10-1 Review and Preview

10-2 Correlation

10-3 Regression

10-4 Prediction Intervals and Variation

10-5 Multiple Regression

10-6 Nonlinear Regression

10

chapter problem

CSI Statistics: Can we use footprint evidence to estimate a suspect's height?

Police sometimes use footprint evidence to estimate the height of a suspect, and the height is included in a description that becomes part of a BOLO ("be on the lookout"). (Aren't acronyms fun? Wait until you get to ANOVA.) Around 1877, anthropologist Paul Topinard collected foot/height measurements and used them to develop this rule: Estimate a person's height by dividing their foot length by 0.15. (An equivalent calculation is to estimate height by multiplying foot length by 6.67.) Try it yourself by measuring the length of your foot, then divide by 0.15 (or multiply by 6.67) to get your estimated height. Is the result reasonably accurate?

Table 10-1 includes some measurements taken from Data Set 2 in Appendix B. Table 10-1 includes shoe length and height measurements from five males, but Data Set 2 includes more measurements from larger samples of males and females. (The data are from "Estimation of Stature from Foot and Shoe Length: Applications in Forensic Science," by Brenda Rohren M.A., MFS, LIMHP, LADC, MAC. Brenda Rohren was a graduate student at Nebraska Wesleyan University when she conducted the research and wrote the report in Fall 2006. The data are used with her permission.)

Using shoe print measurements, such as those in Table 10-1, can we confirm that there is a relationship between lengths of our shoe prints and our heights? If we do conclude that there is a relationship, how do we use it to develop a formula for estimating height based on the length of a shoe print? Such questions are critically important for many applications, and this chapter provides the tools for answering them.

Table 10-1 Shoe Print Lengths and Heights of Males

Shoe Print (cm)	29.7	29.7	31.4	31.8	27.6
Height (cm)	175.3	177.8	185.4	175.3	172.7