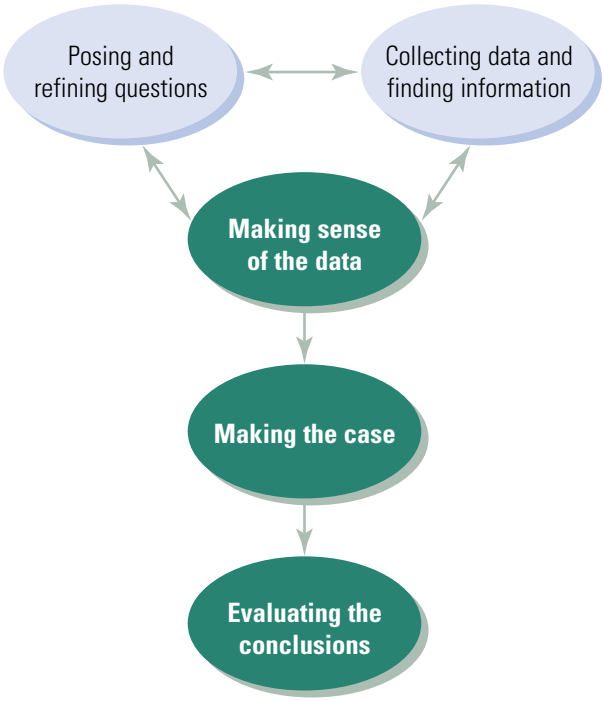
6 Solving Problems with Matrices, Graphs, and Diagrams

Data-Driven Problem Solving



Frequently, in the worlds of business, science, and politics, decisions must be made based on large amounts of raw data. In order to make sense of the data, they have to be put into a form that can be readily manipulated by computer software. Often, the data are entered in the form of a matrix: a rectangular array of numbers for which the rows and columns have specific meanings.

Matrix methods can also be used to analyze and solve problems such as scheduling events, allocating resources efficiently, making manufacturing processes more efficient, building communication networks, or planning delivery routes. The first step in solving these kinds of problems is to use a diagram or graph, and then to translate the information from the diagram into matrix form.

In this chapter, you will

- represent simple and complex processes using diagrams
- solve network problems associated with scheduling events or with efficiently planning routes using simple graph theory
- represent and carry out computations on numerical data using matrices
- use matrix methods to solve problems drawn from a variety of applications