

7. **Name recognition.** A political candidate runs a week-long series of TV ads designed to attract public attention to his campaign. Polls taken before and after the ad campaign show some increase in the proportion of voters who now recognize this candidate's name, with a P-value of 0.033. Is it reasonable to believe the ads may be effective?

8. **Cars.** A survey investigating whether the proportion of today's high school seniors who own their own cars is higher than it was a decade ago finds a P-value of 0.017. Is it reasonable to conclude that more high-schoolers have cars? Explain.

11. **Cell phones.** Many people have trouble setting up all the features of their cell phones, so a company has developed what it hopes will be easier instructions. The goal is to have at least 96% of customers succeed. The company tests the new system on 200 people, of whom 188 were successful. Is this strong evidence that the new system fails to meet the company's goal? A student's test of this hypothesis is shown. How many mistakes can you find?

$$H_0: \hat{p} = 0.96$$

$$H_A: \hat{p} \neq 0.96$$

$$\text{SRS, } 0.96(200) > 10$$

$$\frac{188}{200} = 0.94; \quad SD(\hat{p}) = \sqrt{\frac{(0.94)(0.06)}{200}} = 0.017$$

$$z = \frac{0.96 - 0.94}{0.017} = 1.18$$

$$P = P(z > 1.18) = 0.12$$

There is strong evidence that the new instructions do not work.

12. **Got milk?** In November 2001, the *Ag Globe Trotter* newsletter reported that 90% of adults drink milk. A regional farmers' organization planning a new marketing campaign across its multicounty area polls a random sample of 750 adults living there. In this sample, 657 people said that they drink milk. Do these responses provide strong evidence that the 90% figure is not accurate for this region? Correct the mistakes you find in a student's attempt to test an appropriate hypothesis.

$$H_0: \hat{p} = 0.9$$

$$H_A: \hat{p} < 0.9$$

$$\text{SRS, } 750 > 10$$

$$\frac{657}{750} = 0.876; \quad SD(\hat{p}) = \sqrt{\frac{(0.88)(0.12)}{750}} = 0.012$$

$$z = \frac{0.876 - 0.90}{0.012} = -2$$

$$P = P(z > -2) = 0.977$$

There is more than a 97% chance that the stated percentage is correct for this region.

13. **Dowsing.** In a rural area, only about 30% of the wells that are drilled find adequate water at a depth of 100 feet or less. A local man claims to be able to find water by "dowsing"—using a forked stick to indicate where the well should be drilled. You check with 80 of his customers and find that 27 have wells less than 100 feet deep. What do you conclude about his claim?
- Write appropriate hypotheses.
 - Check the necessary assumptions.
 - Perform the mechanics of the test. What is the P-value?
 - Explain carefully what the P-value means in this context.
 - What's your conclusion?

21. **Law School.** According to the Law School Admission Council, in the fall of 2006, 63% of law school applicants were accepted to some law school.⁴ The training program *LSATisfaction* claims that 163 of the 240 students trained in 2006 were admitted to law school. You can safely consider these trainees to be representative of the population of law school applicants. Has *LSATisfaction* demonstrated a real improvement over the national average?
- What are the hypotheses?
 - Verify that the conditions are satisfied and find the P-value.
 - Would you recommend this program based on what you see here? Explain.

24. Scratch and dent. An appliance manufacturer stockpiles washers and dryers in a large warehouse for shipment to retail stores. Sometimes in handling them the appliances get damaged. Even though the damage may be minor, the company must sell those machines at drastically reduced prices. The company goal is to keep the level of damaged machines below 2%. One day an inspector randomly checks 60 washers and finds that 5 of them have scratches or dents. Is this strong evidence that the warehouse is failing to meet the company goal? Test an appropriate hypothesis and state your conclusion. Be sure the appropriate assumptions and conditions are satisfied before you proceed.

25. Twins. In 2001 a national vital statistics report indicated that about 3% of all births produced twins. Is the rate of twin births the same among very young mothers? Data from a large city hospital found that only 7 sets of twins were born to 469 teenage girls. Test an appropriate hypothesis and state your conclusion. Be sure the appropriate assumptions and conditions are satisfied before you proceed.

26. Football 2006. During the 2006 season, the home team won 136 of the 240 regular-season National Football League games. Is this strong evidence of a home field advantage in professional football? Test an appropriate hypothesis and state your conclusion. Be sure the appropriate assumptions and conditions are satisfied before you proceed.