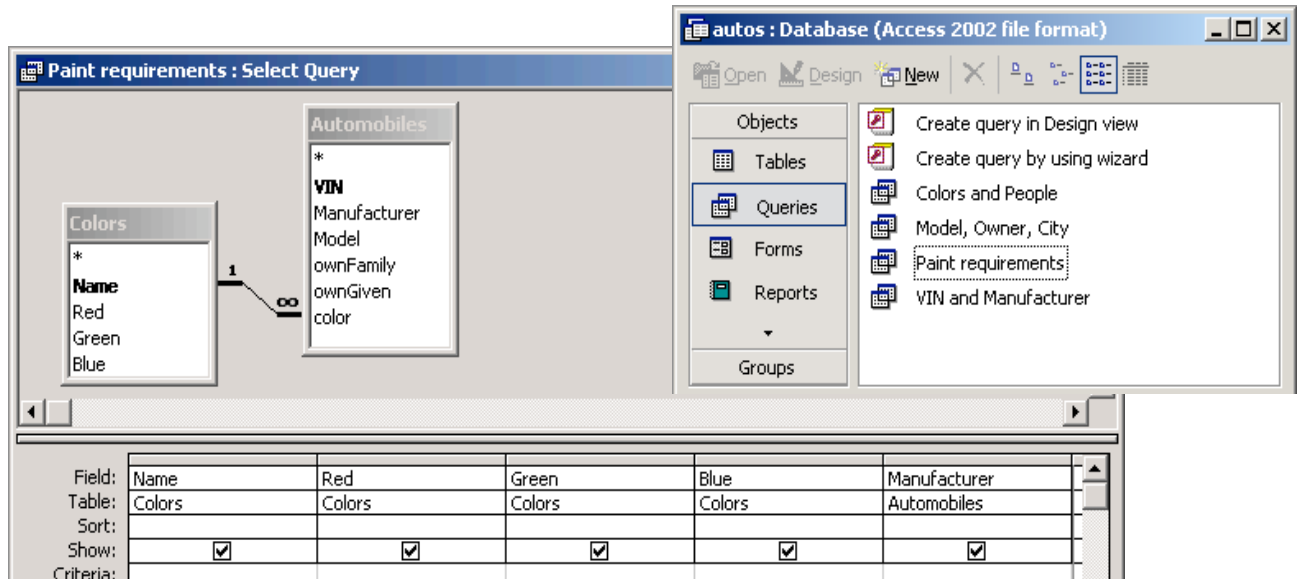
7. In the Manufacturers table, the attribute Name is the primary key. It is linked to the attribute Manufacturer in the Automobiles table. The most likely labeling for this relationship is (circle the one correct answer):

one-to-one one-to-many many-to-many

8. What is the primary key for the Colors table?

9. Given the situation shown here, in particular the primary keys and the relationship between the Colors table and the Automobiles table, which of the following situations can be recorded in this database? Circle yes or no as appropriate for each situation. [4 points]
 - a. Yes No One car can be recorded as having a different color for the body than for the roof.
 - b. Yes No Several cars can be the same color.
 - c. Yes No Two entities in the Colors table can have different values for Name but have the same values for Red, Green, and Blue.
 - d. Yes No A single person (givenName familyName) can be identified as the owner of more than one car.

The queries associated with this database are shown here. One of the queries is named “Paint requirements” and some information related to that particular query is also shown.



10. How many queries are defined for this database? _____

11. How many tables from the database are used in the “Paint requirements” query?

12. Which of the following SQL statements implements the “Paint requirements” query shown above? *Circle the **one** letter associated with the correct SQL statement.*
 - a. SELECT Colors.Name, Colors.Red, Colors.Green, Colors.Blue
FROM Colors;

 - b. SELECT Colors.Name, Colors.Red, Colors.Green, Colors.Blue,
Automobiles.Manufacturer
FROM Colors INNER JOIN Automobiles ON Colors.Name = Automobiles.color;

 - c. SELECT Colors.Name, Colors.Red, Colors.Green, Colors.Blue,
Manufacturers.Name
FROM Colors, Manufacturers;

13. The “virtual table” that is initially built by this query actually contains 10 columns, but the datasheet view that is displayed only contains 5 columns. In relational algebra, this reduction in the number of columns is best described by which of the following terms? Circle the one correct answer.

projection union product