

- 6. Placement exams.** An incoming freshman took her college's placement exams in French and mathematics. In French, she scored 82 and in math, 86. The overall results on the French exam had a mean of 72 and a standard deviation of 8, while the mean math score was 68, with a standard deviation of 12. On which exam did she do better compared with the other freshmen?
- 10. Car speeds.** John Beale of Stanford, CA, recorded the speeds of cars driving past his house, where the speed limit read 20 mph. The mean of 100 readings was 23.84 mph, with a standard deviation of 3.56 mph. (He actually recorded every car for a two-month period. These are 100 representative readings.)
- How many standard deviations from the mean would a car going under the speed limit be?
  - Which would be more unusual, a car traveling 34 mph or one going 10 mph?
- 14. Caught speeding.** Suppose police set up radar surveillance on the Stanford street described in Exercise 10. They handed out a large number of tickets to drivers going a mean of 28 mph, with a standard deviation of 2.4 mph, a maximum of 33 mph, and an IQR of 3.2 mph. Local law prescribes fines of \$100 plus \$10 per mile per hour over the 20 mph speed limit. For example, a driver convicted of going 25 mph would be fined  $100 + 10(5) = \$150$ . Find the mean, maximum, standard deviation, and IQR of all the potential fines.
- 23. Trees.** A forester measured 27 of the trees in a large woods that is up for sale. He found a mean diameter of 10.4 inches and a standard deviation of 4.7 inches. Suppose that these trees provide an accurate description of the whole forest and that a Normal model applies.
- Draw the Normal model for tree diameters.
  - What size would you expect the central 95% of all trees to be?
  - About what percent of the trees should be less than an inch in diameter?
  - About what percent of the trees should be between 5.7 and 10.4 inches in diameter?
  - About what percent of the trees should be over 15 inches in diameter?
- 34. IQs revisited.** Based on the Normal model  $N(100,16)$  describing IQ scores, what percent of people's IQs would you expect to be
- over 80?
  - under 90?
  - between 112 and 132?
- 36. More IQs.** In the Normal model  $N(100,16)$  what cutoff value bounds
- the highest 5% of all IQs?
  - the lowest 30% of the IQs?
  - the middle 80% of the IQs?
- 40. Parameters II.** Every Normal model is defined by its parameters, the mean and the standard deviation. For each model described below, find the missing parameter. Don't forget to draw a picture.
- $\mu = 1250$ , 35% below 1200;  $\sigma = ?$
  - $\mu = 0.64$ , 12% above 0.70;  $\sigma = ?$
  - $\sigma = 0.5$ , 90% above 10.0;  $\mu = ?$
  - $\sigma = 220$ , 3% below 202;  $\mu = ?$
- 43. Kindergarten.** Companies who design furniture for elementary school classrooms produce a variety of sizes for kids of different ages. Suppose the heights of kindergarten children can be described by a Normal model with a mean of 38.2 inches and standard deviation of 1.8 inches.
- What fraction of kindergarten kids should the company expect to be less than 3 feet tall?
  - In what height interval should the company expect to find the middle 80% of kindergarteners?
  - At least how tall are the biggest 10% of kindergarteners?
- 44. Body temperatures.** Most people think that the "normal" adult body temperature is 98.6°F. That figure, based on a 19th-century study, has recently been challenged. In a 1992 article in the *Journal of the American Medical Association*, researchers reported that a more accurate figure may be 98.2°F. Furthermore, the standard deviation appeared to be around 0.7°F. Assume that a Normal model is appropriate.
- In what interval would you expect most people's body temperatures to be? Explain.
  - What fraction of people would be expected to have body temperatures above 98.6°F?
  - Below what body temperature are the coolest 20% of all people?
- 45. Undercover?** We learned in the chapter that the average Dutch man is 184 cm tall. The standard deviation of Caucasian adult male heights is about 7 cm. The average Greek 18-year-old in Athens is 167.8 cm tall. How easily could the average Dutch man hide in Athens? (Let's assume he dyes his hair, if necessary.) That is, would his height make him sufficiently extraordinary that he'd stand out easily? Assume heights are nearly Normal.
- 46. Big mouth!** A Cornell University researcher measured the mouth volumes of 31 men and 30 women. She found a mean of 66 cc for men ( $SD = 17$  cc) and a mean of 54 cc for women ( $SD = 14.5$  cc). The man with the largest mouth had a mouth volume of 111.2 cc. The woman with the largest mouth had a mouth volume of 95.8 cc.
- Which had the more extraordinarily large mouth?
  - If the distribution of mouth volumes is nearly Normal, what percentage of men and of women should have even larger mouths than these?