Example 3.1 **Strong Positive Linear Relationship**

Figure 3.17 shows scores on midterm (X) and final (Y) exams for a class of students. These scores are strongly related, and the slope of the least squares best-fitting line for the data is positive. The correlation between X and Y when calculated is close to 1.0.

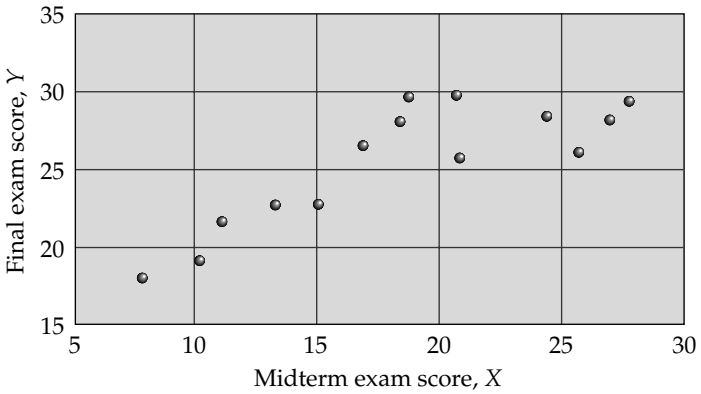

Figure 3.17 **Final exam versus midterm scores.**

Example 3.2

Weak Positive Linear Relationship

Figure 3.18 shows an index of interest in mathematics (X) and final mathematics test score (Y) for a class of students. These scores are weakly related, and the slope of the regression line is positive. This is called a weak, positive relationship between X and Y. The correlation between X and Y is positive, but fairly close to zero.

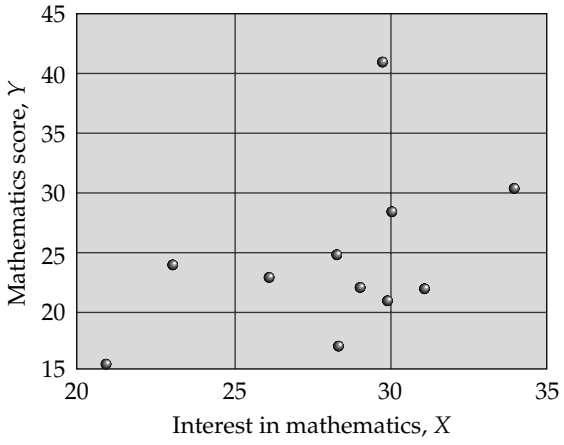

Figure 3.18 **Mathematics achievement versus interest in mathematics.**

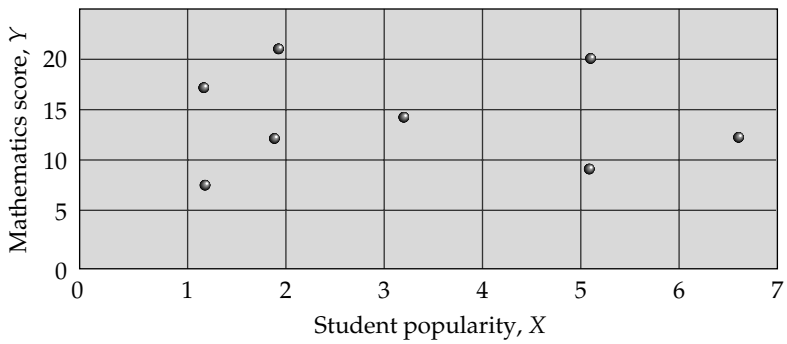

Figure 3.19 **Mathematics test scores versus student popularity.**

Example 3.3 **No Linear Relationship**

Figure 3.19 shows an index of student popularity (X) and mathematics test score (Y) for a class of students. There appears to be no relationship between these two variables. The slope of the best-fitting line is close to zero.

Example 3.4 **Weak Negative Linear Relationship**

Figure 3.20 shows an index of anxiety about mathematics (X) and final mathematics score (Y). These scores are weakly related, and the slope of the regression line is negative. This is called a weak, negative relationship between X and Y. The correlation between X and Y is negative and fairly close to zero.

Example 3.5 **Strong Negative Linear Relationship**

Figure 3.21 shows the year (X) and the infant mortality rate (Y = deaths in one year per 1000 live births) in the state of Massachusetts at the beginning of the 13 decades 1850–1970. These scores are strongly related (they fit rather closely to the regression line, so there is little estimation error), and the slope of the regression line is negative. The correlation between X and Y is fairly close to -1.0. But it is interesting to note that the regularity of the graph makes clear that using a nonlinear curve is a better choice. This issue is taken up in Chapter 13.

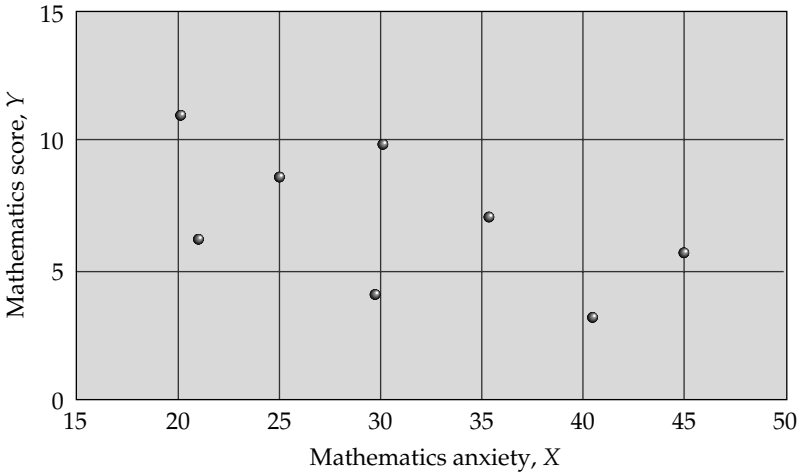

Figure 3.20 **Mathematics test scores versus mathematics anxiety.**

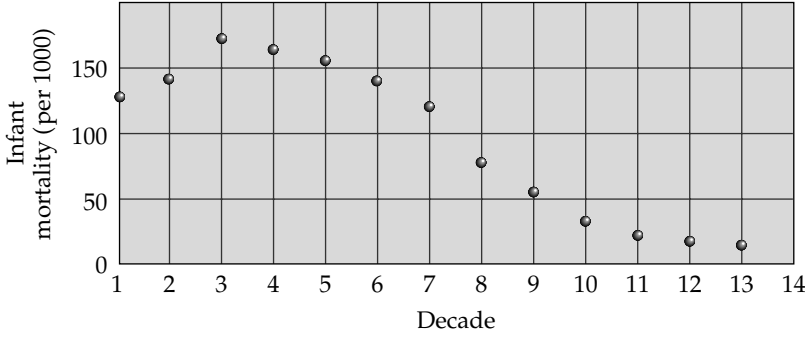

Figure 3.21 **Infant mortality rates for 13 decades.**