

28. **Legal Music.** A random sample of 168 students were asked how many songs were in their digital music library and what fraction of them were legally purchased. Overall, they reported having a total of 117,079 songs, of which 23.1% were legal. The music industry would like a good estimate of the fraction of songs in students' digital music libraries that are legal.
- Think carefully. What is the parameter being estimated? What is the population? What is the sample size?
 - Check the conditions for making a confidence interval.
 - Construct a 95% confidence interval for the fraction of legal digital music.
 - Explain what this interval means. Do you believe that you can be this confident about your result? Why or why not?
32. **Hiring.** In preparing a report on the economy, we need to estimate the percentage of businesses that plan to hire additional employees in the next 60 days.
- How many randomly selected employers must we contact in order to create an estimate in which we are 98% confident with a margin of error of 5%?
 - Suppose we want to reduce the margin of error to 3%. What sample size will suffice?
 - Why might it not be worth the effort to try to get an interval with a margin of error of only 1%?

5. **Conclusions.** A catalog sales company promises to deliver orders placed on the Internet within 3 days. Follow-up calls to a few randomly selected customers show that a 95% confidence interval for the proportion of all orders that arrive on time is $88\% \pm 6\%$. What does this mean? Are these conclusions correct? Explain.

- a) Between 82% and 94% of all orders arrive on time.
- b) 95% of all random samples of customers will show that 88% of orders arrive on time.
- c) 95% of all random samples of customers will show that 82% to 94% of orders arrive on time.
- d) We are 95% sure that between 82% and 94% of the orders placed by the customers in this sample arrived on time.
- e) On 95% of the days, between 82% and 94% of the orders will arrive on time.

7. **Confidence intervals.** Several factors are involved in the creation of a confidence interval. Among them are the sample size, the level of confidence, and the margin of error. Which statements are true?

- a) For a given sample size, higher confidence means a smaller margin of error.
- b) For a specified confidence level, larger samples provide smaller margins of error.
- c) For a fixed margin of error, larger samples provide greater confidence.
- d) For a given confidence level, halving the margin of error requires a sample twice as large.

23. **Only child.** In a random survey of 226 college students, 20 reported being “only” children (with no siblings). Estimate the proportion of students nationwide who are only children.
- Check the conditions (to the extent you can) for constructing a confidence interval.
 - Construct a 95% confidence interval.
 - Interpret your interval.
 - Explain what “95% confidence” means in this context.

35. **Pilot study.** A state’s environmental agency worries that many cars may be violating clean air emissions standards. The agency hopes to check a sample of vehicles in order to estimate that percentage with a margin of error of 3% and 90% confidence. To gauge the size of the problem, the agency first picks 60 cars and finds 9 with faulty emissions systems. How many should be sampled for a full investigation?